e-Proceedings of the 6th International Conference on Digital Innovation - Blockchain and Fintech

Editors
Ms. Neerushah Subarimaniam
Dr. Thanigaivel R Krishnan
Ms. Sundary N. Rajagopal
Ms. Amirah Huzveen Binti Mohd Parveen

VENUE: NTTU, HO CHI MINH CITY, VIETNAM
DATE: 21ST - 22ND JUNE 2023
THE 6TH INTERNATIONAL CONFERENCE ON
DIGITAL INNOVATION – BLOCKCHAIN AND FINTECH
Published by:

Malaysia University of Science and Technology (MUST)
Block B, Encorp Strand Garden Office
No. 12, Jalan PJU 5/5, Kota Damansara
47810 Petaling Jaya, Selangor.

© Copyright 2023, ICDI-BF2023 – International Conference

All rights reserved. No part of this proceedings may be reproduced, stored in retrieval system, transmitted, in any forms or any means, without the prior permission from Nguyen Tat Thanh University (NTTU) and Malaysia University of Science and Technology (MUST).

DISCLAIMER:

The 6th International Conference on Digital Innovation – Blockchain and Fintech (ICDI-BF2023) proceedings is an initial academic exercise promoted to provide opportunities to researchers, academicians, and students to disseminate their research findings.

The conference committee has taken all reasonable care in the preparation and compilation of the information contained in this conference proceedings. The editors of the proceedings hereby confirm that the papers published in this conference proceedings were accepted in accordance with requirements stated by the conference committee.

The editors have good faith in all the authors and presenters who have submitted papers to the ICDI-BF2023 proceedings in terms of the preservation of the accuracy, validity, and reliability of any information published in the ICDI-BF2023 proceedings.

The editors wish to emphasize that the committee is NOT responsible for any research misconducts leading to plagiarism, manipulation of data, fabrication of data, republication, and etc in the papers. The conference committee has agreed to accept manuscripts up to a certain acceptable similarity index percentage. Hence, the conference committee herein expressly disclaims all and any liability or responsibility to readers for any loss or damage of any kind incurred as a result of the use of this conference proceedings as your reference.
Preface

Malaysia University of Science and Technology (MUST) coordinates with Nguyen Tat Thanh University (NTTU) to organize ‘The 6th International Conference on Digital Innovation – Blockchain and FinTech’ at NTT University, Ho Chi Minh City.

The latest edition of the conference focuses on the Blockchain and FinTech. Themed ‘Energising Connectivity’, the 6th edition embraces the country's aspiration to bring together academia, industry, and government to explore the latest trends and developments in rapidly evolving fields such as Management, Blockchain, FinTech, Finance, Marketing, Information Technology & Telecommunication; and Transportation and Logistics.

Conference Objectives

Nguyen Tat Thanh University (NTTU), Vietnam, and Malaysia University of Science and Technology (MUST), Malaysia, are co-organizing the 6th International Conference on Digital Innovation - Blockchain and FinTech with the shared goal of collaborating to strengthen educational advantages. The primary purpose of this collaboration is to educate and nurture professional growths among experts, researchers, entrepreneurs, and lecturers.

The conference focuses on the following areas:

- Management
- Blockchain
- FinTech
- Finance
- Marketing
- Transportation and Logistics
- Information Technology and Telecommunication

This conference will undoubtedly aid both industry and academia by bringing together some of the brightest minds in the blockchain and fintech industries from all over the world.
Ms. Nguyen Mai Lan  
Honourable Chairwoman  
Nguyen Tat Thanh University

Nguyen Tat Thanh University (NTTU) embraces the mission of training highly qualified human resources who are locally and internationally competent, with solid entrepreneurial knowledge, skills, and an entrepreneurial spirit, through training, applied research, technology transfer, and community services based on strategic alliances with enterprises and research institutes that meet local and international standards, demands, and strict requirements of the Industry 4.0.

We are fully aware of the unpredictable and pressing scenarios influencing international economic integration and higher education development, particularly in the Blockchain and FinTech industries, as we are driven by the direction of high-quality workforce provision and research orientation towards the ever-changing challenges all over the world.

One of the urgent solutions to these challenges is to deal with the congestion of commercial cooperation and regional and international goods export and import activities, attracting renovation and innovation in Blockchain and FinTech. Given this, the International Conference on Digital Innovation - Blockchain and FinTech, which will be held at Nguyen Tat Thanh University and will feature experts, researchers, enterprises, and lecturers sharing their expertise, research results, analysis, forecasts, and best practices in this industry, will be regarded as significant contributors to universal readiness for the world's uncertainty and unpredictability.
Professor Dr. Premkumar Rajagopal  
Program Chair  
Malaysia University of Science and Technology

Malaysia University of Science and Technology (MUST) is honored to host the 6th International Conference on Digital Innovation - Blockchain and FinTech in 2023. The theme of the current conference is “Blockchain and FinTech”. The contribution of industry professionals, who would offer insightful feedback to the scholars, partners, and academicians, is a key distinguishing feature of the conference. On the contrary, Blockchain Technology is reckoned for its disrupting financial institutions in new methods radically where it creates an entire new market and avenue to bank the unbanked rather than replacing the existing ones.

Similarly, the abrupt shift in digital innovation, which occurs almost immediately in some parts of the world, has less of an impact now than it had centuries ago. Therefore, to create the "ripple effect" in the market, it is necessary to rethink, recognize, and identify the paradigm change to maintain market agreement. Thus, schematic restructuring cannot be attained through self-realization; it is instead achieved through personalized learning with profound experts, scholars, and individuals who have firsthand knowledge of the processes required to have such an impact.

Hence, the current conference is being organized with these goals in mind, ensuring a fruitful and meaningful outcome for every individual involved. The university expresses heartfelt gratitude to the dedicated organizing committee and the scholars who contributed the manuscripts. We believe that the conference will pave the way for academic and industry partners to collaborate and elevate the world of research and development, with the goal of fostering benevolent growth in the future. Let us endure these immersive moments. Thank you.
THE 6TH INTERNATIONAL CONFERENCE ON
DIGITAL INNOVATION – BLOCKCHAIN AND FINTECH

Steering Committee

Honourable Chair: Ms. Nguyen Mai Lan (NTTU)

Program Chair: Professor Dr. Premkumar Rajagopal (MUST)
: Dr. Thai Hong Thuy, Khanh (NTTU)

Program Co-Chair: Dr. Nor Nor Bakhriah Sarbani
: Dr. Khairir Khalil

Publication Chair: Professor Dr. Geoffrey Alan Williams
: Professor Dr. Sellappan Palaniappan
: Dr. Anthony Vaz

Secretariat: Dr. Nur Nadirah Mohamad Ishak

Working Committee

Paper Review Chair: Professor Dr. Shaheen Mansori

Paper Review and Acceptance: Dr. Vikneswary Suresh
: Ts Dr. Asiah Lokman

Proceedings Editorial Board: Ms. Neerushah Subarimaniam
: Dr. Thanigaivel R Krishnan
: Ms. Sundary N. Rajagopal
: Ms. Amirah Huzveen Binti Mohd Parveen

Proceedings Proofreading and Editing: Ms. Sundary N. Rajagopal
: Mr. Vincent Paul Jr Aloysious Anthony
: Mr. Sophyan Hakim Bin Mohd Hakim
: Ms. Siti Nur Illiyeen Zulkiflie
: Ms. Nurhazwani Binti Kauwi
: Ms. Siti Nur Syafiqah Binti Gazali

Proceedings Reviewers: Associate Professor Dr. Harwindar Singh
: Dr. Jerry Chow Tong Wooi
: Dr. Kamal Abd Razak
: Dr. Nur Nadirah Mohamad Ishak
: Dr. Phan Bun Gia Thuy
: Dr. Vijayan Ramasamy
: Professor Dr. Geoffrey Williams
: Associate Professor Dr. Khashayar Yazdani
: Dr. Ma Tin Cho Mar
: Dr. Wisuwat Wannamakok
: Ts Mr. Shanmuga Pillai Murutha Muthu
: Dr. Ang Ling Weay
: Dr. Asiah Lokman
: Professor Dr. Nor Adnan Yahaya
: Professor Dr. Sellappan Palaniappan
Website Update and Maintenance: Ms. Gomathi Packiry
          : Mr. Hafiz Faqrullah Bin Mazlan

Conference Kit, Logistics, and Facilities: Ms. Nurul Sharafina Binti Abdul Gani
          : Ms. Norliana Fatin Kamaruddin

Communication, Publicity, Program Book, and Hybrid Linkages: Mr. Muhammad Rasydan Bin Ma’at
          : Ms. Siti Nur Iliyeeen Zulkiflie
          : Ms. Suganti Vesovalinggan
          : Ms. Siti Nur Syafiqah Binti Gazali

Venue, Plan Execution, and Presentation: Ms. Thanh Tram
          : Mr. Nguyen Ngoc Hoa
          : Ms. Nguyen Cao Anh

Finance: Mr. Thanga Thurai Vengadasalam
          : Ms. Suriati Mamat

Parallel Sessions and Moderators: Professor Emeritus Dr. Barjoyai Bardai
          : Dr. Nur Nadirah Binti Mohd Ishak
          : Ms. Sundary N. Rajagopal
          : Ms. Suganti Vesovalinggan
          : Professor Dr. Geoffrey Alan Williams
          : Dr. Nor Bakhriah Binti Sarbani
          : Ms. Gomathi Packiry
          : Ms. Siti Nur Iliyeeen Zulkiflie
          : Dr. Khairir Khalil
          : Dr. Thanigaivel R. Krishnan
          : Ms. Nurhazwani Binti Kauwi
          : Ms. Siti Nur Syafiqah Binti Gazali
          : Professor Ts Dr. Sellappan Palaniappan
          : Ms. Neerushah Subarimaniam
          : Ms. Bavane Satyaveanthan
          : Mr. Muhammad Rasydan Bin Ma’at
# Table of Contents

<table>
<thead>
<tr>
<th>Num.</th>
<th>Paper Title</th>
<th>Page Num.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Divulgence on the Intention to Adopt Digital Banking Landscape in Malaysia by Applying Technology Acceptance Model: A Conceptual Framework</td>
<td>2 to 9</td>
</tr>
<tr>
<td></td>
<td>Pavithra Gopalakrishnan &amp; M. Vikneswary Suresh</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Factors Influencing User’s Loyalty Towards Electronic Wallet: A Case Study of Vietnam</td>
<td>10 to 20</td>
</tr>
<tr>
<td></td>
<td>Tram Nguyen Thi Thanh, Khanh Thai Hong Thuy, &amp; Phuong Thai Ngoc Truc</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>An Empirical Study about the Awareness of E-Wallet using in Vietnam</td>
<td>21 to 28</td>
</tr>
<tr>
<td></td>
<td>Phuong Thai Ngoc Truc, Khanh Thai Hong Thuy, &amp; Tram Nguyen Thi Thanh</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Determinants of Stock Price Volatility in Vietnamese Listed Commercial Banks</td>
<td>29 to 40</td>
</tr>
<tr>
<td></td>
<td>Hung Nguyen Thanh</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Impact of Blockchain Technology on Accounting Information Systems</td>
<td>41 to 49</td>
</tr>
<tr>
<td></td>
<td>Le Thi Cam Dung, Thai Hong Thuy Khanh, &amp; Nguyen Thi Hai</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Research on the Trend of Cryptocurrency Development in Vietnam in the Digital Age: Situation and Solutions</td>
<td>50 to 58</td>
</tr>
<tr>
<td></td>
<td>Giang Tran Thi Huong, Khanh Thai Hong Thuy, &amp; Khoa To Le Nguyen</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>A Preliminary Study on Blockchain Implementation in Sri Lanka Banking Sector</td>
<td>59 to 67</td>
</tr>
<tr>
<td></td>
<td>Liyanamahadura Ruchira De Silva &amp; Nor Adnan Yahaya</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Exploring the Potential of Blockchain Technology in Addressing Challenges in Warehouse Operations: A Mixed-Methods Study in Malaysia</td>
<td>68 to 78</td>
</tr>
<tr>
<td></td>
<td>Narayanasamy Rajendran, Anthony Vaz, &amp; Gomathi Packiry</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Streamlining Logistics through Smart Contracts: Evaluation Perceived Benefits, Risks, and Intention to Use in the Malaysian Logistics Industry</td>
<td>79 to 87</td>
</tr>
<tr>
<td></td>
<td>M. Vikneswary Suresh, Thiagarajan Marappan, Pandiyan Vadivelu, &amp; Vimala Martham Muthu</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Determinants of Individual’s Behavior to Adopt Central Bank Digital Currency: Evidence from Vietnam</td>
<td>88 to 102</td>
</tr>
<tr>
<td></td>
<td>Thuy Tran Thi &amp; Khanh Thai Hong Thuy</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Embedded Finance in Vietnam Development Trends, Opportunities, and Challenges</td>
<td>103 to 115</td>
</tr>
<tr>
<td></td>
<td>Hang Nguyen Thi Thu, Khanh Thai Hong Thuy, &amp; Anh Nguyen Lan</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Factors Affecting Customer's Intention to Use Self-Service Banking: A Case Study in Vietnam</td>
<td>116 to 124</td>
</tr>
<tr>
<td></td>
<td>Binh Vu Duc &amp; Chau Tran Pham Hua</td>
<td></td>
</tr>
<tr>
<td>No.</td>
<td>Title</td>
<td>Authors</td>
</tr>
<tr>
<td>-----</td>
<td>----------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>13</td>
<td>The Impact of Digital Banking on the Performance of Commercial Banks in Vietnam by using the CAMELS Ratio Framework</td>
<td>Hoang Trinh Xuan, Khanh Thai Hong Thuy, &amp; Lan Nguyen Mai</td>
</tr>
<tr>
<td>14</td>
<td>Factors Affecting Intentions and Behavior of Students to use Mobile Payment</td>
<td>Thuy Gia Phan-Bui, Hoa Ngoc Nguyen, &amp; Khanh Thuy Hong Thai</td>
</tr>
<tr>
<td>15</td>
<td>Factors Impacting E-Wallet User Acceptance for Customers of Small Businesses towards a Cashless Society in Malaysia: The Moderating Role of Government Implementation and Enforcement</td>
<td>Anthony Vaz &amp; Deepak Ram</td>
</tr>
<tr>
<td>16</td>
<td>Hedonic Valuation Technique and Regression Model Valuation of Land in Ho Chi Minh City</td>
<td>Khanh Thai Hong Thuy, Hai Nguyen Xuan, &amp; Trang Le Thi Doan</td>
</tr>
<tr>
<td></td>
<td><strong>SUPPLY CHAIN, TRANSPORTATION AND LOGISTICS</strong></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Internet of Things (IoT) Impact on Oman's Road Freight Sector: The Importance of Perceived Utility</td>
<td>Shahid Imran, Nor Bakhriah Binti Sarbani, &amp; Charles Tsikada</td>
</tr>
<tr>
<td>18</td>
<td>Lack of Real Talent in the Supply Chain Industry</td>
<td>Manuj R. Nair Ramachandran &amp; Nur Nadirah Mohamud Ishak</td>
</tr>
<tr>
<td>19</td>
<td>Port Facilities Threats and Preventive Security Measures: A Case Study on Port Klang, Malaysia</td>
<td>Balachandar V. Rajoo, Murali Raj Deva Raja, Neerushah Subarimaniam, Sundary N. Rajagopal, &amp; Vincent Paul Jr Aloysious Anthony</td>
</tr>
<tr>
<td>20</td>
<td>Factors Affecting Customer Satisfaction on Logistics Services during the Covid-19 Pandemic - as a Case Study of Headway Joint Stock Company</td>
<td>An Quanch &amp; M. Vickneswary Suress</td>
</tr>
<tr>
<td>21</td>
<td>Integrated Supply towards Maintenance Repair Overhaul (MRO) in the Aviation Industry</td>
<td>Chandravathanah Nadarajan</td>
</tr>
<tr>
<td></td>
<td><strong>MANAGEMENT AND MARKETING</strong></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Capital Cost and Profitability</td>
<td>Nguyen Cao Anh &amp; Thai Hong Thuy Khanh</td>
</tr>
<tr>
<td>23</td>
<td>Bank Risk-Taking and Market Risk: An Evidence of the Vietnamese Stock Market</td>
<td>Nguyen Cao Anh, Thai Hong Thuy Khanh, Tran Thi Thuy, &amp; Nguyen Thanh Hung</td>
</tr>
<tr>
<td>24</td>
<td>The Evolving Trend, Development, and Strategies for Effective Knowledge Management in the Digital Era</td>
<td>Tong Wooi, Chow</td>
</tr>
<tr>
<td>25</td>
<td>Application of Neuro Linguistic Programming in Impacting the Behaviors of Students</td>
<td>Thanga Thurai Vengadasalam &amp; Khairir Khalil</td>
</tr>
<tr>
<td>No.</td>
<td>Title</td>
<td>Authors</td>
</tr>
<tr>
<td>-----</td>
<td>----------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------</td>
</tr>
<tr>
<td>26</td>
<td>Determinant Factors of Corporate Sustainability Information Disclosure: An Empirical Study of Vietnamese Listed Companies</td>
<td>Tram Nguyen, Thi Thanh &amp; Toan Pham Ngor</td>
</tr>
<tr>
<td>27</td>
<td>5Q Factors for Professional and Personal Success</td>
<td>Khairir Khalil &amp; Barjoyai Bardai</td>
</tr>
<tr>
<td>28</td>
<td>Hybrid Workplace Management and the Future of Work</td>
<td>Douglas Kaborni &amp; Vijayan Ramasamy</td>
</tr>
<tr>
<td>29</td>
<td>Optimal Choice of Funding Equity or Debt: An Empirical Evidence in Industry of Vietnamese Plastics and Rubber</td>
<td>Thai Hong Thuy Khanh, Nguyen Cao Anh, Nguyen Mai Lan &amp; Nguyen Thanh Hai</td>
</tr>
<tr>
<td>30</td>
<td>Tax Management in E-Commerce from Theory to Practice in Vietnam and Learnings</td>
<td>Sang Huu Vo, Khanh Thai Hong Thuy, &amp; Thuy Pham Thi Thu</td>
</tr>
<tr>
<td>32</td>
<td>The Effect of Social Media Marketing Activities (SMMAs) and their Impact on Brand Awareness to Small Businesses</td>
<td>Gomathi Packiry</td>
</tr>
<tr>
<td>33</td>
<td>Exploring the Determinants of Purchasing Behavior among Students at Private Higher Education Institutions</td>
<td>Balanchandar V Rajoo, Vijayan Ramasamy, Neerushah Subarimaniam, &amp; Sundary N. Rajagopal</td>
</tr>
<tr>
<td>34</td>
<td>AI Chatbots in Southeast Asia's Financial Services: Balancing Consumer Protection and Privacy in the Digital Age</td>
<td>Ma Tin Cho Mar</td>
</tr>
<tr>
<td>36</td>
<td>Determining the Planning Phase Affecting the Project Performance in Libyan Companies</td>
<td>Bin Salim Mohammed Albahloul Almukhtar &amp; Vijayan Ramasamy</td>
</tr>
<tr>
<td>37</td>
<td>The Moderating Role of Social Media Capability in the Relationship between Interactivity, Reliability, and Technical Knowledge with Customer Purchase Intention in Non-Life Insurance in Vietnam</td>
<td>Xuan-Nhi Nguyen &amp; Anh-Quoc Truong</td>
</tr>
<tr>
<td>38</td>
<td>The Impact of High Inflation in the United States of America on the Bilateral Trade Balance with Vietnam from the Perspective of Real Exchange Rate</td>
<td>Nguyen Thanh Trung</td>
</tr>
<tr>
<td>39</td>
<td>Socio-Cultural Factors of Malaysia's Construction Industry that Procrastinate the Implementation of Construction 4.0</td>
<td>Chee Gin Liong &amp; HJ Kamal Abd Razak</td>
</tr>
<tr>
<td></td>
<td>Title</td>
<td>Authors</td>
</tr>
<tr>
<td>---</td>
<td>----------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>40</td>
<td>Relationship between Factors of New Ways of Working (NWOWS) and Employee Productivity Measures</td>
<td>Samuel Ding Min Lian &amp; Khairir Khalil</td>
</tr>
<tr>
<td>41</td>
<td>Using Neuromarketing in Food Self-Sufficiency: A Literature Review</td>
<td>Akalpita Tendulkar &amp; Nurhazwani Binti Ab Kauwi</td>
</tr>
<tr>
<td>42</td>
<td>Telecommunication Industry Impact on Digital Education and Standard of Living on Sustainable Development in Sri Lanka</td>
<td>S. K. C. Raklani Wickramasinghe, Shaheen Mansori, &amp; Kamal Abd Razak</td>
</tr>
<tr>
<td>43</td>
<td>The Factor Affecting Childcare Services on Parents' Satisfaction</td>
<td>Siti Fatimah Azzahra Hashim</td>
</tr>
<tr>
<td>44</td>
<td>Moderator Role of Trust Ties and Environmental Dynamism in the Relationship of Entrepreneurial Orientation-Performance in a Developing Economy: A Study of B2B Relationships of SMEs in Malaysia</td>
<td>Nur Nadirah Mohamad Ishak &amp; Tapas Mishra</td>
</tr>
<tr>
<td>45</td>
<td>Effective Classroom Management and the Academic Performance of Students at Secondary Schools in the Mentakab District</td>
<td>Vimala Devi Martham Muthu &amp; M. Vickneswary Suresh</td>
</tr>
<tr>
<td>46</td>
<td>Understanding Digital Innovations in Omnichannel Retail Ecosystem: The Role of In-Store Technology in Enabling the Survival of Physical Retails</td>
<td>Ahmad Alashmawy &amp; Harwindar Singh</td>
</tr>
<tr>
<td>47</td>
<td>Attitudes Toward Seeking Professional Psychological Help: A Conceptual Paper</td>
<td>Noor Syamilah Zakaria, Neerushah Subarimaniam, M. Iqbal Saripan, Wan Marzuki Wan Jaafer, Khoo Bee Lee, &amp; Rohani Che Hashim</td>
</tr>
<tr>
<td>48</td>
<td>Counseling Ethics Competence of Malaysian Registered Counselors</td>
<td>Noor Syamilah Zakaria, Neerushah Subarimaniam, Wan Marzuki Wan Jaafer, Ahmad Fauzi Mohd Ayub, &amp; M. Iqbal Saripan</td>
</tr>
<tr>
<td>49</td>
<td>How Important are Trust-Based Ties to Businesses? A Meta-Analysis of the Association between Inter-Organizational Trust and Constructive Behaviours</td>
<td>Nur Nadirah Mohamad Ishak &amp; Tapas Mishra</td>
</tr>
</tbody>
</table>

**INFORMATION TECHNOLOGY AND TELECOMMUNICATIONS**

<table>
<thead>
<tr>
<th></th>
<th>Title</th>
<th>Authors</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>A Comprehensive Survey of Techniques for Lung Cancer Diagnosis and Prediction</td>
<td>Danish Jamil, Maheen Fatima, SMH Rizvi, &amp; Sellappan Palaniappan</td>
<td>531 to 538</td>
</tr>
<tr>
<td>51</td>
<td>Enhancing Skin Cancer Diagnosis through Deep Transfer Learning on Dermoscopic Images</td>
<td>Danish Jamil, Farheen Qazi, Dure Shahwar, Sellappan Palaniappan, &amp; Asiah Lokman</td>
<td>539 to 561</td>
</tr>
<tr>
<td>52</td>
<td>Artificial Intelligence for Human Detection and Traceability in Video Surveillance: A Commercial Building Perspective</td>
<td>Okundaye Jerry Osasuyi &amp; Nor Adnan Yahaya</td>
<td>562 to 571</td>
</tr>
<tr>
<td>53</td>
<td>Foundation Models in Text and Image Generation: A Literature Review on Capabilities, Limitations, Concerns, and Mitigations</td>
<td>562 to 571</td>
<td></td>
</tr>
<tr>
<td>----</td>
<td>---------------------------------------------------------------------------------------------------------------------------------</td>
<td>-------------</td>
<td></td>
</tr>
<tr>
<td>Chan Jia Yee &amp; Khashayar Yazdani</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>54</th>
<th>The Impact of Cyber-Security Issues on Social Media Usage in Organizations: A Case Study of Paradise Estate</th>
<th>572 to 585</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nkiruka Ifeanyi Okoye &amp; Nor Adnan Yahaya</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>55</th>
<th>Stomach Cancer Diagnosis and Prediction using AI Models and Data Mining Techniques: A Review of Five-Year Study</th>
<th>586 to 590</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shanmuga Pillai Murutha Muthu &amp; Sellappan Palaniappan</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>56</th>
<th>ChatGPT and Education: An Evidence-Based Bibliometric Analysis</th>
<th>591 to 595</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ang Ling Weay, Sellappan Palaniappan, Zhang Yu Jiao, &amp; Faiza Rini</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
BLOCKCHAIN AND FINTECH
Divulgence on the Intention to Adopt Digital Banking Landscape in Malaysia by Applying Technology Acceptance Model: A Conceptual Framework

Pavithra Gopalakrishnan* & M. Vikneswary Suresh

*Veritas University College, Malaysia

bMalaysia University of Science and Technology, Malaysia

*pavitaro95@gmail.com

Abstract: Fintech, or financial technology, is transforming the banking industry for the better across the globe, thanks to businesses that have novel business strategies, cutting-edge goods, and cutting-edge services. Market growth for digital banking platforms was anticipated to grow at an annualized rate of 20.5% from 2022 to 2030. The COVID-19 pandemic has increased online banking activity and forced companies and individuals who had previously resisted internet banking to adopt digital banking as their new norm. The adoption of digital banking has become increasingly prevalent in the global financial landscape, offering convenience, efficiency, and accessibility to customers. In Malaysia, the intention to adopt digital banking services has gained significant attention, prompting the need for a comprehensive framework to understand the factors influencing this adoption. This paper presents a conceptual framework based on the Technology Acceptance Model (TAM) to investigate the intention to adopt the digital banking landscape in Malaysia. The proposed framework incorporates key constructs from the TAM, including Perceived Usefulness and Perceived Ease of Use, along with additional factors specific to the Malaysian context. These factors include Privacy and Trust. By integrating these elements, the conceptual framework aims to provide a holistic understanding of the intention to adopt digital banking among Malaysian consumers.

Keywords: fintech, digital banking, financial technology, digital economy, TAM

1. Introduction

The term "digital banking" refers to traditional banking services which include withdrawals, money transfers, term deposits, demand deposits, and savings being digitized and incorporated into a single digital banking application which will be accessible via the internet and mobile devices (Nguyen et al., 2018). This gives consumers the ability to take care of their financial matters at any time and from any location. This may involve the maintenance of accounts, the payment of bills, the transfer of money, the application for loans, and many other financial activities (Bordoloi, 2021).

Within the past few years, financial authorities in Singapore, Malaysia, the Philippines, and Indonesia have issued licenses to new entrants in each of those countries markets. Both Thailand and Vietnam are now in the process of preparing for their own debuts into the world of digital banking (Kaur & Chakraborty, 2022). The digitization of financial services surged during the pandemic, and clients had little alternative but to adopt the usage of digital channels owing to COVID-19 mobility constraints. Customers became considerably more aware of digital banking features than they had been previously (Mohsin et al., 2022).

The Technology Acceptance Model (TAM), which was developed and modified by Davis in 1989, is a prominent paradigm that was originally utilised in communications and information science research (Ranellucci et al., 2020). TAM explains how consumers adopt technology as a function of perceived ease of use and perceived usefulness. External variables influence these perceptions as every individual
are privy to their own perceptions and that influence their attitudes toward technology, which in turn influence their behavioural intentions to utilise and actual usage of technology (Davis, 1989). In the context of Malaysian customers, the overall understanding and acceptance of fintech services are fundamentally unknown and insufficient (Jin et al., 2019).

Thus, this paper begins by divulging the history of the digitization of Banks in Southeast Asia, subsequently Malaysia. It further discusses the challenges encountered by banks and Fintech businesses in the process of digitalizing financial services and identifies opportunities presented by the digitization of banks. Importantly, this paper focuses on independent variables, the perceived ease of use, perceived usefulness, trust, and privacy against the dependent variable which is the intention to adopt the digital banking landscape in Malaysia. The tripartite research objectives are as follow (i) to investigate the current status of trust, privacy, ease of use, and usefulness of digital banking service users in Malaysia, (ii) to determine the critical predictors/determinants of intention to use digital banking service in among Malaysians and finally (iii) to investigate the mediating role of perceived ease of use and usefulness on the relationship between trust and privacy.

2. Literature Review

2.1 Digital Banking in Southeast Asia

Southeast Asia welcomed the services of digital banks as early as 2015 (Kaur & Chakraborty, 2022). Table 1 shows, the various digital banks marking their footprint in Southeast Asian countries from 2015 until 2022. This non-exhaustive list clearly proves the opportunity being grabbed by the countries and their governments. The advent of digital banks in Southeast Asia denotes the acknowledgment of the vast potential and prospects inherent in the digital economy. The aforementioned financial institutions utilise cutting-edge technology and digital platforms to provide their clientele with a wide array of banking services. This allows customers to conveniently engage in financial transactions through the use of mobile applications or online platforms. Digital financial institutions generally exhibit reduced operational expenses relative to conventional physical banks, thereby enabling them to offer more competitive financial products and services.

Table 1. Digital Banks Setting Sail in Southeast Asia

<table>
<thead>
<tr>
<th>Year</th>
<th>Month</th>
<th>Country</th>
<th>Digital Bank</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>August</td>
<td>Vietnam</td>
<td>timo</td>
</tr>
<tr>
<td>2016</td>
<td>August</td>
<td>Indonesia</td>
<td>Jenius</td>
</tr>
<tr>
<td>2016</td>
<td>November</td>
<td>Singapore</td>
<td>FlexM</td>
</tr>
<tr>
<td>2017</td>
<td>March</td>
<td>Philippines</td>
<td>eon</td>
</tr>
<tr>
<td>2017</td>
<td>August</td>
<td>Malaysia</td>
<td>bigpay</td>
</tr>
<tr>
<td>2018</td>
<td>January</td>
<td>Singapore</td>
<td>aspire</td>
</tr>
<tr>
<td>2018</td>
<td>December</td>
<td>Vietnam</td>
<td>OCTO</td>
</tr>
<tr>
<td>2018</td>
<td>December</td>
<td>Thailand</td>
<td>KBTG</td>
</tr>
<tr>
<td>2020</td>
<td>June</td>
<td>Philippines</td>
<td>Overseas Filipino Bank</td>
</tr>
<tr>
<td>2020</td>
<td>August</td>
<td>Vietnam</td>
<td>TNEX</td>
</tr>
<tr>
<td>2020</td>
<td>October</td>
<td>Thailand</td>
<td>Line Bank</td>
</tr>
<tr>
<td>2021</td>
<td>January</td>
<td>Vietnam</td>
<td>CAKE</td>
</tr>
<tr>
<td>2021</td>
<td>March</td>
<td>Indonesia</td>
<td>Bank Neo Commerce</td>
</tr>
<tr>
<td>2021</td>
<td>April</td>
<td>Philippines</td>
<td>tonik</td>
</tr>
<tr>
<td>2021</td>
<td>April</td>
<td>Indonesia</td>
<td>Jago</td>
</tr>
<tr>
<td>2022</td>
<td>May</td>
<td>Philippines</td>
<td>Maya Bank</td>
</tr>
<tr>
<td>2022</td>
<td>June</td>
<td>Singapore</td>
<td>ANEXT Bank, GLDB</td>
</tr>
<tr>
<td>2022</td>
<td>June</td>
<td>Philippines</td>
<td>uno</td>
</tr>
<tr>
<td>2022</td>
<td>July</td>
<td>Philippines</td>
<td>UnionDigital</td>
</tr>
<tr>
<td>2022</td>
<td>September</td>
<td>Singapore</td>
<td>GxS, trust</td>
</tr>
<tr>
<td>2022</td>
<td>September</td>
<td>Vietnam</td>
<td>PVcom Bank</td>
</tr>
<tr>
<td>2022</td>
<td>September</td>
<td>Indonesia</td>
<td>BNI</td>
</tr>
<tr>
<td>2022</td>
<td>October</td>
<td>Philippines</td>
<td>GOtyme</td>
</tr>
</tbody>
</table>

(Source: Whitesight 2022)
2.2 Digital Banking in Malaysia

The Bank Negara Malaysia announced the highly awaited digital banking framework on December 31, 2020, following a six-month public review period. Proposals for a digital banking framework were first revealed in March 2019 and applications were slated to open in the middle of 2020, but the framework's development encountered a stop as a result of COVID-19. With this, Malaysia joins an increasing number of Asian nations that are each implementing their own form of a digital banking infrastructure (Fintech News Malaysia, 2021).

Bank Negara Malaysia has created this framework for digital banks to provide financial services to underserved markets entirely or virtually entirely online. These new businesses with novel business strategies are anticipated to revitalize the banking sector to benefit the economy and individuals. This involves giving underserved and unserved markets meaningful access to and responsible use of relevant financial solutions (Bank Negara Malaysia, 2022).

The Financial Services Act of 2013 and the Islamic Financial Services Act of 2013 contain requirements that will need to be complied with by digital banks. These requirements include standards on prudential, Shariah, business conduct, and consumer protection, as well as anti-money laundering and countering the financing of terrorism (Bank Negara Malaysia, 2020).

Back in April 2022, Bank Negara Malaysia granted digital banking licenses to five consortiums after receiving a total of 29 applications. Malaysians own the majority stake in three out of the five consortia: the first is mobile carrier Axiata's fintech unit Boost Holdings; the second is Kuok Brothers, which partners with ride-hailing and food delivery giant Grab Holdings; and the third is a group led by Shopee owner Sea Group and a unit of YTL Corp., which is a Malaysian conglomerate. Additionally, the licenses were issued to groups that were headed by KAF Investment Bank and AEON Financial Service. (Mohsin et al., 2022)

2.3 Opportunities

Customers will be positioned at the center of what digital banks provide, and they will be provided innovative takes on the services and access points typically associated with traditional financial institutions (Ong, 2020). There is no need for traditional banks to maintain physical locations to provide banking and financial services because digital banks provide these options exclusively online. In addition to making it possible to carry out all banking transactions online, digital banks provide a range of cutting-edge and easily accessible services that are normally unavailable from traditional financial institutions. These services frequently make use of data collected from consumers (Chipman Koty, 2021).

Research that was conducted in 2019 by Google, Temasek, and Bain found that forty percent of persons in Malaysia were "underbanked," which means that their requirements for financial services were not being met, while fifteen percent of adults in Malaysia did not have a bank account. According to the figures provided by the government of Malaysia, eight percent of adults in Malaysia do not have a bank account. The government has high expectations that this number may be brought down to five percent by using digital banking (Chipman Koty, 2021). The use of digital banking has the potential to dramatically increase Malaysia's financial inclusion.

One of the most important objectives of Bank Negara Malaysia is to broaden people's access to financial services by developing an inclusive financial system that is user-friendly, has a high participation rate, encourages responsible behavior, and provides a high level of customer satisfaction and digital banking, without a doubt is one of the tactics utilized to achieve this objective (Gong & Hollins-Kirk, 2022).
2.4 Challenges

Research conducted in 2022 shows that eighteen percent of banks and nineteen percent of enterprises that provide financial technology services agreed that there is a threat posed by cyber security to the digitization of financial services. Because of the lack of certainty regarding risk management systems and the general resilience of most of the financial technology, the improvements in technology have created a new set of issues not only for the financial institutions themselves but also for the regulators and the clients. As more people switch to using digital banking, it is imperative that financial institutions take measures to safeguard their clients from cyber criminals. This will allow them to avoid suffering financial losses because of illicit transactions carried out using emerging technology (Mohsin et al., 2022).

According to a 2022 study, twenty percent of respondents are agreeing with the statement that the primary difficulties in digitalizing financial services encountered by banks and fintech businesses are connected to the legislation and supervisory requirements that are in place. The regulations governing online banking are constantly being updated. The potential benefits of digital banking in terms of customer experience, competition, and inclusiveness have been brought to the attention of regulatory agencies. Despite this, many authorities have been extremely cautious to prevent opportunism that may threaten both trust and the stability of the financial system. Traditional and digital banks are required to comply with the same rules worldwide; nevertheless, many governments have devised regulatory frameworks tailored expressly for digital banks (Mohsin et al., 2022).

2.5 Perceived Usefulness

Perceived usefulness refers to the degree to which an individual feels that utilising technology would enhance his performance and as per the TAM model, the perception of usefulness is one of the most influential variables in a person's decision to embrace technology (Davis, 1989). One of the two elements that might increase the adoption of digital banking among Generation Y in Malaysia, according to a study, is the perceived ease of use of the banking platform (Suhaimi & Hassan, 2018). Considering the influence of each of the independent variables on motivation to use mobile banking, a study from Nigeria found that only perceived usefulness had a significant positive effect on desire to use mobile banking, while other factors have no substantial influence on the variable being explained separately (Olaolu, 2022).

2.6 Perceived Ease of Use

Parallel to the perception of usefulness, the TAM model asserts that the perceived ease of use is a significant aspect in a person's acceptance of a specific technology. Perceived ease of use refers to the degree to which a person feels that utilizing techniques will need no physical or mental effort (Davis, 1989). Consequently, if the technology can be used without additional effort on the part of the user, adoption will be high (Purwanto & Budiman, n.d.). A recent study's findings indicated that perceived ease of use is the most significant indicator of Malaysians' behavioural intent to use digital banking services (Wen Ni, 2020). In addition, a study demonstrated that individuals are eager to embrace this technological shift if internet or digital banking makes their lives simpler (Rapidah et al., n.d.).

2.7 Trust

A person's confidence in the dependability and benevolence of another person or institution is trust, and in the context of online banking, trust is defined as the assurance a user has in an Internet banking service provider's capacity to deliver trustworthy services online (Rapidah et al., n.d.). A study from Vietnam asserts that the negative effect of trust on perceived risk implies that when customers have faith in a type of service, they feel safer and their perception of danger decreases (Nguyen, 2020). Evidence from Indonesia suggests that for consumers to want to use digital banking, they must trust that doing so would improve their everyday productivity (Kusumawati & Rinaldi, 2020).
2.8 Privacy

Privacy in digital banking is defined as a level of security in an electronic environment and the protection of consumer information, guaranteeing that the data utilised is not shared or used for other reasons (Martínez-Navalón et al., 2023). The reassurance given by service providers in terms of trust of the digital banking activities, will, undoubtedly, enhance the implementation of privacy and security for digital banking services (Pavithra & Geetha, 2021). Most customers are unaware of how their personal information or data will be handled or utilised, thus, sort of ambiguity is related with privacy and information security, which are seen as the hazards of e-commerce (Li et al., 2022). It is found that one of the most pivotal elements which influence the adoption of digital banking among retail customers in Oman is privacy (Aljawarneh & Alomari, 2018).

2.9 Relationship between Perceived Ease of Use and Trust

Previous research on the intention to adopt digital banking in Malaysia suggests that elements of the independent variables, especially perceived ease of use and trustworthiness, have become the most important determinants of online banking acceptability (Rapidah et al., n.d.). Further, perceived ease of use positively influenced the trust a customer has in online banking services (Al-Sharafi, Arshah et al., 2018). Based on these studies, the following is the formula for the first hypothesis:

\[ H_1: \text{Trust influences the perceived ease of use of digital banking services in Malaysia.} \]

2.10 Relationship between Perceived Ease of Use and Privacy

A previous study from India urges banks to take required efforts to enhance reliability and privacy which increases the perceived ease of use of the service (Kavitha & Gopinath, 2020). In addition, perceived ease of use is empirically supported by privacy given to users by service providers (Al-Sharafi, Arshah, et al., 2018).

Based on the research, the following is the formula for the second hypothesis:

\[ H_2: \text{Privacy influences the perceived ease of use of digital banking services in Malaysia.} \]

2.11 Relationship between Perceived Usefulness and Trust

The element of trust and reliability has a positive influential role on the perceived usefulness of digital banking services (Kusumawati & Rinaldi, 2020).

As such, the following is the formula for the third hypothesis:

\[ H_3: \text{Trust influences the perceived usefulness of digital banking services in Malaysia.} \]

2.12 Relationship between Perceived Usefulness and Privacy

It turns out that in the realm of government, the perceived usefulness of e-government in South Africa is equally affected by privacy concerns (Bayaga & Ophoff, 2019).

Thus, the following is the formula for the fourth hypothesis:

\[ H_4: \text{Privacy influences the perceived usefulness of digital banking services in Malaysia.} \]
2.12 Conceptual Framework

![Conceptual Framework](image)

*Figure 1. Conceptual Framework (Source: Davis, 1989)*

3. Research Method

The present study aims to achieve three primary research objectives. Firstly, it seeks to investigate the status of trust, privacy, ease of use, and usefulness among digital banking service users in Malaysia. Secondly, the study aims to determine the critical predictors/determinants of intention to use digital banking services among Malaysians. Lastly, the study endeavors to investigate the mediating role of perceived ease of use and usefulness in the relationship between trust and privacy. This study will employ a combination of descriptive and explanatory methodologies. The research methodology in question is widely recognised as "descriptor-explanatory." The proposed methodology aims to facilitate researchers in comprehending the present state of digital banking users in Malaysia. The study intends to identify the crucial determinants of usage intention while also examining the mediating influence of perceived ease of use and usefulness on the correlation between trust and privacy. The present study is geographically situated in Malaysia, with a focus on individuals aged 18 years and above as the unit of analysis.

Based on the data presented by the Department of Statistics Malaysia (DOSM, 2021), it can be inferred that the estimated number of adult individuals in Malaysia in the year 2021 was approximately 22.73 million. Hence, the acquired samples exhibit the capability to accurately depict the Malaysian adult population. The study will utilise a simple random sampling technique, whereby a subset of participants will be randomly selected from the identified population. The study will utilise quantitative methodology, with data being gathered through the dissemination of questionnaires. A self-administered questionnaire shall be disseminated through various social media platforms, including but not limited to WhatsApp, LinkedIn, Facebook, and Instagram. The data shall be analysed using IBM's Statistical Package for the Social Sciences (SPSS) version 28.

4. Conclusion and Future Research

This study provides a conceptual framework that establishes the foundation for future research on the interplay among trust, privacy, and the perceived ease of use and usefulness of digital banking services in Malaysia. The postulated hypotheses underscore the significance of trust and privacy in shaping the perceptions and experiences of customers with regard to these services. Through conducting empirical research in the field, a more profound comprehension of the determinants that impact user conduct can be attained, thereby facilitating the development and execution of digital banking services. The acquisition of this knowledge is crucial in cultivating customer confidence, augmenting privacy protocols, and optimizing the user interface, ultimately propelling the uptake and efficacy of digital banking solutions in Malaysia.
Acknowledgments

We would like to thank all the people who prepared and revised previous versions of this document.

References


Purwanto, E., & Budiman, V. (n.d.). Applying the technology acceptance model to investigate the intention to use e-health: A conceptual framework.


Factors Influencing User’s Loyalty Towards Electronic Wallet: A Case Study of Vietnam

Tram Nguyen Thi Thanh*, Khanh Thai Hong Thuyb & Phuong Thai Ngoc Trucc

Faculty of Finance and Accounting, Nguyen Tat Thanh University, Ho Chi Minh City, Vietnam

*ntttram@ntt.edu.vn

Abstract: The development of Fintech in Vietnam has grown stronger than ever under the effects of the pandemic. With the rapid evolution of technology, there has been a surge in the adoption of innovative payment methods, displacing traditional means and drawing greater scrutiny. One example is the emergence of sophisticated advanced payment apps, such as electronic wallet (e-wallet) implemented on cell phones of consumers, provided by the growth of flexible payment providers that try to suggest more incentives to retailers and consumers, than banks have done before. Thus, understanding the loyalty intention of E-wallet users is important. The aim of this study is to understand better the complexities of factors influencing e-wallet user’s satisfaction and loyalty. The data collected by surveying 350 users in Vietnam was analyzed using a Partial Least Squares - Structural Equation Modelling approach. The findings show that three factors including perceived usefulness, perceived trust and perceived ease of use of the E-wallet, have direct influences on user’s satisfaction and loyalty. This study also offers significant insights for policymakers and E-wallet service providers to develop appropriate strategies to enhance E-wallet services in Vietnam.

Keywords: e-wallet, satisfaction, loyalty, perceived usefulness, perceived trust, perceived ease of use, Vietnam

1. Introduction

Cashless payment through smartphones gained popularity in several developing countries such as Thailand, Vietnam, and Indonesia (Aji et al., 2020). One form of mobile payment alternative is e-wallet payment. An E-wallet is categorized as a form of pre-paid account to store money and can be used to perform transactions in the future. In this case, an e-wallet allows users to save virtual cash, store coupons or promotional offers, make payments, perform cash withdrawals, and perform money transfers. The E-wallet is used to purchase in both online and offline stores. Therefore, an E-wallet is often considered the most convenient payment tool.

According to the E-wallets in Vietnam report (2022), the transaction value of E-wallet in Vietnam increased steadily and rapidly throughout the years from 2017 to 2021, with the five largest e-wallets being: MoMo, Payoo, Moca, ZaloPay, and ViettelPay. Besides the impressive growth of the E-wallet market in Vietnam, the competition is becoming more and more dire moment. Many E-wallet providers are attracted to join the market every year, and the competition becomes tighter, focusing on customer acquisition. In this context, e-wallet providers should pay much attention to customer satisfaction and loyalty.

There have been many studies on the factors affecting the satisfaction and loyalty of e-wallet users such as Pambuko et al. (2021), Chalik and Faturohman (2022), and Karim et al. (2022). Particularly in Vietnam, the research on e-wallets has not received much attention, most of the studies usually focus on the acceptance phase of using e-wallets rather than the satisfaction evaluation phase, and continue to use the service (Nyugen et al., 2020; To & Trinh, 2021). Therefore, this study attempts to fill the research gap identified by focusing on understanding the factors affecting customer satisfaction and loyalty using e-wallets.
By addressing the above research objectives, the structure of the study includes the following sections: (1) Introduction; (2) Conceptual development; (3) Research methodology; (4) Results; (5) Discussion; and (6) Limitations and future research. Figure 1 shows the research process flow chart.

**Figure 1. The Research Process Flow Chart**

2. Conceptual Development

2.1 Conceptual Model

E-wallet is one of the financial technology products (Chalik & Faturohman, 2022). E-wallet is a type of electronic card used for transactions made online through a computer or a smartphone. Its utility is the same as a credit or debit card. An E-wallet needs to be linked with the individual’s bank account to make payment.

Figure 2 illustrates the proposed adoption model, based on the relationships established by hypotheses from previous research. The above discussion indicated the importance of three factors related to E-wallets, including perceived usefulness, perceived trust, and perceived ease of use in the understanding of user satisfaction and loyalty for E-wallet. Previous studies on customer satisfaction with E-wallets have suggested that satisfied customers are likely to continue using the service (Phuong et al., 2020; Zhou et al., 2018). Customer loyalty is considered to lead to repeat purchases, positive attitudes, intentions of continuing the affiliation and intentions of positive recommendation (Bruhn & Grund, 2000). In e-wallets, some studies had conducted to understand customer loyalty (Gupta & Singh, 2017;
Valencia & Layman, 2021). However, there is a lack of studies investigating customer loyalty and satisfaction with E-wallets in Vietnam.

2.2 Research Hypotheses

In existing studies exploring technology acceptance, the technology acceptance model (TAM) has been widely used to postulate that perceived usefulness and ease of use of new technology shape the attitude of users toward the acceptance of new technology (Bagla & Sancheti, 2018). Perceived usefulness is defined as the degree to which a person believes that using a particular system will enhance his or her job performance (Davis, 1989). Perceived ease of use is defined as the degree to which a person believes that the system can be used without much mental effort (Davis, 1989). Perceived usefulness and perceived ease of use significantly affect customer satisfaction in the mobile e-commerce context (Shao & Yin, 2019). Perceived usefulness and ease of use are correlated positively with customer satisfaction and loyalty (Goel et al., 2022).

Perceived trust is the belief that others will react in predictable and expectable ways (Luhmann, 1979). The inclusion of perceived trust in the system was because of a growing concern amongst users about exchanging personal information during the process of revenue collection. In an online or e-transaction, high risk and uncertainty are involved. Here trust plays a significant role in risk mitigation and helps to enhance customer loyalty. Overcoming the issue of lack of trust is the most challenging task for the digital wallet service provider. Trust is affected by design aesthetics, usefulness, ease of use, and customization (Bagla & Sancheti, 2018; Phonthanukitithaworn et al., 2016). E-wallet requires users to provide personal particulars that may risk user privacy and security if they are not adequately protected. Therefore, if users do not trust an E-wallet, they will not be willing to use it. (Sausi et al., 2021) found evidence for the influence of perceived trust on satisfaction.

Many previous studies have identified the relationship between customer satisfaction and customer loyalty in different contexts. Indeed, satisfaction is a key driver of customer loyalty. Once customers are satisfied with a product/service/brand, they would have positive reactions such as repeat purchase intention or positive recommendations to others (Clemes et al., 2008; Wen et al., 2005). The relationship between satisfaction and loyalty was also applied in Digital Payment context (Goel et al., 2022; Pradiatiningtyas et al., 2020).

As a result, based on a review of the literature, the following hypothesis was established in this study:

- **Hypothesis 1**: Perceived usefulness positively affects user satisfaction.
- **Hypothesis 2**: Perceived usefulness positively affects user loyalty.
- **Hypothesis 3**: Perceived ease of use positively affects user satisfaction.
- **Hypothesis 4**: Perceived ease of use positively affects user loyalty.
- **Hypothesis 5**: Perceived trust positively affects user satisfaction.
- **Hypothesis 6**: Perceived trust positively affects user loyalty.
- **Hypothesis 7**: User satisfaction positively affects user loyalty.

![Figure 2. The Proposed Model](image-url)
3. Research Methodology

3.1 Survey Design

Data for this study was collected from the questionnaire-based survey. We adapted the measurement items from relevant studies. Particularly, four items measuring perceived usefulness, and four items measuring perceived ease of use of E-wallets were adapted from (Viswanath Venkatesh et al., 2012). Perceived trust was measured by four items adapted from (Shaw, 2014). Four items adapted from Madan and Yadav (2016) were used to measure satisfaction with E-wallets. The scales of loyalty (five items) were derived from (Zeithaml et al., 1996). A list of measurement items was sent to ten experts working in various universities in Vietnam to check the content validity. Accordingly, they were asked to assess the applicability and representativeness of each measurement item for its associated construct. The questionnaire was modified based on the feedback from the expert panel.

All the items used a 5-point Likert scale ranging from ‘strongly disagree’ (1) to ‘strongly agree’ (5). These items were included in part 2 of the questionnaire, which also asked respondents about the information related to their E-wallet as well as their socio-demographic profiles in part 1. Finally, a pilot survey was carried out with 10 lecturers who have been working at a university and corrections were affected before the full-scale survey was conducted.

3.2 Data Collection

Data were collected through an online survey conducted in Vietnam during March 2023, following a non-probabilistic procedure (https://forms.gle/c8VXRnccHzWz6v38).

3.3 Data Analysis

Due to the complexity of the proposed model, structural equation modelling (SEM) was employed for data analysis in this study. There are two forms of SEM, covariance-based SEM (CB-SEM) and least squares-based SEM (PLS-SEM). While CB-SEM should be applied to assess how well-established theories fit reality, PLS-SEM is used for exploratory analysis and for testing developmental theories (Fornell & Bookstein, 1982). As a result, with newly added constructs in this study, PLS-SEM lends itself well for the purpose of exploration in this research. Accordingly, SPSS 23.0 and Smart PLS 3.0 were used to analyse the data. A systematic procedure for data analysis included analysis of demographic information, exploratory factor analysis, evaluation of the measurement model and evaluation of the structural model.

4. Results

4.1 Profile of Respondents

Table 1 presented the demographic information of respondents in terms of gender, age, living area, and occupation.

<table>
<thead>
<tr>
<th>Demographics</th>
<th>Frequency</th>
<th>Percentage</th>
<th>Demographics</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td>Occupation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>75</td>
<td>24.67</td>
<td>Full-time employee</td>
<td>24</td>
<td>7.89</td>
</tr>
<tr>
<td>Females</td>
<td>225</td>
<td>74.01</td>
<td>Part-time employee</td>
<td>6</td>
<td>1.97</td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
<td>1.32</td>
<td>Student</td>
<td>264</td>
<td>86.84</td>
</tr>
<tr>
<td>Age &lt; 18</td>
<td>1</td>
<td>0.33</td>
<td>Unemployed</td>
<td>3</td>
<td>0.99</td>
</tr>
<tr>
<td>18–24</td>
<td>285</td>
<td>93.75</td>
<td>Self – employed</td>
<td>1</td>
<td>0.33</td>
</tr>
</tbody>
</table>

Table 1. Descriptive Statistics of Respondents (n=304)
4.2 Measurement Model Assessment

The AVE value of every variable in this study has fulfilled the minimum requirement, which is 0.5 (Table 2). Therefore, every variable has fulfilled the requirement of convergent validity analysis, and the value of the loading factor has fulfilled the minimum requirement, which is \( > 0.70 \) (Hair et al., 2014). Variables are considered reliable, with the value of composite reliability being \( > 0.6 \) and Cronbach’s Alpha being \( > 0.6 \) (Henseler et al., 2009).

Table 2. Results of Data Analysis

<table>
<thead>
<tr>
<th>Variable</th>
<th>Outer Loading</th>
<th>AVE</th>
<th>CA</th>
<th>CR</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Perceived Usefulness (PUSE)</strong></td>
<td></td>
<td>0.875</td>
<td>0.952</td>
<td>0.966</td>
</tr>
<tr>
<td>I find using E-wallet useful in my daily life</td>
<td>0.935</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-wallet is very helpful.</td>
<td>0.950</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Using E-wallet helps me to accomplish my tasks more efficiently</td>
<td>0.932</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work becomes easier after using E-wallet.</td>
<td>0.925</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Perceived Trust (PTRU)</strong></td>
<td></td>
<td>0.874</td>
<td>0.952</td>
<td>0.965</td>
</tr>
<tr>
<td>I trust that E-wallet is safe and has reliable features.</td>
<td>0.929</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I trust E-wallet apps and transactions done by E wallet.</td>
<td>0.931</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I trust E-wallets keep me financial information secure.</td>
<td>0.948</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I trust E-wallets keeps me personal information safe</td>
<td>0.931</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Perceived Ease of Use (PEOU)</strong></td>
<td></td>
<td>0.886</td>
<td>0.957</td>
<td>0.969</td>
</tr>
<tr>
<td>E-wallet is easy to use.</td>
<td>0.947</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-wallet use is clear and understandable.</td>
<td>0.956</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-wallet transactions save me lot of time and energy.</td>
<td>0.928</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>It is easy to interact with E wallet.</td>
<td>0.935</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Satisfaction (SAT)</strong></td>
<td></td>
<td>0.891</td>
<td>0.959</td>
<td>0.970</td>
</tr>
<tr>
<td>I would feel satisfied with the features of E-wallet.</td>
<td>0.938</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I would feel contented with the features of E-wallet.</td>
<td>0.938</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I would feel pleased because it potentially fulfills my needs.</td>
<td>0.957</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I would feel comfortable with E wallets usage.</td>
<td>0.943</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Loyalty (LOY)</strong></td>
<td></td>
<td>0.854</td>
<td>0.957</td>
<td>0.967</td>
</tr>
<tr>
<td>I say positive things about E-wallet to other people</td>
<td>0.942</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I would recommend E-wallet to someone who seeks my advice</td>
<td>0.941</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I encourage my friends to use E wallet</td>
<td>0.944</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I consider the E-wallet to be my first choice</td>
<td>0.896</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I intend to use E-wallet more often in the future</td>
<td>0.898</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CA = Cronbach’s Alpha
CR= Composite Reliability

The Fornell-Larcker Criterion and Heterotrait-Monotrait (HTMT) are two measures of discriminating validity (Henseler et al., 2009). Table 3 describes the Fornell-Larcker Criterion to demonstrate the
discriminant validity. The discriminant validity of the Fornell-Larcker ratio was examined in this study. It shows that the value is diagonal and higher than the below value. Therefore, it proves that this study does not have any discriminant value. Likewise, Table 4 shows the HTMT, which describes the discriminant validity. The HTMT ratio also measures the discriminant validity. It shows that the value is no value is higher than 1.0 (Bagozzi & Phillips, 1991). Therefore, it proves that this study does not have any discriminant value.

Table 3. Fornell-Larcker Criterion

<table>
<thead>
<tr>
<th></th>
<th>LOY</th>
<th>PEOU</th>
<th>PTRU</th>
<th>PUSE</th>
<th>SATISFN</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOY</td>
<td>0.924</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PEOU</td>
<td>0.876</td>
<td>0.941</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PTRU</td>
<td>0.850</td>
<td>0.799</td>
<td>0.935</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PUSE</td>
<td>0.834</td>
<td>0.879</td>
<td>0.820</td>
<td>0.935</td>
<td></td>
</tr>
<tr>
<td>SATISFN</td>
<td>0.907</td>
<td>0.905</td>
<td>0.834</td>
<td>0.862</td>
<td>0.944</td>
</tr>
</tbody>
</table>

Table 4. HTMT

<table>
<thead>
<tr>
<th></th>
<th>LOY</th>
<th>PEOU</th>
<th>PTRU</th>
<th>PUSE</th>
<th>SATISFN</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOY</td>
<td>0.915</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PEOU</td>
<td>0.889</td>
<td>0.836</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PTRU</td>
<td>0.873</td>
<td>0.920</td>
<td>0.860</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PUSE</td>
<td>0.947</td>
<td>0.944</td>
<td>0.872</td>
<td>0.901</td>
<td></td>
</tr>
</tbody>
</table>

4.3 Structural Model Assessment

Using PLS-SEM, the sample size was estimated using an observational t-value bootstrapping process and a p-value (Sohaib et al., 2019). However, even when t-values over 1.645 are statistically significant, the p-values of 0.05 and below are accepted or supported. This study uses normal bootstrapping with a range of 500 bootstraps and 304 cases to determine the value of the direction coefficients. Figure 3 demonstrates the structure model of the study.

As shown in Table 5, the paths had T-values greater than 1.645 at the significance level of 0.05, indicating that hypotheses H1; H3; H4; H5; H6; H7 were empirically supported. It concluded that perceived usefulness, perceived trust, and perceived ease of use of the E-wallet has direct influences on user satisfaction. User loyalty was directly influenced by perceived trust, perceived ease of use, and user satisfaction. Out of four constructs, the best predictor of loyalty was satirized (β SATISFN -> LOY = 0.464, t = 6.191, p = 0.000). The paths PUSE -> LOY had the t-values 0.056 (< 1.645) at the significance level of 0.05, indicating that hypotheses H2 was empirically not supported.

Table 5. Results of Path Coefficient and Hypotheses Testing

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Relationship</th>
<th>Original Sample (β Value)</th>
<th>T Statistics</th>
<th>P Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>PUSE -&gt; SATISFN</td>
<td>0.160</td>
<td>2.521</td>
<td>0.012</td>
</tr>
<tr>
<td>H2</td>
<td>PUSE -&gt; LOY</td>
<td>0.005</td>
<td>0.056</td>
<td>0.955</td>
</tr>
<tr>
<td>H3</td>
<td>PEOU -&gt; SATISFN</td>
<td>0.560</td>
<td>8.770</td>
<td>0.000</td>
</tr>
<tr>
<td>H4</td>
<td>PEOU -&gt; LOY</td>
<td>0.238</td>
<td>2.700</td>
<td>0.007</td>
</tr>
<tr>
<td>H5</td>
<td>PTRU -&gt; SATISFN</td>
<td>0.256</td>
<td>4.624</td>
<td>0.000</td>
</tr>
</tbody>
</table>
Based on the summary results of mediating effect in Table 6, customer satisfaction mediates the relationship between perceived ease of use of the E-wallet and user’s loyalty ($\beta = 0.260$, $t = 5.428$). On the other hand, customer satisfaction mediates the relationship between perceived trust and user loyalty ($\beta = 0.119$, $t = 3.468$). Likewise, perceived usefulness has a significant mediating effect on customer satisfaction ($\beta = 0.074$, $t = 2.246$).

Table 6. Results of Specific Indirect Effects

<table>
<thead>
<tr>
<th>Relationship</th>
<th>Original Sample</th>
<th>Standard Deviation (STDEV)</th>
<th>T Statistics</th>
<th>P Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEOU -&gt; SATISFN -&gt; LOY</td>
<td>0.260</td>
<td>0.048</td>
<td>5.428</td>
<td>0.000</td>
</tr>
<tr>
<td>PTRU -&gt; SATISFN -&gt; LOY</td>
<td>0.119</td>
<td>0.034</td>
<td>3.468</td>
<td>0.001</td>
</tr>
<tr>
<td>PUSE -&gt; SATISFN -&gt; LOY</td>
<td>0.074</td>
<td>0.033</td>
<td>2.246</td>
<td>0.025</td>
</tr>
</tbody>
</table>

Table 7. Assessments of the Model and Findings

<table>
<thead>
<tr>
<th>Relationship</th>
<th>T Statistics</th>
<th>P Values</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEOU -&gt; LOY</td>
<td>2.532</td>
<td>0.012</td>
<td>Significant</td>
</tr>
<tr>
<td>PEOU -&gt; SATISFN</td>
<td>8.596</td>
<td>0.000</td>
<td>Significant</td>
</tr>
<tr>
<td>PTRU -&gt; LOY</td>
<td>4.256</td>
<td>0.000</td>
<td>Significant</td>
</tr>
<tr>
<td>PTRU -&gt; SATISFN</td>
<td>4.952</td>
<td>0.000</td>
<td>Significant</td>
</tr>
<tr>
<td>PUSE -&gt; LOY</td>
<td>0.052</td>
<td>0.958</td>
<td>Not significant</td>
</tr>
<tr>
<td>PUSE -&gt; SATISFN</td>
<td>2.547</td>
<td>0.011</td>
<td>Significant</td>
</tr>
<tr>
<td>SATISFN -&gt; LOY</td>
<td>6.482</td>
<td>0.000</td>
<td>Significant</td>
</tr>
<tr>
<td>PEOU -&gt; SATISFN -&gt; LOY</td>
<td>5.475</td>
<td>0.000</td>
<td>Significant</td>
</tr>
<tr>
<td>PTRU -&gt; SATISFN -&gt; LOY</td>
<td>3.752</td>
<td>0.000</td>
<td>Significant</td>
</tr>
<tr>
<td>PUSE -&gt; SATISFN -&gt; LOY</td>
<td>2.261</td>
<td>0.024</td>
<td>Significant</td>
</tr>
</tbody>
</table>

Based on Figure 3, the R-squared ($R^2$) value of user satisfaction is 0.858, while the ($R^2$) value of user loyalty is 0.862, implying that 86.2% of user loyalty is affected by perceived usefulness, perceived trust, perceived ease of use and user satisfaction.
5. Discussion

5.1 Major Findings

Research results show that perceived usefulness, perceived ease of use, and perceived trust affect user satisfaction and user loyalty in using E-wallet. Research results determine that user satisfaction is not only the strongest factor but also a direct impact on user loyalty.

5.2 Theoretical and Practical Implications

Improve the features of e-wallets with simplicity and convenience, ease of use, thus enhancing customer satisfaction and positively impacting the intention to continue using or user. In addition, companies providing e-wallet services also need to focus on building business images by using tangible websites such as social networks, corporate, etc., combined with intangible elements such as the staff's positive attitude towards customers, and professional behavior.

![Figure 3. Structure of the Model](image)

In the context of online payment technology, the perception of trust plays an important role in customer satisfaction and loyalty. In the process of using e-wallets, customers are more concerned about the risks of information security and online fraud, trust can be an important factor to help retain customers, reduce worry and dissatisfaction. For trust, e-wallet providers need to pay due attention to building customer trust through improving security management, building strict processing processes, providing secure transactions between buyers and sellers and better protecting their customers.
6. Limitations and Future Research

Some limitations that provide research direction for future studies need to be acknowledged. First, our respondents represent a small group of the population, a high proportion of respondents in this survey were the young generation who have more chances to access and complete the online survey posted on social networks than the older generation. In further research, more older respondents should be surveyed so research that compares satisfaction and loyalty between age groups can be carried out. Second, apart from three factors found to influence satisfaction and loyalty towards E-wallets in the current research, the investigation of other factors such as perceived risk, social influence, and attitude will be an interesting idea for further research. Finally, this study has not investigated the effects of several important moderators on the constructed model. It is an exciting idea and needs to be examined in further research.

7. Conclusion

This study aimed at examining user loyalty toward E-wallets in Vietnam. The data collected by surveying users in Vietnam, the findings show that three factors including perceived usefulness, perceived trust, and perceived ease of use of the E-wallet, have direct influences on user satisfaction and loyalty. This study also concluded that user satisfaction positively affects loyalty to e-wallets.

References


An Empirical Study about the Awareness of E-Wallet using in Vietnam

Phuong Thai Ngoc Truc\textsuperscript{a*}, Khanh Thai Hong Thuy\textsuperscript{b} & Tram Nguyen Thi Thanh\textsuperscript{c}
\textsuperscript{a,b,c}Faculty of Finance and Accounting, Nguyen Tat Thanh University, Ho Chi Minh City, Vietnam
*tnphuong@ntt.edu.vn

Abstract: Digital payments are making waves now, as of 2021 the transaction value of digital payments in Vietnam reached 12,922 million US dollars, this number in the previous year was 9,985 million US dollars. The rise of digital payments has opened the door to many e-wallets in Vietnam which have operated successfully in recent years. More and more users are showing a preference for e-wallet transactions instead of using cash. However, the usage of e-wallets has been questioned. An online survey was conducted in Vietnam in March 2023, following a non-probabilistic procedure with 439 respondents to collect opinions on their perception of e-wallets. The research results show that 69.2% of the respondents are currently using e-wallets for common tasks such as transferring/receiving money, paying for online shopping, and using telecommunications utilities. Of those surveyed, 20.3% have never used an e-wallet, with the most common reason being that they have no need for it or have never heard of it. Finally, 10.5% of the respondents used to use e-wallets but stopped due to privacy concerns or technical problems. The research results also suggest some implications for e-wallet service providers to improve the level of e-wallet usage in Vietnam.

Keywords: e-wallet, users, awareness, Vietnam

1. Introduction

Financial technology has become one of the most significant aspects of the financial services industry. One of the most prominent financial technologies is the e-wallet. Bringing benefits to users, E-wallet has been well received and widely used in many countries. Japan, America, Sweden, and South Korea have already rolled out cell phone-based digital wallet solutions. Consumers in those countries can use their cell phones to pay for groceries, order drinks from a vending machine, and even identify themselves at airline ticketing counters (Pachpande & Kamble, 2018). China is a role model of a cashless society. E-wallet has become the primary financial instrument to complete payments for China citizens. WeChat Pay and Ali Pay are two top cashless payment options in this country (Korella & Li., 2018). Indonesia is leading towards a digital economy and electronic payment system. One of the most popular and widely used electronic payment systems is the e-wallet (Angelina & Rahadi, 2020). There are a growing number of e-wallet providers in Indonesia: GO-PAY, OVO, Link Aja, and Dana dominate the market share (Syifa & Tohang, 2020). E-wallets eventually appeared in the Malaysian market in recent years. WeChat Pay, Maybank QR Pay, Samsung Pay, Boost, Touch ‘n Go, Grab Pay, and Favepay are the most popular examples of e-wallet applications in Malaysia (Tenk et al., 2020).

In Vietnam, E-wallets were first-time regulated in Decree No. 101/2012/ND-CP promulgated by the Government on November 22, 2012, and Circular No. 39/2014/TT-NHNN enacted by the State Bank of Vietnam on December 11, 2014. However, these legal documents have not been comprehensive in all aspects related to E-wallet provision activity. Therefore, on November 22, 2019, the State Bank of Vietnam promulgated Circular No. 23/2019/TT-NHNN amending and supplementing several articles of Circular 39 to complete the legal framework of E-wallet provision activity. Circular No. 23/2019/TT-NHNN officially takes effect from January 07, 2020, which supplements some highlight provisions as Regulating specifically on dossiers and information of subjects opening E-wallets; Customers must link the E-wallets with the bank account before using the E-wallets; Top-up methods and top-up limit into
E-wallets; E-wallet service providers must ensure its solvency. The electronic payment market in Vietnam is getting more active a total of 33 units operating in the e-Wallet field. However, only a few are popular among users (Vietnamcredit, 2020).

Besides the benefits such as making payment transactions, receiving/ transferring money quickly and conveniently, many people are still afraid of e-wallets, due to the challenges and problems that arise when using them. Typically, the process of making transactions is faulty, losing money, personal data can be accessed by hackers illegally.

This study was conducted to assess the perception of Vietnamese people about the benefits and obstacles when using e-wallets. From there, propose implications for e-wallet service providers to improve benefits and overcome obstacles, thereby contributing to improving the level of e-wallet usage in Vietnam, speeding up the process. non-cash payment development process in Vietnam.

2. Literature Review

According to The Economic Times (2018), the e-wallet is determined as an electronic card or an app consumers use when conducting online transactions via mobile devices such as tablets, laptops, or smartphones. E-wallet is considered the core tool for the growth of e-commerce and financial technology industries, especially in the Industry Revolution 4.0.

In terms of accessibility, the users are served with three different types of e-wallets which are closed e-wallet, semi-closed e-wallet, and open e-wallet. A closed e-wallet is a type of e-wallet that is issued by a specific company or organization and can only be used for transactions within that organization. Closed e-wallets are not interoperable with other payment systems, and they do not allow the user to withdraw cash or perform other financial transactions outside of the organization. – for example, Starbucks cards or Lazada Wallet. Meanwhile, a semi-closed e-wallet is a type of e-wallet that is issued by a company or organization and can be used for transactions within that organization as well as at other merchants who are part of the same payment network. These e-wallets are interoperable with other payment systems and can be used to withdraw cash at authorized locations –for instance, Alipay or LinePay. On the other hand, open e-wallets have enabled the consumer to conduct transactions in stores, apps, or the web. Only banks can be the issuer of open e-wallet, which works like credit cards, up to pre-funded amounts. Examples of open e-wallet are Visa Checkout or Masterpass (Ramli & Hamzah, 2021).

The functions of an e-wallet are similar to a traditional wallet, and it should be connected to the user’s account for it to function securely. E-wallets offer several benefits for payment transactions. E-wallets provide a convenient and fast payment method, allowing users to do transactions without carrying physical payment cards or cash. E-wallets are used to pay for goods and services online, in-store, or through peer-to-peer transactions.
Figure 1. Applicable Area of E-Wallet for Payment Transactions (Bakar et al., 2020)

Using an e-wallet is a straightforward process. Here are the basic steps to use an e-wallet for payment transactions:

1. Download and Install the e-wallet software/App
2. Create an Account
3. Reload of cash amount in e-wallet software using a credit card, debit card, or bank account

- Make a Payment (Scan the code of payment or enter the payment amount, and authorize the transaction using your device's biometric authentication or password)
- Monitor Transactions (Monitor transaction history and account balance within the e-wallet app, allowing you to track your spending and manage your finances more effectively)

Figure 2. Applicable Area of E-Wallet for the Payment Transaction
According to Leong et al. (2019), in the case of e-wallets, users will be exposed to monetary savings due to promotional offers, hedonic benefits due to experiences in using an e-wallet, and novelty due to the newness of a new system. E-wallet is a system that stores a customer's data for easy retrieval for online purchases. Since completing forms of an e-retail transaction can be a reason for aborting a transaction, an e-wallet service can reduce this inconvenience for the consumer.

E-wallets offer numerous benefits to our lives. There are several obstacles that can hinder the adoption of e-wallets. Firstly, lack of awareness about what e-wallets are and how they work can lead to disinterest in using them. Secondly, security concerns about the safety of personal and financial information can deter people from using e-wallets (Chandrasekhar & Ghosh, 2018; Sinha et al., 2019). Thirdly, if e-wallets are not widely accepted by merchants, consumers may not see the value in using them (Subaramaniam et al., 2020). Fourthly, e-wallets may not offer the same features and benefits as traditional payment methods, such as the ability to withdraw cash or earn rewards. Additionally, e-wallets require a stable internet connection to function properly, which can be a challenge in areas with poor connectivity (Goyal, 2017; Goswami & Sinha, 2019). Furthermore, e-wallets require a smartphone or other mobile device, which may not be accessible to everyone (Subaramaniam et al., 2020). Lastly, some people may be resistant to change and prefer to stick with traditional payment methods that they are familiar with (Subaramaniam et al., 2020). All these factors can contribute to the obstacles that prevent people from adopting e-wallets.

3. **Research Methodology**

This article is conceptual based and descriptive research methodology is used to present data required to fulfill the objectives.

The method that was chosen to collect primary data is online survey as it is easier to obtain the data when compared to other methods. Our team opted to conduct a pilot test before launching our internet survey to gather data from the public. This extra step enabled us to enhance our research design and performance by identifying any mistakes early on. Although it was an additional step, the pilot test proved to be invaluable in ensuring that we could improve our online survey’s accuracy and effectiveness. Data collection was from an online survey conducted in Vietnam in March 2023, following a non-probabilistic procedure (https://forms.gle/c8VXRRnccHzWz6v38). The online survey was constructed using Google Forms and shared on social media platforms such as Facebook, WhatsApp and e-mail to participants. The electronic survey was used in this study since it is considered the most convenient and efficient way to collect necessary information (Sekaran & Bougie, 2016).

The total number of respondents in our survey is 439 participants and we were able to collect a lot of useful data and information regarding the awareness of e-wallet using in Vietnam. Excel and SPSS 23.0 were used to analyze the data.

4. **Result**

Of those who participated, 25% were male and 74% were female. The most common living area among the respondents was urban (90%).
The majority of the sample population equivalent to 439 respondents were from the age group of 18 to 26 and contributed 94% of the total sample size. Out of total 439 respondents, 377 were students, 30 were full-time employees.

Of those who participated, 69.2% of the respondents are currently using e-wallets, 20.3% have never used an e-wallet, finally, 10.5% of the respondents used to use e-wallets but stopped due to privacy concerns or technical problems.

Firstly, the survey results show that for the group of respondents who have never used an e-wallet, the reason is that they have no need to use it (47 people, equivalent to 52.8%). Additionally, some participants indicated that they did not know about e-wallets (34 people, equivalent to 38.2%), were concerned about incurring transaction fees (15 people, 16.9%), had privacy concerns (14 people, 15.7%), or faced other obstacles such as ineligibility or technological challenges. However, the survey also revealed that 62 out of 89 people expressed a future need to use e-wallets once their concerns and obstacles with using them are resolved.
Secondly, the survey results also indicate that customers have encountered some obstacles while using e-wallets. These include technological challenges (7 participants, equivalent to 15.2%), concerns about privacy and security of personal information (14 participants, equivalent to 30.4%), and reliance on smartphones or mobile devices, which can be disadvantageous if the device is stolen (16 participants, equivalent to 34.8%). As a result of these issues, some customers have discontinued their use of e-wallets.

Thirdly, in addition to the group of participants who have never used or stopped using e-wallets, a majority of surveyed participants (304 participants, equivalent to 69.2%) find e-wallets to be very useful. Specifically, participants reported using e-wallets to transfer/receive money (252 participants, equivalent to 82.9%), make non-cash payments at stores or online (201 participants, equivalent to 66.1%), top-up telecommunications services such as phone credit and data (179 participants, equivalent to 58.9%), and pay utility bills such as electricity, water, internet, television, landline phone, tuition
fees, credit card bills, and insurance (171 participants, equivalent to 56.3%). The most commonly used e-wallets among the survey respondents were Momo, Zalo Pay, VNPay, and ShopeePay.

Figure 7. Purpose of Using E-Wallet

5. Discussion and Conclusion

Firstly, e-wallets are still very new to many people, the survey results show that many respondents have never known about e-wallets. Therefore, to raise the awareness and recognition level of customers for e-wallets, e-wallet service providers need to build effective information channels for customers to access this service. First, using Social Media Marketing, Promote the e-wallet service on social media platforms such as Facebook, Twitter, Instagram, and LinkedIn. Create eye-catching posts, videos, and graphics that highlight the benefits of an E-wallet. Second, using Influencer Marketing, Partner with influential people to promote e-wallet services. This can help e-wallet service providers reach a wider audience and build credibility with potential customers. Third, using partnerships with other businesses or organizations such as retailers or financial institutions, to promote e-wallet service to their customers. By using a combination of these strategies, e-wallet service providers can effectively raise awareness about e-wallet service and attract new customers.

Secondly, the survey results also show that users do not use or stop using e-wallets because of concerns about security and privacy issues. Therefore, to overcome this limitation, e-wallet service providers need to improve their service and ensure that the e-wallet service is secure and protected from cyber-attacks. Implement strong security measures, two-factor authentication, encryption, and fraud detection systems. Collaborate with other e-wallet service providers and financial institutions to create an interoperable e-wallet ecosystem that benefits customers and promotes financial inclusion.

Thirdly, many users appreciate the benefits of e-wallets, they use e-wallets for many different types of transactions such as transferring/receiving money, paying at stores, paying online, and making payments for utility bills or telecommunications services. Thus, e-wallet service providers need to pay attention to maintaining and further promoting the utilities that e-wallets bring, thereby retaining old customers and attracting new customers.

6. Limitations and Future Research Directions

Some limitations that provide research direction for future studies need to be acknowledged. First, our respondents represent a small group of the population. A high proportion of respondents in this survey were the young generation have more chances to access and complete the online survey posted on social networks than the older generation.
In addition, the study only focuses on presenting the current situation of using e-wallets in Vietnam, which divides the survey's participants into three groups: never used, used, and currently using e-wallets. Therefore, the author proposes that future studies can be further developed by doing detailed research for each specific group of participants. For example, for a group of participants who are using e-wallets, researchers can determine which factors affect satisfaction and loyalty to this service.

References


Determinants of Stock Price Volatility in Vietnamese Listed Commercial Banks

Hung Nguyen Thanh
University of Economics, Ho Chi Minh City, Vietnam
*nguyenthanhhungncs@gmail.com

Abstract: Due to the limited research on determinants of stock price volatility, the current study is conducted to fill this void by investigating primarily bank-specific factors driving the volatility of banks’ stock price. We apply both static and dynamic estimation methods such as fixed-effect regression and dynamic generalized method of moments, respectively, to capture these potential explanatory factors and provide more robust results. A comprehensive sample of 24 Vietnamese listed commercial banks on a quarterly basic dataset (2006Q2-2021Q1) is employed. The findings show significant evidence on the bank-specific and macro-economic determinants of stock return volatility. Specifically, commercial banks with good performance, high capitalization, and more liquidity show positive impacts on stock return volatility, implying the negative fluctuations in banks’ stock return as a result of these pivotal factors. The opposite cases are observed for banks’ size and both measures of macroeconomic drivers such as economic growth and inflation, except for bank risk with an inconclusive impact on stock return volatility. These results are robust when using quantile panel regression, where the impacts of explanatory on stock return volatility are significantly consistent across all almost quantile levels based on dependent variable values. Given these findings, several policy implications are provided for policy-makers, investors and banks’ managers.

Keywords: stock price volatility, bank-specific determinants, commercial banks, Vietnam

JEL Code: G11 G15 G21

1. Introduction

The ups and downs in stock prices over a certain period are referred to as stock return volatility (SRV). It is a regular phenomenon in the equities market that gauges unanticipated movements in stock values. According to Kanniainen (2007), stock price volatility is a measure of the rate at which new information arrives. Investors, brokers, dealers, academics, and regulators are all concerned about SRV. They do so not just because volatility assesses risk and affects the firm’s worth, but also because variations in stock prices indicate key news relating to firms. According to Guo (2002), the volatility of stock prices is a systemic risk that ordinary share investors experience. Investors are risk-averse by nature, and the volatility of their assets is important to them since it represents the degree of risk to which they are exposed.

According to conventional value theory, the existence of corporations is dependent on the maximizing of their corporate performance and shareholder wealth (Alchian, 1950; Mishra & Goel, 2005). In addition, both internal managers and shareholders also pay much attention to the stock price movement due to its implications for corporate performance, information on improved operation and its impact on their profit. Moreover, Christiansen et al. (2012) focus primarily on the examination of stock return volatility driven by macroeconomic and financial factors, emphasizing the necessity of understanding volatility, as it may be a result of investing and investors’ decisions to allocate assets on the market. A greater knowledge of the impact of macroeconomic swings on stock market fluctuation is intriguing, as it facilitates the perception of connections between changes in stock prices and risk factors, as well as
cyclical indicators. They also demonstrate that this information allows predicting future return movement on the stock market. This is intuitively pivotal to investigate the predictors of stock return volatility.

The stock market is critical and enormous to each country’s economy. Additionally, it adds to the country’s economic development by stimulating capital formation and increasing economic growth. Stock prices could fluctuate as a result of supply and demand pressures. The variables that affect the demand and supply of stocks may be classified into three broad categories: technical factors, fundamental factors, and market attitudes (Gautam, 2017). To put it differently, the variables affecting share prices or stock returns are both internal and external. Internal variables such as dividend per share, profits per share, book value, leverage, and size (among others) all contribute to the stock performance of the company. External factors or macroeconomic variables include gross domestic product, interest rate, government regulation, and currency exchange rate, and among others.

The historical volatility of stock prices has been extensively researched and discussed in economic studies. Numerous institutions, including financial institutions or banks, employ these variables in their day-to-day risk management since they may be altered by fluctuations in the variables for which they are computed. If continuous capitalization is considered in the computation, mathematical historic volatility is defined as the standard deviation (or standard deviations) of the variable in issue across a unit of past time. In this regard, the assessment of stock return volatility based on historical data might be used as a measure of the uncertainty around the level of stock return in the foreseeable future (Hull, 1998).

It could be observed from a comprehensive literature review on this topic of interest that many researchers have attempted to find underlying elements that may have an influence on stock return volatility. It has been established that macroeconomic conditions and internal factors of economic agents could have an impact on stock performance or stock returns. It is appropriate to consider the extent to which external and internal variables have influenced the historical volatility of stock returns (Niewińska, 2020). It should be noted that research on the influence of firm-specific characteristics and macroeconomic factors on stock return is highly important with much attention. However, there is a lack of studies on factors shaping stock price volatility. Moreover, in limited research on this topic, none of them is conducted in the context of Vietnam, especially for the commercial bank’s stock. As a result, the focus of this study is to examine potential factors mainly relating to individual drivers of stock price volatility in Vietnamese commercial banks, differently compared to others.

Extending our existing understanding of stock return volatility determinants is very crucial for investment portfolios, stock market control policy and bank management. Bank’s stock seems to be appropriate for such a study because of their large levels of liquidity (due to high capitalization) and open up to trade by a majority of investors, which leads to uniqueness of this analysis. This is consistent with the real context of Vietnamese bank’s stocks. In this sense, only listed commercial banks in the Vietnamese stock market exchange have been chosen. Stocks of financial institution (i.e., commercial bank) are among the most significant components of investors’ investment portfolios; consequently, a thorough identification of the volatility determinants is critical for a right decision-making of investors relating to banks’ stock and a more precise projection of future stock returns in the financial sector.

Several findings are provided as follows. First, positive implications of good performance, capitalization, and liquidity on stock return volatility are discovered, indicating that these crucial characteristics contribute to increased stock return volatility. Second, with the exception of bank risk, which has an uncertain impact on stock return volatility, bank size and macroeconomic indicators such as economic growth and inflation have the opposite effect on stock return volatility. Third, according to the values of the dependent variable, the influence of explanatory variables on stock return volatility is significant at a majority of quantile levels.
From this introduction, the rest of the current paper is structured as follows. Section 2 reviews related literature. Next, Section 3 describes the data and methodology. The findings are provided in Section 4, followed by a conclusion in Section 5.

2. Literature Review

SRV is the primary risk that investors with equities market portfolios naturally confront, since they seek high returns on these risky assets. Understanding the magnitude of SRV and its predictors could assist financial analysts and policymakers in forecasting and mitigating such volatility and its unfavorable consequences on investment returns and economic growth. For more details, SRV is used by academics and practitioners as a proxy for market instability and as a risk representation. They describe SRV as the degree of uncertainty or risk associated with the magnitude of changes in a stock price (Zhang, 2012). SRV relates to a high degree of unpredictability, uncertainty, and risk. Volatility is critical in the financial markets, as it is one of the hallmarks of inefficient markets where securities are not priced correctly. Additionally, the high volatility of financial market returns has a major detrimental impact on investors seeking to avoid risk. Additionally, this volatility has the potential to impact spending patterns, borrowing decisions, and other macroeconomic indicators. Volatility is frequently used in this context to refer to the dispersion or variation from the mean or average value or price, and it is quantified simply by the standard deviation or divergence of stock returns (Daly, 2011).

There is a large body of previous research investigating the predictors of stock prices or stock returns. For example, Almumani (2014) shows that there was a positive influence of the independent factors such as dividend per share, earnings per share, size, and price earnings ratio on dependent variables such as market price of share. Gupta and Reid (2013) investigate the relationship between industry-specific stock returns and changes in monetary policy and macroeconomic news. Naveed and Ramzan (2013) employ a sample size of 15 listed banks on the Karachi Stock Exchange from 2008 to 2011, demonstrating that size has a considerable positive effect on share price while the remaining factors have a negligible effect. Arshad et al. (2015) use the listed commercial banks in Karachi stock exchange from 2007 to 2013 and demonstrate that earnings per share have a greater impact on stock prices and a positive and significant relationship with them than the book to market value ratio and the interest rate, both of which have a significant but negative relationship with stock prices, while other variables (GDP, price earnings ratio, dividend per share, and leverage) have no effect on stock prices.

Based on an examination of prior research, while a substantial amount of research has been devoted to the issue of forecasting volatility, much fewer have investigated the drivers of stock return volatility. Some researchers aim to identify critically potential elements driving SRV, although these papers are substantially less in number than research focusing on predictions. The bulk of studies employ the GARCH and ARCH models (Alberg et al., 2008; Pagan & Schwert, 1990). For more details, Schwert (1989) demonstrates that SRV could be affected by business cycles. In addition, future volatility merely calculated on the basis of historical data stock returns, without taking into consideration macroeconomic variables, may explain only little (aggregated) stock market fluctuations. To expand the work of Schwert (1989) and Campbell (1991) describes characteristics shaping the volatility of financial asset returns. Given monthly and daily returns based on the NYSE and ASE indices from 1926 to 1988, a negative relationship between the volatility of returns and return itself is evidenced. This study inspired much interest in explore factors, which is used to explain SRV (Cochrane, 1999; Mehra & Prescott, 2003; Tauchen, 2011). Heston (1993) proposes unobservable elements explaining return dynamics, which is hypothesized that factors such as inflation, industrial production and dividends may predict return volatility. Kearney and Daly (1998) attempt to uncover factors influencing the volatility of stock returns on the Australian stock exchange, demonstrating the lack of a statistically significant association between volatility and the foreign exchange market.

Using their “no-arbitrage model”, Corradi et al. (2013) explain stock return volatility using macroeconomic data and unobservable variables. Their findings indicate that a rise in industrial production plays a substantial influence. Over time, a steady increase in industrial production leads to
Given database of listed banks of the euro zone countries for the 2004 to 2015 period, Niewińska (2020) demonstrates that certain variables have a substantial effect on the variables analyzed, including the ratio of long-term investments to total assets, the solvency ratio, the price to book value, the unemployment rate, beta, and implied volatilities in the S & P500 and EUROSTOXX50 indexes.

The drivers of SRV have been a topic of interest due to its relevance of systematic risk affecting other macroeconomic factors. Therefore, researchers and practitioners have attempted to determine the primary variables driving stock return volatility and their impact on the actual economy (Corradi et al., 2013). It is critical for practitioners to have a better understanding of the determinants of stock return volatility. Aforementioned research on the driver of stock return volatility is scarce in banking context, especially in an emerging market like Vietnam, which allows us to make profound contributions to literature on both bank-specific and macroeconomic determinants of stock return volatility. Moreover, we apply combined regression methods such as OLS, FEM, REM, FEM with Driscoll and Kraay (1998) standard error, two-step system GMM and quantile panel regression. In this regard, none of the research is the same approach as our viewpoint.

3. Data and Methodology

3.1 Data

Current research examines 24 Vietnamese joint stock commercial banks that are listed on three Vietnamese stock exchanges (HOSE, HNX, and UPCOM) covering the period of 2006Q2 to 2020Q1. One should note that none of the research on determinants of stock return volatility in Vietnamese listed commercial banks is conducted, which is another innovation of the current paper. Additionally, Clause 1 of Article 40 of the Securities Law states: “An organization listed securities on a stock exchange must meet the capital, business operations, and financial capacity requirements, as well as the principal, number of shareholders, or number of securities owners”. As a result, listed joint-stock commercial banks often better meet the criteria of financial soundness, so the study on this group of banks helps to eliminate the idiosyncratic factors of other bank types possibly affecting the bank-specific determinants of stock return volatility.

3.2 Model

We regress a dependent variable - stock return volatility on bank-specific and macroeconomic determinants. For more details, explanatory variables as internal factors are related to bank individual characteristics such as performance, risk, scale, capitalization, and liquidity as well as external factors describing the state of the economy such as growth rate of GDP and inflation.

Similar to Sharma (2018), the proposed model capturing above variables is as follows:

\[
SRV_{i,q} = \alpha_0 + \alpha_1 TOBINQ_{i,q} + \alpha_2 DROA_{i,q} + \alpha_3 SIZE_{i,q} + \alpha_4 CAP_{i,q} + \alpha_5 LIQUID_{i,q} + \alpha_6 GDPG_{q} + \alpha_7 INF_{q} + \varepsilon_{i,q}
\]  

(1)

where i and q denote bank and quarter, respectively. \(\varepsilon\) is an error term. Based on the approach of French et al. (1987), the dependent variable - stock return volatility is calculated as follows:

\[\text{SRV} = \frac{1}{T} \sum_{t=1}^{T} \left( \frac{R_{t} - \mu}{\sigma_{t}} \right)^2 \]

\[\text{where } T \text{ is the number of observations, } \mu \text{ is the mean return, and } \sigma_{t} \text{ is the standard deviation of returns at time } t.\]

\(^{1}\)To be specific, ACB, BID, CTG, EIB, HDB, LPB, MBB, MSB, STB, TCB, TPB, VCB, VIB, and VPB are among the banks listed on HOSE, whereas BAB, NVB, and SHB are listed on HNX and ABB, BVB, KLB, NAB, PGB, SGB, and VBB are listed on UPCOM.
SRV_{tq} = 2 \sqrt{\sum_{d=1}^{N_q} R^2_{i,d} + 2 \sum_{d=1}^{N_q-1} R_{i,d}R_{i,d-1}} (2)

where \( N_q \) is the number of trading days in quarter \( t \). \( R_{i,m} \) is stock return for a given bank \( i \) at day \( d \), which is calculated by:

\[
R_{mt} = \frac{\ln(P_{i,d})}{\ln(P_{i,d-1})} (3)
\]

\( P_{i,d} \) and \( P_{i,d-1} \) are the stock price of bank \( i \) in day \( d \) and \( d-1 \), respectively.

We integrate five variables for bank idiosyncratic characteristics as potential determinants of stock return volatility: TOBINQ is bank performance computed as the book value of total assets minus book value of common equity plus market value of common equity divided by book value of total assets. DROA is bank risk calculated by standard deviation of returns on total assets. SIZE is the logarithmic form of total assets. CAP is the ratio of capital to total assets. LIQUID is the proportion of liquid assets over total assets. These proxies are collected from quarterly financial reports of each bank in a study sample.

In addition, we capture macro-economic determinants of stock return volatility: GDPG is economic growth computed by the growth rate of GDPG and INF is inflation calculated by the growth rate of consumer price index. These variables are retrieved by the World bank database. One should be noted that in order to address the dynamic natures in stock return volatility, we integrate the lagged dependent variables, namely \( SRV_{tq} \), into specification (1) and employ the dynamic approach such as two-step system GMM for regression. All study variables are illustrated in Table 1.

Table 1. Variable Definitions

<table>
<thead>
<tr>
<th>Variable</th>
<th>Explanation</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>SRV</td>
<td>Stock return volatility</td>
<td>Quarterly Financial statement</td>
</tr>
<tr>
<td>TOBINQ</td>
<td>Book value of total assets minus book value of common equity plus market value of common equity divided by book value of total assets</td>
<td>Quarterly Financial statement</td>
</tr>
<tr>
<td>DROA</td>
<td>Standard deviation of return on total assets</td>
<td>Quarterly Financial statement</td>
</tr>
<tr>
<td>SIZE</td>
<td>Total assets in log form</td>
<td>Quarterly Financial statement</td>
</tr>
<tr>
<td>CAP</td>
<td>Ratio of capital over total assets</td>
<td>Quarterly Financial statement</td>
</tr>
<tr>
<td>LIQUID</td>
<td>Ratio of liquid assets over total assets</td>
<td>Quarterly Financial statement</td>
</tr>
<tr>
<td>GDPG</td>
<td>Growth rate of gross domestic product</td>
<td>World bank &amp; SBV</td>
</tr>
<tr>
<td>INF</td>
<td>Growth rate of consumer price index</td>
<td>World bank &amp; SBV</td>
</tr>
</tbody>
</table>

(Source: Author’s Summary)

3.3 Regression Method

Given the characteristics of the collected data, statistical panel data models were used to analyze the influence of internal and external factors on the volatilities of stocks returns of banks. These models combine cross-section data (from individual dimension) with time-series data (quarterly dimension). They allow for a cross-section analysis of Vietnamese commercial banks listed on several stock exchanges. In this research, we employ both static and dynamic regression models to provide more robust findings from the different regression approaches. In this regards, we employ Ordinary Least
Squares (OLS), Fixed-effect regression model (FEM), Random-effect regression model (REM), and Fixed-effect regression model (FEM) with standard error of Driscoll and Kraay (1998) as static models; whereas, the two-step system generalized method of moments (S-GMM) is used as a dynamic model. The latter approach aims to capture the existence of endogenous problems stemming from the association of the lagged dependent indicator with an error term. This method is well-explained for dynamic models when using simultaneous equations in differences and levels and exploiting internal instrument variables through the lagged regressors in both equations (Arellano & Bover, 1995; Blundell & Bond, 1998).

Moreover, the panel quantile regression model is employed to investigate the influence of explanatory variables on stock return volatility via the conditional distribution. By using this method, we could observe the independent variable impacts on the dependent variable of several specific quantile levels. In this first proposed quantile regression of Koenker and Bassett Jr (1978), independent variables are more properly depicted in terms of their effect on the dependent variable range and conditional distribution. Using information captured in the study sample, quantile regression analysis of the model is analyzed. According to the assumption that $y|x$’s population quantile is a linear function of $x$, we note the equation as follows:

$$ y_q(x_i) = x_i'\beta_q $$

In which, $\beta_q$ is the calculated coefficient of the $q$ quantile. In this case, $\hat{\beta}_q$ is an estimator of $\beta_q$ determined by solving the following minimized objective function:

$$ \min_{\hat{\beta}_q} \sum_{i:y_i \geq x_i'\hat{\beta}_q} q |y_i - x_i'\hat{\beta}_q| + \sum_{i:y_i < x_i'\hat{\beta}_q} (1-q) |y_i - x_i'\hat{\beta}_q| $$

Linear programming can be used to figure out the value of the unknown parameters in Eq. (5). (Buchinsky, 1995). Setting the value of $q$ allows obtaining $\hat{\beta}_q$ for different quantiles.

4. Empirical Findings

4.1 Descriptive Statistics

Table 2 summarizes the descriptive statistics for all variables examined. Several remarks are provided as follows. The mean value of quarterly stock return volatility (SRV) is 0.025%, ranging from 0.011 (min) to 0.062 (max) with a high fluctuation (0.013% for standard deviation). These values are positive, implying a positive return for investors when holding a portfolio of listed commercial banks in a study sample. TOBINQ ranges from 0.597% to 3.333%, with a mean of 1.398, demonstrating a relatively well performance of commercial banks operating in Vietnam. DROA shows a mean of 0.001% with a low fluctuation, confirming the relatively well management for bank risk. The scale and capital of studied banks is relatively stable with the mean values of 18.569 and 16.858%, respectively. Listed commercial banks have a low level of liquid assets with the mean of -0.097 with a high level of fluctuation. In terms of macro-economic factors such as economic growth and inflation, the high standard deviation values and the wide range of extreme values indicate the co-movement between these factors.
4.2 Pairwise Correlation Matrix

Table 3 reports the results for pairwise correlation among studied variables. This shows that all pairs of correlation are less than the threshold value of 0.8 (Vo, 2018), suggesting no concerns regarding the issue of multicollinearity. In other words, this allows entering explanatory variables into the same model without spurious regression results. To confirm the valid approach of the above pairwise correlation matrix, VIF is provided and shows a value greater than threshold value of 10. Again, there is no serious multicollinearity in the regression model capturing all explanatory variables.

Table 3. Pairwise Correlation Matrix among Variables

<table>
<thead>
<tr>
<th></th>
<th>SRV</th>
<th>TOBINQ</th>
<th>DROA</th>
<th>SIZE</th>
<th>CAP</th>
<th>LIQUID</th>
<th>GDPG</th>
<th>INF</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>SRV</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOBINQ</td>
<td>-0.001</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.19</td>
</tr>
<tr>
<td>DROA</td>
<td>0.080</td>
<td>0.025</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.22</td>
</tr>
<tr>
<td>SIZE</td>
<td>-0.352***</td>
<td>0.352***</td>
<td>-0.217***</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.81</td>
</tr>
<tr>
<td>CAP</td>
<td>-0.028</td>
<td>0.242***</td>
<td>-0.394***</td>
<td>0.607***</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td>1.85</td>
</tr>
<tr>
<td>LIQUID</td>
<td>0.022</td>
<td>0.113*</td>
<td>0.086</td>
<td>0.231***</td>
<td>0.073</td>
<td>1.000</td>
<td></td>
<td></td>
<td>1.13</td>
</tr>
<tr>
<td>GDPG</td>
<td>-0.144**</td>
<td>0.132**</td>
<td>-0.010</td>
<td>0.016</td>
<td>0.019</td>
<td>-0.010</td>
<td>1.000</td>
<td></td>
<td>1.04</td>
</tr>
<tr>
<td>INF</td>
<td>-0.063</td>
<td>-0.022</td>
<td>0.128*</td>
<td>-0.195***</td>
<td>-0.259**</td>
<td>0.164***</td>
<td>-0.132**</td>
<td>1.000</td>
<td>1.15</td>
</tr>
</tbody>
</table>

Notes: Symbols ***, **, and * denote the significance level at 1%, 5%, and 10%. All variables are defined in Table 1.

4.3 Baseline Regression Results: Static Model (OLS, FEM, and REM)

The empirical evidence on determinants of stock return volatility is provided in Table 4. Column (1) to Column (4) show the findings based on the approach of Ordinary Least Squares (OLS), Fixed-effect regression model (FEM), Random-effect regression model (REM) and Fixed-effect regression model (FEM) with standard error of Driscoll and Kraay (1998), respectively. We put these regression methods next to each other to produce more robust findings when making comparisons among different regression approaches. We discuss the main results as follows.

For more details, all else equal, TOBINQ has a significantly positive impact on stock return volatility, irrespective of static method regression included. This implies the improved performance could show an increase in fluctuations in stock return for listed commercial banks in a study sample. For magnitude at an extreme case (Model 1), 1% increase in TOBINQ could produce a marginal increase of 0.0028% in stock return volatility. For the case of DROA, we observe the positive influence of volatility of return on total assets on determining stock return volatility. This indicates that an increase in stock return movement is as a result of an increase in bank risk. For the extreme size of coefficients (Model 2), 1%
increase in bank risk could lead to an increase of 1.585% in SPV. In addition, findings indicate that banks’ capital and liquidity have a significantly positive impact on SRV in a manner that 1% increase in bank’s capital and liquid assets may lead to a small increase in SRV of 0.0006% and 0.016%, respectively, for extreme cases in the model (Model 1).

Concerning macro-economic factors, we observe the negative impact of GDPG and INF on SRV, suggesting the eliminating effect of these variables on stock return movements. The impact of GDPG is significant across all models rather than that of INF with only two models remaining significant. All else equal, for its magnitude of coefficients in extreme cases (Model 1), findings reveal that 1% increase in economic growth and inflation are likely to cause a 0.0015% and 0.0005% drop in SRV, respectively.

Taken together, a set of determinants of stock return volatility also show a significant in predicting the fluctuation of stock return volatility in which banks’ performance, risk, capital, and liquid assets have a positive impact on SRV, whereas scale and both macro-economic factors such as growth rate of GDP and inflation could have a opposite influence on SRV.

Table 4. Regression Results for a Static Model (OLS, FEM, REM, and FEM with Driscoll and Kraay (1998) Standard Error)

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOBINQ</td>
<td>0.0028***</td>
<td>0.0024**</td>
<td>0.0024†</td>
<td>0.0025***</td>
</tr>
<tr>
<td></td>
<td>(0.0008)</td>
<td>(0.0012)</td>
<td>(0.0012)</td>
<td>(0.0010)</td>
</tr>
<tr>
<td>DROA</td>
<td>1.0410</td>
<td>1.5847**</td>
<td>1.5847***</td>
<td>1.1696</td>
</tr>
<tr>
<td></td>
<td>(0.7995)</td>
<td>(0.8161)</td>
<td>(0.5549)</td>
<td>(0.8049)</td>
</tr>
<tr>
<td>SIZE</td>
<td>-0.0085***</td>
<td>-0.0031</td>
<td>-0.0031</td>
<td>-0.0080***</td>
</tr>
<tr>
<td></td>
<td>(0.0008)</td>
<td>(0.0021)</td>
<td>(0.0022)</td>
<td>(0.0010)</td>
</tr>
<tr>
<td>CAP</td>
<td>0.0006***</td>
<td>0.0004**</td>
<td>0.0004†</td>
<td>0.0006***</td>
</tr>
<tr>
<td></td>
<td>(0.0001)</td>
<td>(0.0002)</td>
<td>(0.0002)</td>
<td>(0.0001)</td>
</tr>
<tr>
<td>LIQUID</td>
<td>0.0161***</td>
<td>-0.0028</td>
<td>-0.0028</td>
<td>0.0124**</td>
</tr>
<tr>
<td></td>
<td>(0.0048)</td>
<td>(0.0075)</td>
<td>(0.0111)</td>
<td>(0.0059)</td>
</tr>
<tr>
<td>GDPG</td>
<td>-0.0015***</td>
<td>-0.0007**</td>
<td>-0.0007</td>
<td>-0.0014***</td>
</tr>
<tr>
<td></td>
<td>(0.0004)</td>
<td>(0.0004)</td>
<td>(0.0007)</td>
<td>(0.0004)</td>
</tr>
<tr>
<td>INF</td>
<td>-0.0005***</td>
<td>0.0001</td>
<td>0.0001</td>
<td>-0.0004***</td>
</tr>
<tr>
<td></td>
<td>(0.0001)</td>
<td>(0.0002)</td>
<td>(0.0002)</td>
<td>(0.0001)</td>
</tr>
<tr>
<td>CONS</td>
<td>0.1828***</td>
<td>0.0743†</td>
<td>0.0743†</td>
<td>0.1743**</td>
</tr>
<tr>
<td></td>
<td>(0.0137)</td>
<td>(0.0401)</td>
<td>(0.0408)</td>
<td>(0.0181)</td>
</tr>
</tbody>
</table>

Notes: Symbols ***, **, and * denote the significance level at 1%, 5%, and 10%. All variables are defined in Table 1.

4.4 Baseline Regression Results: Dynamic Panel Model (S-GMM)

To capture the dynamic nature of the dependent variable and the issue of endogeneity, we revisit the aforementioned regression by using the S-GMM. Before discussing the research findings, we should look at the Hansen test, which significantly demonstrates the validity of instrument variables and no presence of second-order autocorrelation. The model with S-GMM approach also indicates presence and absence of the first- and second-order serial association in the error terms. Moreover, the lagged dependent variable shows a significantly positive; all these justifying our regression framework. Table 5 presents qualitatively similar results as reported previously, except for DROA and CAP showing no significance. These variables need to be tested in the panel regression quantile to confirm the existence of any impact on SRV.
Table 5. Regression Results for a Dynamic Model (Two-Step System GMM)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficient</th>
<th>t-statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>lSRV</td>
<td>0.2538***</td>
<td>3.83</td>
<td>0.001</td>
</tr>
<tr>
<td>TOBINQ</td>
<td>0.0109**</td>
<td>2.5</td>
<td>0.021</td>
</tr>
<tr>
<td>DROA</td>
<td>-0.7791</td>
<td>-1.01</td>
<td>0.324</td>
</tr>
<tr>
<td>SIZE</td>
<td>-0.0076***</td>
<td>-6.64</td>
<td>0.000</td>
</tr>
<tr>
<td>CAP</td>
<td>0.0002</td>
<td>1.13</td>
<td>0.269</td>
</tr>
<tr>
<td>LIQUID</td>
<td>0.0124**</td>
<td>2.31</td>
<td>0.031</td>
</tr>
<tr>
<td>GDPG</td>
<td>-0.0012***</td>
<td>-3.23</td>
<td>0.004</td>
</tr>
<tr>
<td>INF</td>
<td>-0.0005***</td>
<td>-4.51</td>
<td>0.000</td>
</tr>
<tr>
<td>CONS</td>
<td>0.1554***</td>
<td>7.35</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Number of Banks 22
Number of Instrument 14
AR (1) 0.004
AR (2) 0.351
Hansen 0.268

Notes: Symbols ***, **, and * denote the significance level at 1%, 5%, and 10%. All variables are defined in Table 1.

4.5 Generalized Quantile Panel Regression

To provide more insights into the impact of explanatory variables on the conditional values of the dependent variable, we analyze the regression model by adding more advanced regression, namely panel quantile regression, mainly based on the different distribution of dependent variable possibly driven by explanatory proxies in the study model. This is a reasonable way to test the robustness of findings as discussed previously and shows several stories of determinants of stock return volatility through its value distribution. As reported in Table 6, from the 0.25-0.75 quantiles, TOBINQ shows a positive impact on SRV. In addition, CAP and LIQUID have significantly positive effects on almost all SRV quantile levels. In addition, SIZE shows the consistent negative influence across all quantile levels (0.1-0.9), which is similar to the case of GDPG. For the case of INF, quantile levels all report the negatively driving of inflation on SRV, except for the middle quantile level. On the contrary, DROA shows no significant impact on SRV at any quantiles, implying ambiguous effect in driving stock return volatility. These results are consistent with aforesaid findings, which confirms significant drivers of stock return volatility, except for bank risk (DROA).

Table 6. Results of Generalized Quantile Panel Regression

<table>
<thead>
<tr>
<th></th>
<th>Q10</th>
<th>Q25</th>
<th>Q50</th>
<th>Q75</th>
<th>Q90</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOBINQ</td>
<td>0.0010</td>
<td>0.0016**</td>
<td>0.0021**</td>
<td>0.0031**</td>
<td>0.0037</td>
</tr>
<tr>
<td></td>
<td>(0.0007)</td>
<td>(0.0008)</td>
<td>(0.0009)</td>
<td>(0.0013)</td>
<td>(0.0023)</td>
</tr>
<tr>
<td>DROA</td>
<td>0.5775</td>
<td>0.9581</td>
<td>1.0131</td>
<td>0.8140</td>
<td>0.5013</td>
</tr>
<tr>
<td></td>
<td>(0.6773)</td>
<td>(0.7394)</td>
<td>(0.8526)</td>
<td>(1.2098)</td>
<td>(2.2179)</td>
</tr>
<tr>
<td>SIZE</td>
<td>-0.0038***</td>
<td>-0.0060***</td>
<td>-0.0067***</td>
<td>-0.0088***</td>
<td>-0.0141***</td>
</tr>
<tr>
<td></td>
<td>(0.0006)</td>
<td>(0.0007)</td>
<td>(0.0008)</td>
<td>(0.0011)</td>
<td>(0.0021)</td>
</tr>
<tr>
<td>CAP</td>
<td>0.0003***</td>
<td>0.0005***</td>
<td>0.0006***</td>
<td>0.0007***</td>
<td>0.0012***</td>
</tr>
<tr>
<td></td>
<td>(0.0001)</td>
<td>(0.0001)</td>
<td>(0.0001)</td>
<td>(0.0002)</td>
<td>(0.0003)</td>
</tr>
<tr>
<td>LIQUID</td>
<td>0.0091**</td>
<td>0.0115***</td>
<td>0.0116**</td>
<td>0.0139*</td>
<td>0.0177</td>
</tr>
<tr>
<td></td>
<td>(0.0040)</td>
<td>(0.0044)</td>
<td>(0.0051)</td>
<td>(0.0072)</td>
<td>(0.0133)</td>
</tr>
<tr>
<td>GDPG</td>
<td>-0.0006*</td>
<td>-0.0013***</td>
<td>-0.0015***</td>
<td>-0.0017***</td>
<td>-0.0022**</td>
</tr>
<tr>
<td></td>
<td>(0.0003)</td>
<td>(0.0003)</td>
<td>(0.0004)</td>
<td>(0.0005)</td>
<td>(0.0010)</td>
</tr>
<tr>
<td>INF</td>
<td>-0.0003***</td>
<td>-0.0005***</td>
<td>-0.0001</td>
<td>-0.0005**</td>
<td>-0.0008**</td>
</tr>
</tbody>
</table>

37
5. Conclusion

Research on stock return volatility aims to predict the series of future stock returns rather than to determine the critical factors driving this volatility. In other words, the majority of volatility research is conducted with the intention of forecasting future stock prices; however, very few articles discuss the elements that influence volatility in particular. Several studies have attempted to find the drivers of stock price or stock return because this could have profound implications for investors. However, there is a lack of deep insight into the determinants of stock return volatility. To better understand the volatility of stock returns, this paper mainly focuses on the analysis of the banking sector in Vietnam. We analyzed the impact of macro-economic and bank-specific drivers of stock return volatility for a sample of 24 commercial banks listed in HOSE, HXN, and UPCOM covering the period of 2006Q2 to 2021Q1.

The findings reveal that good performance, capitalization, and liquidity have positive implications on stock return volatility, suggesting that these important elements increase stock return volatility. Except for bank risk, which has an ambiguous impact on stock return volatility, the opposite impact is true for bank size and macroeconomic factors like economic growth and inflation. Based on the dependent variable’s values, the influence of explanatory variables on stock return volatility is considerable at almost quantile levels.

Our research findings offer some implications for related parties who have a desire to observe the fluctuations of stock returns. For bank managers, paying attention to the information captured in bank-specific balance sheet items as well as macroeconomic factors could be important implications for the direction of stock return volatility. With regard to investors, these results could be a reference to investment decision-making when it comes to the factors associated with stock return volatility stemming from other bank-specific characteristics in addition to the banks’ stock price by itself. Concerning policymakers, excessive volatility of stock return could be a signal for issues of systematic risk, which give rise to follow the information of determinants of stock return movements.

This research could not avoid limitations relating to the inadequate inclusion of bank-specific and market variables that have a potentially critical role on stock return volatility. For more details, as noted in previous studies, these variables include interest rate, banks’ stock beta, long-run investments to total assets, the ratio of fee and commission income over total assets and among others, which is excluded due to the data availability on the quarterly basis. Further research could integrate more variables possibly driving the fluctuation and redo all the regression in current study. Moreover, the replication of this paper could be applied to other emerging contexts to have more representative evidence on determinants of stock return volatility.

References


**Impact of Blockchain Technology on Accounting Information Systems**

Le Thi Cam Dung a*, Thai Hong Thuy Khanh b & Nguyen Thi Hai c

a,b,c: Finance and Accounting, Nguyen Tat Thanh University, Ho Chi Minh City

*ltcdung@ttt.edu.vn

**Abstract:** Technology is developing more and more strongly, leading to increasing levels of influence on people's lives in general and professional fields in particular. In order to keep pace with the development of information technology in the current period, the application of Blockchain in many industries and fields is really necessary, including the implementation of technologies this Blockchain in the accounting information system. The goal of the article is to consider the application of Blockchain technology in the AIS and to determine the impacts of Blockchain on the AIS. The research is carried out by descriptive statistics method through the collection of domestic and foreign documents and research articles on Blockchain and their impact on the AIS and the accounting field. The information in the article is mainly secondary information that has been collected, filtered, classified and sorted by the authors. Research results show that the application of Blockchain technology to the accounting field will bring more advanced features. An AIS based on Blockchain technology can provide a real-time accounting reporting system, prevent fraud, secure and transparent accounting information, ensure the security and privacy of customers. The authors believe that this finding will encourage businesses in Vietnam to use more Blockchain technology in the AIS in the future.

**Keywords:** blockchain, accounting information system, impact, Vietnam

1. **Introduction**

In the context of the stormy development of the current 4.0 technology revolution, Blockchain - digital technology is a special topic that receives a lot of attention on domestic and foreign forums. In Vietnam, on September 27, 2018, the Ministry of Science issued Decision No. 2813/QĐ-BKHCN approving the national key science and technology program for the period up to 2025: “Supporting research and development and technology application of industry 4.0, in which blockchain (Blockchain), is ranked second after Artificial Intelligence (Artificial Intelligence) in the series of key technology products of the 4.0 technology revolution. Vietnamese experts in recent years have also focused on many areas of Blockchain and have had initial products: Blockchain platform, Blockchain application in healthcare, electronic invoices, traceability of goods, etc. agricultural products and there have been trials in the banking and customs sectors. However, there are not many articles or in-depth studies on the influence of Blockchain on AIS. Therefore, in this article, the authors synthesize and analyze the impact of Blockchain on AIS with the desire to contribute a more multi-dimensional view for businesses before the challenge of applying new technology in professional practice.

2. **Theoretical Background Overview**

2.1 **Introduction to Blockchain**
Over the past decade, the application of Blockchain has increased so much that it is considered the greatest revolution since the advent of the internet. The leading applications of Blockchain technology are typical in the following prominent areas:

**Cryptocurrencies:** Cryptocurrency is the most prominent Blockchain application. Blockchain benefits for cryptocurrency are that there is no territorial boundary, and it is used for the global transaction.

**Anti-Money Laundering:** Blockchain transaction creates an immutable record, the Blockchain ledger performs the function of monitoring, validating, and recording transaction history so that the authorities can easily trace the origin amount of money.

**Supply Chain Management:** The Blockchain's immutable ledger makes it suitable for real-time tracking of goods as they move and change hands in the supply chain.

**Healthcare:** Applying Blockchain technology to track medicines and prescriptions throughout the supply network, the application of this technology helps prevent counterfeit drugs.

**Food traceability:** Using Blockchain technology to enable transparent and guaranteed traceability of product information, from production to consumption, it is updated to a system using a Blockchain platform. This information is integrated with a barcode on the product, this technology helps to reduce costs and increase transparency.

### 2.2 The Origin and Development of Blockchain

In 1991, Stuart Haber and W. Scott Stornette introduced a computationally realistic solution for digital documents that were timestamped so that they could not be tampered with. Cryptographically secured Blockchains were first described.

In 1998, a decentralized digital currency working on 'bit gold' by computer scientist Nic Szabo was born. In 2000 Stefan Konst published a cryptographically secure string theory, with ideas for implementation.

In 2004 scientist Hal Finney announced a system called Reusable Proof of Work (RPoW) as the foundation for digital currency, it was an important turning point in the history of cryptocurrency, for allowing users around the world to verify correctness in real-time.

In 2008, a person or group of people with the pseudonym Satoshi Nakamoto established the model for the distributed Blockchain. This design added blocks to the original chain without being signed by trusted parties. In 2009 implemented the first Blockchain as a public ledger of transactions made in Bitcoin. In Satoshi Nakamoto's original paper the words block, and chain turned into a single word, Blockchain in 2016.

From its birth until 2013 bitcoin was in an upward trajectory, then Thailand, and China banned the cryptocurrency, and the US confiscated 26,000 bitcoins despite these failures Bitcoin magazine co-founder Vitalik Buterin. The proposed decentralized application platform led to the establishment of the Ethereum Foundation in 2014, paving the way for Blockchain technology to be separated from the monetary sector, in financial transactions it has great potential.

More and more people are interested in using Blockchain for application areas other than cryptocurrencies, this trend is increasingly exploding as more governments and businesses invest in the research and use of Blockchain to handle activities related to its field such as intellectual property...
rights, financial services, vaccine distribution, healthcare, food traceability, and voting. Blockchain application to AIS.

2.3 What is Blockchain?

According to the blockchain web, a blockchain is a growing list of records, called blocks, that are linked by cryptography. By design, Blockchains are immutable and resistant to data modification.

According to Robert Sheldon, blockchain is a type of database, a public ledger for recording transactions. The Blockchain is distributed on a peer-to-peer (P2P) network. It is made up of blocks of data that are linked together to form a continuous sequence of immutable records. Each computer in the network maintains a copy of the ledger to avoid errors at a single point in time. Blocks are added in order and are permanently tamper-proof.

2.4 Introduction to AIS

According to Susanto (2013), AIS is an essential integration of diverse business processing systems, the synthesis of subsystems, and associated components, and harmoniously combined to handle the problem. financial data into accounting information. According to this understanding, an AIS will perform activities such as: Collecting, and recording input data, storing and processing data to generate information, and providing output information to decision-makers. (Romney & Steinbart, 2015).

An accounting information system is an integrated framework within a company that uses physical resources to convert economic data into financial information for operating and managing a company's operations and reporting results. company to stakeholders (Wilkinson et al., 2000).

An accounting information system is a complex system consisting of a mixture of many interrelated components such as data, information, human resources, information technology equipment, accounting models, and procedures continuously related to income, classification, and recording of accounting data for stakeholders to make decisions (Mancini et al., 2013).

3. Blockchain from an Accounting and Auditing Perspective

According to Wang and Kogan (2018) several reports, such as PwC 2016 Deloitte 2016, EY 2016, and KPMG 2017, reported that the use of Blockchain technology by auditing firms increases the efficiency of the process audit.

Under Blockchain technology, users of financial information will not need to rely on an auditor's assessment of the truthfulness of financial statements but can greatly ensure that financial statements are compiled in a timely and accurate manner. generate their own non-monetary reports. adjustments, such as depreciation and inventory valuation (Potekhina & Riumkin, 2017).

Modifying asset records from previous years, this type of error or fraudulent activity is sometimes difficult if Blockchain application because it is not possible to change the data once it has been recorded and the data is modified in real time. (Potekhina & Riumkin, 2017).

According to Wang and Kogan (2017), the advent of Blockchain creates new possibilities and threats for real-time continuous auditing and accounting. Continuous auditing and real-time accounting are designed to develop integrated and real-time accounting information systems to enable reliable and low-cost accounting and auditing. Moreover, the stability and refund feature will facilitate the exchange of information and prevent fraud. Although the application of Blockchain in accounting and auditing is still in its infancy, it promises to share financial statements with a high degree of security and privacy.
4. Impact of Blockchain Technology on AIS

In fact, according to statistics and researchers, managers often receive inaccurate, incomplete, or accurate information, but it is not timely. Besides, accountants also face information overload, especially in the field of internal audit and control, where the volume and complexity of information to be examined is very large. Therefore, the application of Blockchain technology in accounting is the best solution to help businesses solve the above problems.

According to Tarifa-Fernandez et al. (2019) explore more specifically the challenges that Blockchain poses to accounting information systems (AIS), delineating and categorizing their actions and opportunities. These authors analyze key theories of corporate management to study the impact of Blockchain technology on information system accounting and its implications for corporate stakeholders. The authors found 17 uses of Blockchain technology in the accounting information process:

- The certainty of the completion of the transaction;
- Improve supplier/consumer choices in the supply chain;
- Align the organization's goal management actions;
- A more harmonious relationship between managers and owners;
- Automate some transactions;
- Verify that accounting rules have been applied;
- Avoid mistakes;
- Reliability of information;
- Deterrence against concealment; confirm to both parties that the transaction has occurred;
- Confidentiality of information privacy;
- Evidence that the information has not been tampered with;
- Inability to change information;
- Reduce lost data;
- Traces enable transaction tracing;
- Control management actions;
- Spot any need throughout the process.

AIS consists of five parts: (1) Data collection, (2) Data processing, (3) Storage, (4) Information provision, and (5) Control and feedback. These departments work together to perform accounting processes and connect business activities to create value for the business.

AIS, if based on Blockchain technology, can provide a real-time accounting and reporting system, prevent payment fraud, secure and transparent accounting information, ensure confidentiality, and owner privacy.

Blockchain can create a decentralized ledger system, with high reliability and minimal operating costs. Therefore, the use of Blockchain in accounting is very important. A promise to simplify compliance with legal requirements strengthens double accounting, whatever that may be.

When you use Blockchain, the ledger is not meant to replace the current ledger, which is an improvement to business and accounting records. The advantage of this tool is that it is much more secure than traditional accounting (Coyne & McMickle, 2017).

A decentralized Blockchain-based accounting information system, so authority and control are distributed, reducing the risk of manipulation. It is also a system-intensive and non-laboratory work the data it uses refers to linear transactions, which makes it possible to enter data consecutively. Another fundamental feature of it is the ability to incorporate smart contracts that allow processes to self-execute, increasing controllability.

Besides the advantages, Blockchain technology still has some disadvantages as follows: Although protected by the consensus algorithm, the software Blockchain-based development is still the prey of more than 50% of cyber-attacks. Modifying data is extremely difficult: once the data is put into the Blockchain, it is very difficult to modify. Stability is an advantage but at the same time a disadvantage of Blockchain.
5. Research Methods and Data

The article uses qualitative research methods:

Descriptive statistics to determine the applicability and impact of Blockchain on AIS, interviewing using questionnaires. At the same time, the authors collect domestic and foreign documents and research articles on Blockchain and their impact on AIS that have been collected, selected, classified, and sorted by authors. The authors hope to close this topic in accounting academic literature.

To serve the research objective of evaluating the applicability of Blockchain technology to AIS and in the field of accounting and auditing in general, thereby analyzing the impacts of Blockchain technology on AIS, the authors assume Using the interview method through survey questionnaires at 50 enterprises with a total of 140 accountants, auditors, and administrators at enterprises in Ho Chi Minh City. The design questionnaire was sent online to the interviewees via email. The study used mainly descriptive statistics of the research results.

Research data were collected from 102 responses from managers, accountants, and auditors and presented in Table 1.

Table 1. Description of the Survey Sample

<table>
<thead>
<tr>
<th>Classification Group</th>
<th>Classification Criteria</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interview subject</td>
<td>Manager at enterprise</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>Accountant</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>Auditor</td>
<td>30</td>
</tr>
<tr>
<td>Type of business</td>
<td>Medium Enterprise</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Big business</td>
<td>20</td>
</tr>
</tbody>
</table>

6. Research Results and Discussion

The survey results show that the percentage of enterprises having investment policies for technology application and innovation following the trend of the 4.0 technology revolution is not high. 15/50 surveyed enterprises account for 30%, and the proportion of enterprises having an organizing training program for employees on skills to apply new technologies in accounting and auditing is still low 5/50 surveyed enterprises account for 10%, and the proportion of enterprises that do not have investment policies for application and innovation of technology according to the trend of technology revolution 4.0 is still high, but 30/50 surveyed enterprises account for 60%. The survey results are shown in Figure 1.
For managers, when asked, 10/28 accounting for 35.7% of managers are willing to invest in technology in accounting and auditing (shown in Figure 2). However, when the authors conducted a survey, If the respondents have knowledge about Blockchain technology and its application to AIS, the results show that only 32/102 accounting for 31.4% of respondents know about Blockchain technology and its applications to AIS (shown in Figure 2).
According to the survey results of a group of people who do not support the application of Blockchain technology to AIS, they think that their understanding of Blockchain technology is still limited, so they are worried about a high level of risk, besides, organizations are still hesitant to use new technology. Most respondents believe that changing mindsets, changing traditional ways of working, especially in the accounting and auditing industry, is not easy and takes a long time to adapt.

7. Discussion and Recommendation of Policies to Increase the Application of Blockchain Technology in AIS and in the Field of Accounting and Auditing in General in Vietnam

In the world, there are many enterprises applying Blockchain technology in many fields, such as: Google explores the use of Blockchain to enhance security of cloud services and protect data; Apple filed a patent related to Blockchain in the system to generate and confirm the timing of transactions on the network – aka timestamp; Alibaba announced that import e-commerce platform Koala has updated its products to include a blockchain traceability system; Facebook explores the use of blockchain to enhance user security and privacy; Nestle deploys Blockchain technology to track coffee information; Ford Blockchain application creates a blockchain-based database to store vehicle identifiers; Walmart is currently using Blockchain technology to create a food traceability system.

The 4.0 technology revolution with the increasing application of technology in all fields has been comprehensively changing many areas of the domestic and foreign economy, including the accounting and auditing fields. But here is the application of Blockchain technology to AIS. According to the survey results, the application of Blockchain technology in accounting and auditing is still very new in Vietnam, there are very few businesses willing to apply Blockchain technology in accounting activities and its audit and the number of people knowledgeable about Blockchain technology is still limited. Therefore, to increase the application of Blockchain technology to AIS in particular and in the field of accounting and auditing in general in Vietnam, the authors have made some recommendations as follows:

a. Accounting and auditing staffs need to have professional knowledge, need to update more information about technology, as well as new applications in the working environment of the industry in the future.

b. On the business side, it is necessary to develop a team of skilled employees with deep professional knowledge and ability to integrate; Strengthen training and development of soft
skills; Update knowledge about Blockchain technology for administrators as well as accounting and auditing staff.

c. All countries have the same starting point. Therefore, Vietnam has the opportunity to compete fairly, shoulder to shoulder with other countries, if we have a strategy, training process and legal corridor as the basis for the application of Blockchain technology to AIS in particular and in the field of accounting and auditing in general in Vietnam.

At the same time, the authors have pointed out the impacts of Blockchain technology on AIS, the authors hope that with these findings, along with some recommendations that the authors have made, there will be many businesses in Vietnam. Nam applies Blockchain technology to AIS and in the field of accounting and auditing in general in the near future.

8. Conclusion

The study has shown the impacts of Blockchain technology on AIS and assessed the applicability of Blockchain technology in AIS and in the field of accounting and auditing in general in Vietnam. The limitation of this study is that it does not conduct empirical or applied tests using real data. To face these limitations, this opens many doors for researchers to conduct research in future addresses these limitations and limitations by using experimental tools and applications to examine the importance or determinants and requirements of Blockchain in accounting or auditing work.

Acknowledgment

This research is funded by Nguyen Tat Thanh University, Ho Chi Minh city, Vietnam.

References


Le Thi Kim Thoa & Tran Anh Son (2023). Impact of blockchain on the accounting information system applicability in Vietnamese enterprises.


Research on the Trend of Cryptocurrency Development in Vietnam in the Digital Age: Situation and Solutions

Giang Tran Thi Huong a, Khanh Thai Hong Thuy b & Khoa To Le Nguyen c

a,b,c Faculty of Finance and Accounting, Nguyen Tat Thanh University, Vietnam

*tthgiang@ntt.edu.vn

Abstract: Currently, along with the development of science and technology, digital currency, also known as cryptocurrency, is gradually becoming an object of transactions worldwide with a huge volume. Especially for cryptocurrency, a type of digital currency that is not issued by central banks, created by algorithms and encrypted based on DLT/Blockchain technology. Cryptocurrency transactions are increasing worldwide, and it has brought significant changes in many fields, particularly in the financial and banking systems. In Vietnam, although there is no official regulation, trading and buying and selling of cryptocurrencies are still happening every day, posing significant challenges for management. This research article aims to investigate the current situation and trends of cryptocurrency development in Vietnam and its potential growth and impact on the country's financial system. The study also examines the challenges and potential risks related to the use of cryptocurrency in Vietnam. Based on the analysis, this study provides recommendations for policymakers to operate the currency market effectively and address the challenges and potential risks. The findings of this research contribute to the understanding of the future of cryptocurrency in Vietnam and the potential opportunities and challenges that it may bring to the country's financial system. This study also highlights the importance of regulating cryptocurrency trading and creating a transparent and secure legal framework to facilitate the development of the cryptocurrency market in Vietnam.

Keywords: digital currency, cryptocurrency, cryptocurrency exchange, digital age, dlt/blockchain technology, bitcoin, central bank, Vietnam

1. Introduction

The trend of developing cryptocurrencies in the digital age has become a widely discussed and concerned topic worldwide in recent years. With the advancement of technology and the internet, cryptocurrencies have become a popular and convenient means of payment. In Vietnam, cryptocurrencies are also becoming an increasingly used payment method.

According to the latest report by market research company Finder, Vietnam is leading Southeast Asia in the use of cryptocurrencies. Notably, Bitcoin is the most used cryptocurrency in Vietnam and is widely used in online transactions.

However, the use of cryptocurrencies in Vietnam faces many risks and challenges. Some banks and financial institutions still do not accept cryptocurrencies as a legitimate means of payment, and some users are also concerned about safety and risks in using cryptocurrencies.

Research on the trend of developing cryptocurrencies in Vietnam will help us better understand the situation of cryptocurrency development in the country and provide appropriate solutions and policies to ensure safety and sustainable development for the cryptocurrency market in Vietnam.
2. Situation on the Trend of Cryptocurrency Development in Vietnam in the Digital Age

2.1 Cryptocurrency: Virtual Currency, Digital Currency, or Encrypted Currency?

The term "cryptocurrency" is still relatively new, and its definition and classification have caused confusion for governments around the world. In Vietnam, there is currently no official definition of "cryptocurrency", and various terms are used which can lead to misunderstanding about its nature. Cryptocurrency comes in two main forms: coins and utility tokens (referred to as tokens for short).

Coins are typically open-source and managed and developed in a decentralized manner with the purpose of being used as a means of payment or stored as an asset. Tokens are usually issued and managed by individuals or companies for the purpose of exchanging the right to use a specific utility or application.

All cryptocurrency transactions are encrypted and placed on separate blockchains on the internet, with most being confirmed through a decentralized computer system to ensure security and transparency.

Therefore, cryptocurrency shares some similarities with virtual currency and digital currency, but there are two fundamental differences: (i) Virtual and digital currency are issued and controlled centrally by companies, individuals, or central banks (through the banking system); and (ii) Most virtual and digital currency transactions are not encrypted which can lead to transaction content and personal information being compromised in the event of an illegal intrusion.

Recently, the term "cryptocurrency" meaning "virtual currency" or "virtual asset" has been widely used, leading to a misunderstanding about its meaning and value. Standardization of terminology and definition is an important and necessary issue.

2.2 The Overall Picture of Cryptocurrency in the World

The year 2022 can be considered as a "purifying" year of the crypto market, witnessing many of the biggest changes in trends and characteristics of the "finance-technology" industry with much controversy. Previously, many trends were overinflated, and speculation caused the market to exceed its value in 2021. Large corrections of crypto are necessary for long-term development.

The changes in crypto are greatly influenced by the general economy. After the US Federal Reserve continuously raised interest rates to limit inflation, the US stock market had its sharpest decline since the 2008 financial crisis. Due to the close correlation with traditional finance since being held by many large organizations, the crypto market also suffered a significant decline.

Specifically, many large crypto projects and investment funds went bankrupt such as Terra, 3AC, and FTX. Bitcoin billionaires lost much of their assets such as CZ losing $60 billion and Brian Armstrong losing $4.5 billion. The price of Bitcoin decreased by more than 60% in 2022 to around $17,000. The NFT market plummeted as rare NFTs that were once sold for millions of dollars like CryptoPunk, now only worth hundreds of thousands of dollars.

The decline opened challenges for 2023 but also many opportunities for the crypto market. Resilient projects, well-prepared for the upcoming "Bull Run" market trend. 2023 will be an accumulation phase, laying the foundation for the next cycle. The market may experience the strongest growth in the period of 2024 to 2025 when the appetite for risk and speculation returns. In which, the crypto and stock markets will continue to have a positive correlation, according to the company's statement.

Similarly, the Messari analysis platform has a positive outlook, stating that the "crypto winter" has passed and now is a great time to build projects. The development and presence of crypto in the future are certain, even though purification is happening. Especially when the macro market recovers, the crypto market will have strong changes.
In addition, centralized exchanges such as Coinbase or Crypto.com also have optimistic views of the market in 2023. The electronic trading platform, Huobi, predicts that the crypto market will hit bottom in early 2023. Web2 giants like Twitter will continue to develop towards Web3 and introduce new SociaFi models.

Therefore, regarding the market trend in 2023, research and investment funds have a consensus that the first half of 2023 will be challenging for investment markets like crypto. However, the second half of 2023 will be a good time for investors to accumulate and look forward to the market's growth in the coming years.

3. Cryptocurrency Landscape in Vietnam

Vietnam is the world's leading country in accepting cryptocurrencies for two consecutive years, 2021 and 2022. According to the Vietnam Crypto Market Report 2022 released by Coin98 on February 26, Vietnam has the second-largest cryptocurrency ownership rate in ASEAN after Thailand and is one of the top five countries in blockchain development.

The perspective on blockchain in Vietnam has also undergone significant changes in 2022. Although there is no legal framework yet, the Vietnamese government has begun supporting and creating opportunities for new technology by researching and applying blockchain technology in education, and economics, and initiating legal research for crypto.

Vietnam is also one of the world's leading countries in accepting crypto, ranking in the top 10 countries with the highest number of users on crypto exchanges and decentralized applications.

From July 2021 to June 2022, the value of digital asset trading activities in Vietnam reached 112.6 billion USD, higher than Singapore's (101 billion USD). According to the Markets and Markets report, the blockchain-related market in Vietnam is expected to reach nearly 2.5 billion USD in 2026, five times the scale compared to 2021.

As of December 2022, Vietnam has more than 200 active blockchain projects in various fields, mainly in GameFi, DeFi, and NFT. Some projects have even reached a market capitalization of over 1 billion USD, becoming prominent technology unicorns in the region.

One of the reasons that is believed to have contributed to the rapid development of crypto in Vietnam is the explosion of the "Play to Earn" trend. After Axie Infinity, a Vietnamese GameFi project exploded and reached a market capitalization of over 9.7 billion USD, the crypto market in Vietnam experienced rapid growth. Many projects have reached a market capitalization of over 100 million USD, attracting new players and investors.

Vietnam is a developing country with a young population, and crypto has become one of the preferred investment channels for investors. Despite the risks, along with high profits comes the favored taste of young investors.

The crypto map of Vietnam has witnessed many unicorn projects and is currently in a period of "favorable conditions and favorable location" to transform and develop into a blockchain center in the world if seizing the opportunity. Although undergoing a difficult period with many projects having to temporarily suspend operations, many Vietnamese projects are still developing and expanding their staff during the "digital winter season" with confidence in the future of Bitcoin.
4. Fields of Crypto Development in Vietnam

According to the 2022 Vietnam Crypto Market Report, there are over 200 active Blockchain projects in Vietnam spanning various sectors. The country is primarily developing in the areas of GameFi, DeFi, NFT, Web3, infrastructure, and wallets (e-wallets).

4.1 Gaming, Metaverse

On average, Vietnamese people spend 3.9 hours playing games each day, which is 10% higher than in the United States, according to Data.ai. Vietnam also has 5 names on the list of top 10 largest game publishing companies in the Southeast Asia, Australia, and New Zealand (ANZSEA) region, including Amanotes, OneSoft, GameJam, VNG, and Arrasol. Therefore, the number of blockchain game projects accounts for the majority, about 28.8% of Vietnam's crypto market. The game content is diverse, ranging from pet raising, and role-playing, to science fiction.

One of the most prominent blockchain game projects is Axie Infinity developed by Sky Mavis. The project reached a market capitalization of $9.7 billion at one point. Besides Axie Infinity, there are also many other notable blockchain projects such as Ancient8, Yield Guild Games, Thetan Arena, Sipher, and Summoner Arena that have made their mark on the crypto market.

However, there are also a few trend-following projects, with many projects exhibiting signs of scams such as Zuki Moba, Crypto Bike. These scam projects have caused many investors to lose money and be cautious, losing faith in crypto projects developed by Vietnamese teams, especially with projects with anonymous teams.

4.2 DeFi

In the Vietnamese market, DeFi projects are still in the early stages of development and are not yet focused on generating revenue or profit. However, this is also an area with attractive revenue potential as it accounts for 38% of the total revenue of the entire market in the first 8 months of 2022. Revenue from DeFi projects typically comes from transaction fees. The DeFi sector accounts for 26% of the Vietnamese crypto market, with prominent DeFi projects including Coin98 Finance, Kyber Network, and Rikkai Finance.

4.3 NFT

NFT is one of the most profitable areas in the crypto market, especially NFT Marketplace development projects. As of the first 8 months of 2022, the revenue of the NFT Marketplace group accounted for 49% of the total market. This lucrative market accounts for 12.4% of Vietnam's crypto market with prominent projects including Axie Infinity, Spores, DareNFT, and Titan Hunter.

Infrastructure projects, which provide blockchain services, also occupy a significant market share in Vietnam with 11.3%. Some notable projects include TomoChain, which the Ministry of Education and Training plans to use to store national diplomas on the blockchain, and SotaTek, which has experienced 3,000% growth with 750 employees.

4.4 Web3

Web3 projects currently hold a 5.1% market share in Vietnam. In the real estate sector, there are crypto real estate projects such as MoonKa and Realbox, which allow investors to own a portion of real estate with very low capital investment. There are also projects that support users in their careers such as DeHR, which is likened to a decentralized LinkedIn.
4.5 Wallet

In the Wallet sector, there are many projects with notable developments such as Coin98 Wallet. This is an electronic wallet that supports more than 70 blockchains including Bitcoin, Ethereum, Binance Smart Chain, Polygon, etc. Currently, the project has over 5 million users. In addition to Coin98 Wallet, other notable electronic wallet projects include Holdstation Wallet and Krystal Wallet.

4.6 X to Earn

In 2022, after the Move to Earn (M2E) trend was initiated by the StepN project, a series of M2E projects were developed in Vietnam such as Calo Metaverse - a project that combines sports training with virtual reality, with over 50,000 downloads and 7,200 daily players, or Run Together - a project that sold out 7,413 NFT Shoes Boxes within 30 minutes of launch and had over 15,000 downloads after 6 days. In addition, other X to Earn projects have emerged, such as ShopNEXT (Shop to Earn), Crypstater (Work to Earn), beFITTER, GooRide, and RUNNOW.

5. Market Capitalization of Crypto Companies in Vietnam

In the top 200 leading crypto companies in the world, there are seven companies founded by Vietnamese entrepreneurs. There are more than 10 companies with a market capitalization of over 100 million USD with global influence. Notably, there are 3 Vietnamese projects that have achieved a market capitalization of over 1 billion USD, including Coin98, Axie Infinity, and Kyber Network. Among them, Axie Infinity was the project with the highest market capitalization of 9.7 billion USD.

![Figure 1. Token Market Capitalization of Crypto Projects in Vietnam, as of December 2022](image)

As of December 2022, the token market cap of these companies has decreased during the cryptocurrency winter. However, Axie Infinity still maintains a market cap of nearly 1 billion USD, Kyber Network with over 87 million USD, Onus with over 45 million USD, Coin98 with over 36 million USD, and more.

In 2022, Vietnamese crypto projects have successfully raised over 170.37 million USD, mostly in seed rounds. However, the revenue of some Vietnamese crypto projects is significantly higher than the amount raised. Notably, Sky Mavis raised a total of 311 million USD through four rounds, raising its valuation to 3 billion USD. In return, Axie Infinity helped Sky Mavis earn 4 billion USD in revenue from selling NFTs. Kyber Network also successfully raised 60.4 million USD through four rounds and generates an annual profit of around 12 million USD.
According to Forbes, there are 50 blockchain-based billion-dollar companies in the world, including Amazon, Google, Samsung, Facebook, and more.

Table 1. **Vietnamese Businesses Applying Blockchain Technology as of December 2022**

<table>
<thead>
<tr>
<th>Time</th>
<th>The Company Applies Blockchain Technology</th>
<th>Application Field</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>HSBC</td>
<td>The international L/C transaction</td>
</tr>
<tr>
<td>08/2018</td>
<td>FPT</td>
<td>AkaChain blockchain platform</td>
</tr>
<tr>
<td>10/2018</td>
<td>Viettel</td>
<td>Medical record management</td>
</tr>
<tr>
<td>04/2019</td>
<td>Misa</td>
<td>MelInvoice.vn electronic invoice</td>
</tr>
<tr>
<td>09/2020</td>
<td>BIDV</td>
<td>Commercial financing transaction</td>
</tr>
<tr>
<td>11/2020</td>
<td>HDBank, VietinBank</td>
<td>The international L/C transaction</td>
</tr>
<tr>
<td>12/2020</td>
<td>MBBank, Vietcombank</td>
<td>The international L/C transaction</td>
</tr>
<tr>
<td>2019</td>
<td>Masan Group</td>
<td>Blue loyalty points management platform</td>
</tr>
<tr>
<td>2020</td>
<td>Bao Viet Life Insurance</td>
<td>Loyalty points management platform</td>
</tr>
</tbody>
</table>

Vietnamese businesses are also not left behind in the technology race as there are over 10 companies experimenting and applying blockchain technology in their business operations. Among them, the finance and banking sector is the most widely applied field for blockchain technology, along with activities such as managing reward points and personal information.

6. **Challenges and Difficulties in Managing Cryptocurrencies in Vietnam Today**

The rapid development in both the quantity and value of cryptocurrencies is posing many challenges to the financial system, banks, and the monetary policy of countries, such as controlling macroeconomic variables like inflation, interest rates, and exchange rates.

If cryptocurrencies are recognized as a means of payment, the global currency market will witness a historic transformation from the exclusive mechanism of central banks to a competitive market mechanism between the traditional currency (centralized issuance) and cryptocurrencies (decentralized issuance).

In this regard, the fundamental difference in the currency issuance mechanism may give cryptocurrencies an advantage over traditional currencies when the quantity of money created over time can be accurately predicted.

When the market is large in value and highly liquid, the stability of cryptocurrencies is likely to be higher than that of traditional currencies, helping users plan their finances better and avoid inflation shocks.

The convenience of conversion and the inherent anonymity of cryptocurrencies will make it difficult for monetary authorities to collect statistics and control the flow of capital in and out of the domestic economy.

Cryptocurrency transactions will mostly take place on blockchains outside the banking system. The underground economy and cross-border transactions are likely to expand significantly, and without strict control measures, the problem of "capital flight" could occur in cryptocurrency transactions between domestic and foreign partners.

The emergence of cryptocurrencies with anonymity and absolute security has made it much more difficult to control and prevent money laundering or tax evasion.
Financial companies, banks, and insurance companies will be the areas that face the most challenges. With a decentralized verification network mechanism operated accurately, fairly, transparently, and safely, cryptocurrencies have reduced the role and importance of financial intermediaries.

With its breakthrough technology, cryptocurrencies allow for transactions from small amounts of a few USD to large transactions of hundreds of millions of USD in minutes at very low costs globally. To use the international money transfer service of a traditional bank, customers may have to wait for a few days to complete the transaction and pay much higher fees.

With the strong development of smart contracts, other financial service products such as credit, insurance, derivatives, etc. have gradually appeared on decentralized blockchains, providing customers with more options.

Another significant challenge is the exploitation of issuing cryptocurrencies to illegally raise capital or commit fraud, embezzling funds from investors.

With the ease of creating new cryptocurrencies along with the lack of knowledge and high-profit motivation of many investors, there have been many fraudulent fundraising cases with a total value of hundreds of millions of USD on a global scale.

The risks from illegal capital raising activities as well as multi-level companies operating under the guise of blockchain technology will remain latent if there are no laws to control the issuance of new cryptocurrencies soon.

7. Some Solutions for Managing Cryptocurrencies in Vietnam

With the strong growth in the token market capitalization of crypto projects, all countries have a common view on the revolutionary nature of the technologies that create cryptocurrencies, believing that their potential is enormous and can bring fundamental changes in many fields such as finance, healthcare, education, etc.

International experience has shown that the potential of cryptocurrencies and the technologies that create them cannot be denied, especially in the era of the Fourth Industrial Revolution with the pivotal role of applying advances in information technology.

To adapt to the era of the Fourth Industrial Revolution, Vietnam needs to have policies related to cryptocurrency management that are both strict and effective to minimize potential risks while promoting the healthy development of this technology. To efficiently manage virtual currency transactions in Vietnam, the following contents should be implemented:

Firstly, research can be conducted to legalize Bitcoin and some other cryptocurrencies that have similar characteristics as commodities or assets that can be traded, exchanged, and taxed.

Allow cryptocurrency exchanges to operate under special supervision from authorized agencies. Require members participating in trading on the exchange to register accurate personal information, and legal entities, specifically to prevent illegal activities, tax evasion, money laundering, or “currency bleeding.”

Secondly, organize conferences and forums with leading experts in blockchain technology in Vietnam and around the world to obtain more accurate and up-to-date information on cryptocurrencies as well as their future trends. Publish full and widespread information, warning risks for traders and cryptocurrency investors.
To prevent situations where investor expectations rise too high compared to the actual value of the cryptocurrency market, leading to speculative phenomena with too much capital causing "asset bubbles," affecting the stability and sustainability of the financial system as well as social security.

Thirdly, there needs to be a comprehensive and thorough evaluation of all issues related to the issuance of new cryptocurrencies, especially Tokens through initial coin offerings (ICO).

Research can permit ICOs for companies issuing Tokens when they have a completed product/service and ensure that the type of Tokens issued is only used to access the company's permitted products/services.

ICOs should not be permitted for companies without completed products/services, and there should be supportive policies to help these businesses raise funds through investment funds.

Fourth, it is necessary to strongly overhaul the financial-banking system towards minimizing service fees, prioritizing convenience, information security, and customer account safety. It is necessary to apply scientific and technological advancements that create cryptocurrencies into the operation of the financial-banking system to improve service quality.

Fifth, legal frameworks for management and supervision will be perfected. The legal framework for managing cryptocurrencies in Vietnam will be studied and improved to resolve difficulties in currency statistics, and payment scale, and ensure stability, transparency, and control of interest rates, credit growth, and inflation.

Sixth, the information technology infrastructure will be improved, and the management team's capabilities will be enhanced. Policies to upgrade the IT infrastructure and develop the capabilities of financial and encryption experts will be implemented to improve the long-term management effectiveness of cryptocurrencies and minimize negative impacts on monetary policy goals.

8. Conclusion

Currently, cryptocurrencies are not recognized in Vietnam as a form of currency or payment method. Due to this lack of recognition, any risks associated with investing or trading in cryptocurrencies are not legally protected. However, in the long run, with the development of science and technology, especially information technology in the digital age, the presence of cryptocurrencies in Vietnam will become more and more popular, accounting for a larger proportion of the economy's money supply. Therefore, it is necessary to develop effective tools and policies to control these currencies to limit risks not only for investors but also for the financial system and national monetary policy.

References


A Preliminary Study on Blockchain Implementation in Sri Lanka Banking Sector

Liyanamahadura Ruchira De Silva and Nor Adnan Yahaya

Abstract: Blockchain has been regarded as one of the most important innovations in the current business world. The increasing cases of bank fraud have made the cyber security system of Sri Lanka and the banking sector questionable. Apart from these, the Sri Lanka banks have also reported some key challenges they have been facing while implementing blockchain technology within the operations such as budget, regulation and compliance, bureaucracy and corporate culture, concerns over privacy and security, lack of understanding, difficulty in identifying valid use of cases and suboptimal technological infrastructure. Hence, the main aim of this study is to gain some actionable insights on the challenges faced by the Sri Lanka banking sector in implementing blockchain in the face of opportunities offered by the technology within the financial sector of Sri Lanka per se. Towards that end, a total of 15 secondary sources have been reviewed with the support of thematic analysis where it can be concluded that the application of blockchain technology has initiated the development of fintech companies within the financial sector in Sri Lanka. The significant challenges faced by the banks and other financial institutions are found to be concerning budget, regulation and compliance, bureaucracy and corporate culture, privacy and security, lack of understanding, difficulty in identifying valid use of cases, and finally suboptimal technological infrastructure. From the study, it is recommended that the banks need to develop a strong business case regarding the adoption of blockchain before implementing the technology when budget is a challenge.

Keywords: blockchain technology, financial services, distributed ledger, crypto currency, banking industry

1. Introduction

1.1 Background

Blockchain has been regarded as one of the most important innovations in the current business world. The concept of blockchain was first presented in 2008 in the publication, “Bitcoin: A Peer-to-Peer Electronic Cash System”. The blockchain has provided a special emphasis on cryptography performance rather than dependency on 3rd parties for performing transactions. Blockchain helps companies worldwide in solving the issues related to double spending within the organization. The critical features provided by blockchain technology are smart contract feasibility. A smart contract is a piece of cutting-edge technology that may be used in a blockchain ecosystem to mechanically negotiate, carry out, and enforce the conditions of a legally binding agreement. Current application domains of blockchain include the financial sector, healthcare, as well as in government projects related to culture and arts. Blockchain applications leverage the distributed ledger architecture associated with blockchain which has helped companies to become not dependent on centralized authorities. A typical blockchain implementation utilizes peer-to-peer (P2P) arrangement where all participants are connected via decentralized server networks that are operated by the respective owners of the involved decentralized institutions.

1.2 Rationale

The global blockchain market was valued at USD 4.67 billion in 2021 and is projected to grow from USD 7.18 billion in 2022 to USD 163.83 billion by 2029, exhibiting a CAGR of 56.3% during the forecast period. Based on Fortune business inside analysis, the global market exhibited a decline of
52.4% in 2020 compared to 2019. The global COVID-19 pandemic has been unprecedented and staggering, with blockchain experiencing lower-than-anticipated demand across all regions compared to pre-pandemic levels.

The above market trend prediction represents greater opportunities for putting blockchain technology into better use in the near future. As we can see now, the application of blockchain technology in the financial sector has revolutionized the fintech industry. This has also permeated the Sri Lanka banking sector where using blockchain technology has now become almost inevitable. However, despite that the banking sector in Sri Lanka has failed in utilizing blockchain technology for preventing banking fraud. The increasing cases of bank fraud have made the cyber security system for Sri Lanka banking sector questionable. Apart from these, the Sri Lanka banks have also reported some key challenges they have been facing while implementing blockchain technology within the operations such as budget, regulation and compliance, bureaucracy and corporate culture, concerns over privacy and security, lack of understanding, difficulty in identifying valid use of cases and suboptimal technological infrastructure (Hewavitharana et al., 2019). Therefore, the primary objective of this study is to analyze the challenges faced by the Sri Lanka banking sector while implementing blockchain as well as evaluating potential solutions for the identified challenges. In addition, this study would also evaluate the opportunities of blockchain technology within the financial sector of Sri Lanka per se.

1.3 Aim and Objectives

Simply stated, the main aim of this study is to gain some actionable insights on the challenges faced by the Sri Lanka banking sector in implementing blockchain in the face of opportunities offered by the technology within the financial sector of Sri Lanka per se.

Towards that aim, the following are the primary objectives of this study:

a. To analyze the challenges faced by the Sri Lanka banking sector in implementing blockchain
b. To evaluate the potential solutions for the identified challenges
c. To evaluate the opportunities of blockchain technology within the financial sector of Sri Lanka

2. Overview of Related Work

Blockchain technology has been identified as an immutable and shared laser that has facilitated the process of tracking assets and recording transactions within a business network. An asset can be
intangible, that is patent, intellectual property, branding, and copyrights or it can also be tangible such as cash, car, house, and land. With the help of blockchain net worth value of any asset can be traded in the virtual mode which significantly helps companies in cutting costs and reducing risks that are involved within these trading and transactions (Dharmadasa, 2021). Businesses have been running mainly based on information and therefore, the faster the companies or businesses would be able in receiving the information and the accuracy level of the data or information as the greater impact on the business. Therefore, blockchain technology is very supportive to deliver information as the technology has been providing shared immediate and completely transparent information that is stored within immutable ledgers that are mainly accessed by permissioned network members (Kosala et al. 2021). Therefore, the blocks in the network have been helping businesses in tracking orders, accounts payments, production information and much more. As the members share a single view of the business, blockchain technology can help the members in understanding all the details of the transactions and enable them in gaining greater confidence and new opportunities and efficiency. According to Perera and Abeygunasekera (2022), lucky elements of blockchain have been regarded as distributed ledger technology, immutable records, and smart contracts. A greater example of the utilization of blockchain technology within the financial sector can be regarded as the development of INBLOCK. This technology has been helping companies in improving cryptocurrency security, especially within financial services. Technology has been emphasizing meta-coin cryptocurrency issues which are mainly based on the Hyperledger fabric (Jayathilake & Seneviratne, 2022). Technology has helped financial institutions in making digital asset transactions to be more convenient, faster, and safer.

Figure 2. Process of Using Blockchain Technology within the Banking Industry
(Source: Gunasekara & Sridarran, 2021)

As per the perspective of Gohil and Thakker (2021), one of the potential threats to the banking sector in the current business world is regarded to be technology. One potential disruption of the financial sector has been coming from applications of blocks in technology which have significantly disrupted lasers underlying cryptocurrencies like Bitcoin. Large financial institutions such as investment banks, stock exchanges and central banks have evaluated the importance of blocks in technology within financial service operations and therefore these organizations have been emphasizing on development and utilization of their blockchain solution (Ito & O’Dair, 2019). Within the financial industry, the basic utilization of blockchain technology has been observed within payment systems. Blockchain-utilizing companies have evolved within recent years and there are some other changes as well that occurred within the financial industry. Blockchain technology has enabled customers to trust the untrusted parties and enabled the untrusted parties access to the database. The main technology has provided financial services such as payments without other parties like banks (Malyavkina et al., 2019). Blockchain technology has initiated decentralization within the banking industry which has allowed the banks to focus on other activities and not only to emphasize tracking of payment transactions. The use of blockchain technology has significantly influenced the banking industry and especially has changed many financial services such as settlement systems payments securities management fundraising credit loans and trade finance (Papathanasiou et al., 2020). The decentralization of the ledger for payments
has been enabled by the blockchain which has helped the fintech companies and other financial institutions in providing lower interest rates and faster payments in competition with banks.

Figure 3. Usage of Blockchain Technology in the Banking Industry
(Source: Dewasiri et al., 2023)

Blockchain technology has also affected the settlement and clarity in systems where its introduction of the distributed lasers has been helping in reducing the cost of operations and helping in real-time transactions among financial institutions. This technology has significantly influenced and changed the firms’ patterns by introducing initial coin offerings. The initial coin offerings have been regarded as a new model of financing that has been unbundling the access of capital to capital-raising firms and services (Fairooz & Wickramasinghe, 2019). By tokenizing traditional securities such as stocks, bonds, and alternative assets — and placing them on public blockchains — blockchain technology could create more efficient, interoperable capital markets. Blockchain has significantly removed the need to get the key course in the credit and loan industry and has made the process of borrowing money more secure as well as providing lower interest rates (Jayalath et al., 2020). Trade finance has been completely changed to blockchain as blockchain technology has replaced the paper-heavy trading system of finance with digital trading. This technology has developed more security transfer in class among the trade parties worldwide (Pigera et al., 2023).

3. Blockchain Benefits and Threats

The way bank’s view blockchain technology has substantially evolved over the last few years. The following are some significant advantages and risks of this.

3.1 Five Important Benefits

3.1.1 Enhanced Security

Blockchain technology has the potential to fundamentally alter how sensitive and important data is perceived. Blockchain assists in preventing fraud and unlawful behavior by producing a record that cannot be changed and is encrypted end-to-end. By employing permissions to restrict access and anonymizing personal data, privacy issues can also be solved on the blockchain. To prevent hackers from accessing data, information is kept across a network of computers rather than on a single server.

3.1.2 Greater Transparency

Without blockchain, every company needs to maintain a different database. Blockchain uses a distributed ledger, which ensures that transactions and data are recorded consistently across all locations.
Full transparency is provided since every network user with permission can see the same data at once. Every transaction is permanently recorded and has a time and date stamp. Members may access the whole transaction history thanks to this, which almost eliminates the possibility of fraud.

3.1.3 Instant Traceability

Blockchain establishes an audit trail that records an asset's origins at each stage of its travel. This helps to give proof in industries where customers are concerned about environmental or human rights issues surrounding a product, or in industries plagued by fraud and counterfeiting. Blockchain makes it feasible to directly communicate provenance information to customers. Data on traceability can reveal weak points in any supply chain, such as those where goods may be stored on a loading dock while being transported.

3.1.4 Increased Efficiency and Speed

Traditional paper-intensive procedures take a long time, are subject to human mistakes, and frequently call for third-party mediation. Transactions can be finished more quickly and effectively by automating these operations with blockchain. The blockchain may hold documentation and transaction information together, doing away with the necessity for paper exchange. Clearing and settlement can happen considerably more quickly because there is no need to reconcile various ledgers.

3.1.5 Automation

With "smart contracts", transactions can even be automated, enhancing your productivity and accelerating the procedure even further. The subsequent stage in the transaction or process is automatically started once pre-specified requirements are satisfied. Smart contracts lessen the need for human intervention and rely less on outside parties to confirm that a contract's provisions have been adhered to. When a consumer files a claim for insurance, for instance, the claim may be immediately settled and paid once the customer has submitted all required evidence.

3.2 Five Most Pressing Issues in Blockchain

Here are five of the most pressing security issues related to blockchain technology.

3.2.1 Vulnerabilities at Blockchain Endpoints

Despite claims that blockchain is almost "unhackable," it's vital to keep in mind that the majority of blockchain transactions have much less secure destinations. A significant amount of bitcoin, for instance, might be transferred into a "hot wallet," or digital savings account, as a result of bitcoin trading or investing. These wallet accounts could not be as secure against hackers as the blockchain's actual blocks.

3.2.2 Scalability Issues

The blockchains that exist today are the biggest ever constructed, and as the technology continues to gain popularity, blockchains will only continue to grow. Simply because these large-scale blockchains have not been tested, this has led some experts to express caution. Many people worry that as the blockchain ecosystem expands, new vulnerabilities may be found and exploited, or that the technical foundation underpinning blockchain may become more prone to simple errors. Due to the significant processing demands required to validate transactions, blockchain networks can be slow and inefficient. The capacity of blockchain networks to process and validate transactions and applications in a timely manner is stressed as the number of users, transactions, and apps rises. Due to this, it is challenging to deploy blockchain networks in applications.
3.2.3 Regulation Issues

The absence of defined regulatory norms is yet another concern regarding blockchain security. Since there is little standardization in the blockchain industry, it is difficult for developers to learn from others’ failures.

3.2.4 Complexity

It takes a high level of technical ability to implement and maintain the complicated technology known as blockchain. Blockchain technology adoption may be hampered by technical issues, which may also turn off potential users and developers. The intricacy of blockchain technology might cause implementation mistakes and inefficiency.

3.2.5 Insufficient Testing

A final issue to address is that while blockchain has historically been used for cryptocurrency trades, it is increasingly being used in other fields. The problem is the coding used in non-cryptocurrency applications tends to be untested and highly experimental, meaning that hackers may be able to find and exploit vulnerabilities.

4. Findings of the Study

4.1 Blockchain Technology Utilization Within the Financial Sector of Sri Lanka

The application of blockchain technology has initiated the development of fintech companies within Sri Lanka the financial sector. As per the perspective of the central bank of Sri Lanka (CBSL), the government introduced committees on blockchain and fintech for improving technology progress within the financial industry of Sri Lanka. The Sampath bank which has been identified as the first bank of Sri Lanka has taken initiative towards blockchain-based banking solutions. This bank has introduced a personal gifting mobile application named ‘igift’ (Palihapitiya, 2020). It has helped the consumer associated with this bank to give money to anyone with the help of their smartphone contact list. Similarly, the commercial bank of Sri Lanka has utilized blockchain technology for remittances. It has enabled the bank to provide temper proof and transparent money transfers. Blockchain technology has also enabled the bank to accurately check remittances (Abeysekera & Kumarawadu, 2022). The HSBC bank has also utilized blockchain technology by launching web-based supply chain platforms for allowing buyers and customers to upload several invoices at once, helping apparel exporters and users for estimating future cash flows. The suppliers have been utilizing these platforms for receiving early payments based on the credit ratings of buyers (Hewavitharana et al., 2019). The financial institutions of Sri Lanka still have not explored solutions for Banking fraud using blockchain Technology.

4.2 Challenges Faced by the Sri Lanka Banking Sector While Implementing Blockchain

According to Dharmadasa (2021), previously banks worldwide have been regarding blockchain as a temporary and risky venture and are just synonymous with Bitcoin. But in the recent few years technologies have described the financial sector greatly and therefore financial institutions and banks have been discovering strategies through which these institutions can automate processes and improve efficiency. Like other financial institutions worldwide the banks and financial institutions of Sri Lanka have also emphasized on development and utilizing blockchain technology within their organization. Some of the recognized financial Institutions and banks of Sri Lanka have already adopted blockchain. However, most banks have reported as being struggling in adopting blockchain technology within their organizations. According to Kosala et al. (2021), the significant challenges faced by the banks in financial institutions have been identified as budget, regulation and compliance, bureaucracy and corporate culture, concerns over privacy and security, lack of understanding, difficulty in identifying valid use of cases and suboptimal technological infrastructure.
As per the perspective of Perera and Abeygunasekera (2022), budgeting has been regarded as one of the most significant challenges while exploring blockchain adoption. The technology has been regarded as one of the exploring territories within the financial institutions. Therefore, it is a great cost for the banks to implement technology. The decentralized nature of blockchain has been beneficial for the banks but it has also been creating challenges and difficulties for the financial institution due to the compliance and regulations associated with the decentralization of blocks in technology. Jayathilake and Seneviratne (2022) opine that even though financial institutions are habituated to dealing with strict laws and regulations, the anonymous nature of blockchain technology has become a greater strain for financial companies. In the context of blockchain, anonymity can be achieved by using pseudonymous addresses, which are unique strings of characters representing a user's identity on the blockchain. These addresses are generated through a cryptographic process and are not directly linked to a person's real-world identity. The peer-to-peer transaction has been offering pseudonymity that has been regarded to be secure in comparison to other payment methods. But most banks and financial institutions have shown greater concern about unique vulnerability, especially regarding security. The banks have stated that in blockchain technology, there is a greater risk of security such as a private key attack, double spending, and selfish mining.

### 4.3 Potential Solutions for the Identified Challenges

According to Gunasekara and Sridaran (2021), to meet the budget challenge of adopting blockchain Technology the banks need to develop a strong business case regarding the adoption of blockchain before implementing the technology. Considering the regulation and compliance with blockchain technology, it needs a regulatory framework that would help the banks in avoiding criminal activities like money laundering (Malyavkina et al., 2019). But there are no consistent regulations imposed by the Sri Lanka government and there is a lack of guidance and clarity that has made blockchain integration to be complex and risky for financial institutions. Therefore, the banks need to regularly analyze the new law and regulations related to blockchain implementation as it would help the banks in remaining compliant within the industry. Furthermore, according to Gohil and Thakker (2021), banks and financial institutions can combat their privacy and security risks due to blockchain technology and for that, the banks need to develop an in-depth understanding of the blockchain technology and need to evaluate and implement safeguarding practices to ensure greater security within the payment system. Through it, the bank should be able to drive public acceptance by showcasing security and privacy benefits that would be appropriately integrated within the blockchain applications (Ito & O’Dair, 2019).

### 4.4 Future Opportunities of Blockchain Technology Within the Financial Sector of Sri Lanka

Blockchain technology within the financial institution and sector would mainly emphasize and improve cross-border payments. According to Papathanasiou et al. (2020), it is expected that yearly 60% of all cross-border payments of retail foreign exchange within the South Pacific region would be operated with the help of blockchain technology. In this contact, Sri Lanka needs to make progress on collaboration. Blockchain technology would greatly evolve the two main sub-sectors of Sri Lanka's financial sector which are trade finance and cross-border payments. In 2021 the Google trade finance gap was estimated to be nearly 1.5 trillion found signifying a substantial amount of trade not utilized by the economies. From the reports of the Asian Development Bank, it has been observed that 57% of trade finance requests of SMEs have been rejected. In contrast, SMEs have the most significant contribution within the emerging market of Sri Lanka (Dewasiri et al., 2023). Therefore, the Sri Lanka financial institution and banks have greater opportunities in facilitating SMEs and providing them with the required access to trade Finance with the help of blockchain technology through addressing inefficiency in the trade finance sector. The strongest juice cases of blocks and Technology in the financial sector have been identified as payment settlement and authorization. From the data, it has been that blockchain use has been expected to be 77% for cross-border payment and 79% for payment authorization. But due to repelling the liquidity cost and transfer times have decreased significantly with this causing a 60% reduction in liquidity cost, a 99% decline in Compliance cost and a 48% decrease in payment operation cost (Fairooz & Wickramasinghe, 2019). Considering the lathe large number of
citizens in Sri Lanka people like blocks in the solution can be assessed by the banks and Financial Institutions for reducing the cause and increasing remittance transfer significantly.

5. Conclusion

From the research study, it can be concluded that the application of blockchain technology has initiated the development of fintech companies within Sri Lanka the financial sector. The significant challenges faced by the banks in Financial Institutions of being identified as budget, regulation and compliance, bureaucracy and corporate culture, concerns over privacy and security, lack of understanding, difficulty in identifying valid use of cases and suboptimal technological infrastructure. In meeting the budget challenge of adapting blockchain technology, it is recommended that the banks need to develop a strong business case regarding the adoption of blockchain before implementing the technology.

The banking sector in Sri Lanka will be the biggest casualty if the blockchain technology is not adopted properly. It is because the present and future customers of financial services demand the use of high technology to deliver services to them speedily, efficiently, and cheaply. The present systems followed by banks in Sri Lanka do not meet with these requirements. Hence, banks should seriously consider adopting blockchain technology in providing services to customers. By being flexible in their approach to new technology, the banks and other financial institutions can ensure sustained growth for them.

The blockchain is still in a development stage when it comes to using it for other transactions in society. However, its superiority will make it a universal application. At that stage, it will really be a disruptive technology. Banks need not wait until that date to take action to cover themselves. Hence, it is useful if banks get themselves seamlessly integrated to this new technology right away.

Acknowledgements

We wish to express our gratitude to all our friends and colleagues who helped us in many ways in the process of conducting this research and who gave us the encouragement to pursue and achieve our academic goals.

References


Exploring the Potential of Blockchain Technology in Addressing Challenges in Warehouse Operations: A Mixed-Methods Study in Malaysia

Narayanasamy Rajendran*, Anthony Vazb & Gomathi Packiryc
a,b,cMalaysia University of Science and Technology, Malaysia
*rajendran@must.edu.my

Abstract: This study explores the application of blockchain technology in warehouse operations in Malaysia. The main objective of the study is to address the challenges faced by traditional warehouse operations and evaluate the potential of blockchain technology in improving warehouse operations. The study focuses on the following aspects of warehouse operations: receiving, put-away, storage, picking, shipping, inventory management, cycle counting, cross-docking, and the contemporary role of the modern warehouse. The study uses a mixed-methods research approach, combining both quantitative and qualitative methods. The unit of analysis is the warehouse operation, with a sample size of 100 warehouses in Malaysia. Data will be collected through a questionnaire survey and semi-structured interviews with warehouse managers and workers. The questionnaire survey will collect data on the challenges faced by traditional warehouse operations, the potential of blockchain technology in addressing these challenges, and the effectiveness of blockchain technology in improving warehouse operations. The interviews will provide deeper insights into the experiences and perspectives of warehouse managers and workers regarding the adoption and implementation of blockchain technology in warehouse operations. The findings of this study are expected to contribute to the literature on the application of blockchain technology in supply chain management, particularly in the warehouse industry. The study will identify the key challenges faced by traditional warehouse operations and evaluate the potential of blockchain technology in addressing these challenges. The study will also provide insights into the effectiveness of blockchain technology in improving inventory management, cycle counting, cross-docking, and the contemporary role of the modern warehouse. The study will conclude with recommendations for the adoption and implementation of blockchain technology in warehouse operations, including the key success factors and potential limitations and drawbacks of the technology.

Keywords: blockchain technology, warehouse operations, supply chain management, inventory management

1. Introduction

Warehouse operations are crucial in the supply chain management process, with the main objective being to ensure that goods are efficiently stored, processed, and delivered to customers. However, traditional warehouse operations have been faced with various challenges that have resulted in inefficiencies, such as poor inventory management, delays in order processing, and high operational costs. With the advancement in technology, blockchain technology has emerged as a potential solution to address these challenges in warehouse operations. This article aims to explore the application of blockchain technology in warehouse operations, with a focus on receiving, put-away, storage, picking, and shipping, as well as inventory management, cycle counting, cross-docking, and the contemporary role of the modern warehouse. The effective management of a supply chain presents various obstacles and impediments, such as the establishment of trust among stakeholders, the attainment of transparency, and the optimisation of efficiency at every stage of the supply chain. According to Cole et al. (2019), the implementation of blockchain technology has the capacity to improve the adaptability and
nimbleness of supply chain processes. The blockchain technology facilitates the engagement, collaboration, and verification of information and data among all the parties within the ecosystem. According to Viriyasitavat et al. (2019), blockchain has the potential to serve as an append-only transactional data store for centralised brokers that are managed by a single trusted authority.

Effective warehouse operations activities provide visibility, lower risks to the supply chain, maximise profits, and allow for the fulfilment of ever-more-complex client demands (Agrawal et al., 2020). With the help of digital transformation, these management operations can adapt and effectively address the complexity of contemporary SCs. Through information technologies, businesses can engage in and improve inter-organizational collaboration with their partners, such as suppliers and customers. Information technologies are acknowledged as essential components in promoting quick and secure cooperation (Ahmadi et al., 2020; Al Barghuthi et al., 2019) which involves information sharing, synchronising choices, and aligning goals with the relevant stakeholders (Ahmad et al., 2021).

In essence, blockchain technology (BCT) is a distributed ledger that stores transaction records in a distributed manner among network nodes. The Bitcoin cryptocurrency's core technology, BCT, was originally mentioned by its creator, Satoshi Nakamoto, in 2008 (Bose et al., 2018). There are currently numerous platforms and protocols that, technically speaking, diverge from the original Bitcoin blockchain. The technology was formally unveiled to the public and introduced in 2009 as well. Since then, blockchain technology has undergone four significant stages of development: origin, transactions, contracts, and application (Heutger & Kückelhaus, 2018). It has developed into a very dependable technology with an unmatched reputation for security and trust. The technology uses an entirely internal peer-to-peer transaction between the two parties.

Many parties are involved in the transaction process in the logistics and warehouse industries, and numerous technologies are employed to support each activity. Numerous firms still use paper documents and manual data entry as of this writing. This makes monitoring much more difficult and could result in a number of issues (Heutger & Kückelhaus, 2018). In order to address operational problems in the logistics sector, notably warehouse operations, blockchain technology may operate as a change agent in this situation. It can help with better efficiency, data transparency, and more secure information and data delivery. Only parties possessing trusted credentials may receive trust from parties with the required authorization. According to Abeyratne and Monfared (2016), blockchain technology has six technological advantages, including process integrity, immutability, transparency, efficiency, and resilience.

1.1 Problem Statement

The expansion of logistics capabilities to aid in improving trade facilitation, where the flow of commodities plays a crucial part in Malaysia’s economic growth, is a key area of concentration in the 12th Malaysia Plan. According to the 12th Malaysia Plan’s performance metrics, the installation and use of blockchain technology may help the logistics infrastructure achieve those goals (Economic Planning Unit, 2020). For instance, the development of blockchain technology for the nation is being carefully coordinated by the Malaysian Industry-Government Group for High Technology (MiGHT) and Malaysia’s Blockchain Infrastructure will be jointly created and operated by Zetrix, a Malaysia-based layer one blockchain structure and MIMOS Technology Solutions Sdn. Bhd. (MTSSB), a tech consultancy, after the two entities signed a memorandum of understanding (MOU), according to a press release on Friday, 7th October (Bernama, 2022).

Government-led blockchain projects are already underway in nations including Singapore, Australia, China, France, and Russia, and there has been extensive global blockchain research. There is a significant issue in the Asia-Pacific region since many industrial workers lack confidence and trust
when it comes to the use of their own data, turning it into a liability rather than an advantage for the company.

From a local standpoint, Malaysia is in a risky situation because the country's lack of knowledge about blockchain could put it at risk (Yatim, 2018). Regardless of whether Malaysia decides to adopt the technology or disregard it entirely, other nations are assuming the task of investing in blockchain technology for their individual nations, which will affect Malaysia. Malaysia's government does not currently appear to have any plans to assist the growth and acceptance of blockchain, particularly in warehouse operations. Despite various local blockchain projects being proposed, the infrastructure and facilities to support the system application and development have not been set up or even envisaged (Yatim, 2018).

There were 48 blockchain startups in Malaysia as of April 2020, compared to 397 in Singapore (Tracxn, 2021). Due to a dearth of local competence in creating the technology, there is a significant gap (Yunus Jalil, 2019). In addition to the lack of cryptography expertise needed to develop blockchain technology, there is a lack of understanding of the advantages blockchain technology can offer.

Traditional warehouse operations are often characterized by poor inventory management, leading to inaccurate stock levels, delays in order processing, and increased operational costs. Inefficient picking and shipping processes often result in delayed deliveries and poor customer satisfaction. Lack of real-time visibility and transparency in warehouse operations makes it difficult to track the movement of goods, leading to increased risk of theft and loss of inventory. Therefore, this paper intends to investigate if warehouse operations can have a head start as blockchain technology is still in its nascent stage? Can warehouse operators enjoy the benefits of blockchain adoption as early adopters, instead of merely users of a more mature technology? This study attempts to shed light in the following areas:

a. What are the key challenges faced by traditional warehouse operations in Malaysia, specifically in receiving, put-away, storage, picking, and shipping, as well as inventory management, cycle counting, cross-docking, and the contemporary role of the modern warehouse?

b. How can blockchain technology be applied to address these challenges in warehouse operations?

c. What are the potential benefits of using blockchain technology in warehouse operations, and how effective is it in improving inventory management, cycle counting, cross-docking, and the contemporary role of the modern warehouse?

d. What are the potential limitations and drawbacks of using blockchain technology in warehouse operations, and how can they be mitigated?

e. What are the key success factors for the adoption and implementation of blockchain technology in warehouse operations, and how can they be addressed?

2. Literature Review

For a few reasons, blockchains are thought to be well-suited for use in the logistics and supply chain management industries. The data generated at each stage of the product's life cycle, as it moves from manufacture to consumption, can be recorded as a transaction, giving the product a permanent history. Blockchain technology, among other things, can effectively contribute to: (i) Recording every single asset (from goods to containers) as it moves through supply chain nodes; (ii) Tracking orders, receipts, invoices, payments, and any other official document; and (iii) Tracking digital assets (like warranties,
certifications, copyrights, licences, serial numbers, and bar codes) in a unified manner and in parallel with physical assets. Walmart Canada has initiated the adoption of blockchain technology in collaboration with logistics companies for the purpose of inventory transportation. According to Banerjee (2015), the utilisation of a shared node in a blockchain server facilitates the synchronisation of shipment tracking, logistics data, and payment automation without necessitating any alterations to the logistics companies' operations or information technology systems. Walmart Canada has initiated the adoption of blockchain technology in collaboration with logistics companies for the purpose of inventory transportation. According to Banerjee (2015), the utilisation of a shared node in a blockchain server facilitates the synchronisation of shipment tracking, logistics data, and payment automation without necessitating any alterations to the logistics companies' operations or information technology systems. 

Additionally, due to its decentralised structure, the blockchain can efficiently help suppliers and vendors share information regarding the manufacturing process, delivery, maintenance, and wear-off of items, opening new avenues for collaboration in intricate production lines (Litke et al., 2019). By implementing blockchain technology, the difficulties in logistical aspects, such as delivery delays, lost documents, unknown sources of items, and errors can be reduced and even avoided. More sustainability, fewer mistakes and delays, lower transportation costs, quicker issue detection, more consumer and partner trust, better product delivery, and better inventory management are all advantages of integrating blockchain into the supply chain.

The authors of the article "An agri-food supply chain traceability system for China based on RFID & blockchain technology" (Tian, 2016) examined the benefits and drawbacks of utilising RFID (Radio-Frequency Identification) and blockchain technology in the construction of the agri-food supply chain traceability system. They gave an example of how this system was constructed. By acquiring, transmitting, and exchanging the real information about agri-food in the production, processing, warehousing, distribution, and selling linkages, it may achieve the traceability of reliable information throughout the entire agri-food supply chain, which would effectively guarantee the food safety.

IBM has made an effort to simplify how the supply chain can use blockchain (Dickson, 2018). The technology ADEPT ("Autonomous Decentralised Peer to Peer Telemetry") was created by IBM in collaboration with Samsung and incorporates components of the fundamental architecture of bitcoin to create a distributed network of devices, or decentralised Internet of Things. (Bit Torrent, 2018) (for file sharing), Ethereum (Crosby, 2006) (for Smart Contracts), and (Crosby, 2006) (for Peer-to-Peer Messaging) are the three protocols that ADEPT employs in its platform.

From an ecosystem of suppliers through store shelves and eventually to customers, food goods can be digitally tracked and authenticated with the aid of blockchain (Figure 1). The goal of IBM, Walmart, and Nestle is to leverage blockchain to create a more reliable, authentic, and transparent global food supply chain IBM (International Business Machines). There are already a few applications that merge blockchain technology with food technology, with the main goal being to address food safety concerns. Their motivations are in line with the goal of creating a secure, transparent, and sustainable food supply chain (Mao, 2019).
All parties involved in shipping can benefit from using blockchain to improve sustainability, decrease or eliminate fraud and errors, handle inventory more effectively, save courier costs, cut down on waste and paperwork delays, and discover problems more quickly. This would boost total trade volume by 15% and the global GDP by almost 5% (World Economic Forum’s Report, 2018).

Blockchain in logistics was the subject of research by (Hackius & Petersen, 2017). In an online survey, they gathered the opinions of logistics experts on the following use cases: obstacles, enablers, and the overall prospects of blockchain in logistics and supply chain management. The majority of the participants were enthusiastic about blockchain technology and its advantages. They contend that in order to pique the attention of a traditionally conservative business like logistics for blockchain, the advantages over current ICT solutions must be more properly outlined and use cases must be further investigated. The blockchain allows users to query transaction data, ensuring the platform’s overall transparency. Additionally, distributed data storage and encryption methods protect the system’s data (Wum & Tran, 2018). They came to the following conclusions regarding the possibilities of the blockchain (Figure 2).

Ease Paperwork Processing (global container shipping involves a lot of paperwork—costing time and money. Also, freight documents are prone to loss, tampering, and fraud).

Identify Counterfeit Products (counterfeit medicine is a growing problem for pharmacy supply chains. This especially pertains to expensive, innovative medicine like cancer drugs. Pharmacies must make sure to sell “the right thing” to the consumers).

Facilitate Origin Tracking (in the food supply chain, foodborne outbreaks are a challenge for retailers. They must get a quick overview of where the food came from, and which other products are also affected and must be removed from the stores).

Operate the Internet of Things (logistics objects are equipped with sensors that generate data along the supply chain—e.g., about the status of a shipment. This data must be stored in an immutable, accessible way).
In this instance, business operations that are a part of logistics have been identified by the study’s authors. They presented research on the knowledge and state of blockchain technology in supply chain and logistics as of right now. Examining the views of business owners and employees in the logistics sector towards the adoption of blockchain technology was used to perform the research and analysis. Their investigation found that integrating blockchain technology into logistical operations was very beneficial based on the data gathered during the testing (Hackius, & Petersen, 2017).

2.1 Blockchain Technology

The technology of blockchain facilitates the synchronisation of transactions, contracts, and data throughout the network and all nodes. Each stakeholder is responsible for validating and verifying transactions, as per the research conducted by Abeyratne and Monfared in 2016. The blockchain technology is comprised of a series of interconnected blocks, each of which contains numerous authenticated transactions. The utilisation of multiple blocks interconnected in a single chain renders the manipulation of data considerably challenging. The utilisation of blockchain technology enables the creation of a portable identity. Numerous corporations are directing their operations towards an effective digital supply chain (DSC) in accordance with prescribed standards. This involves implementing solutions that integrate business processes with all members of the supply chain within their network. The consensus protocol is a crucial aspect of the distribution process in a blockchain system. It enables parties that lack mutual trust and coordination to reach an agreement on transactions and blocks on the blockchain server, as noted by Zheng et al. (2018).

2.2 Supply Chain Operations Challenges

According to Banerjee (2015), the operations of the supply chain encompass the implementation strategy of all procedures and the interconnectivity of all systems. Enhancing supply chain operations is imperative for all corporations to augment their financial and operational efficacy. The participation of numerous stakeholders within the supply chain engenders heightened operational complexities and diminishes the potential for direct interpersonal engagement among distinct members. The intricate structure of the supply chain poses certain obstacles (see Table 1).

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Challenge</th>
<th>Description of Challenge</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lack of trust among all stakeholders</td>
<td>The supply chain contains many stakeholders with a complex processing chain, so access to all real-time activities in the operations is the</td>
<td>Francisco &amp; Swanson (2018)</td>
</tr>
</tbody>
</table>
2.3 Underlying Theory

The underlying theory that supports the exploration of blockchain technology in addressing challenges in warehouse operations is the concept of decentralized and transparent transactional systems. Blockchain technology, characterized by its decentralized and immutable nature, offers a novel approach to record and verify transactions in a secure and transparent manner. By applying blockchain to warehouse operations, it becomes possible to enhance traceability, improve supply chain collaboration, and mitigate operational inefficiencies.

2.4 Hypotheses

Based on the provided information, the following research hypotheses can be developed for the study:

H1: Traditional warehouse operations in Malaysia face significant challenges in areas such as receiving, put-away, storage, picking, shipping, inventory management, cycle counting, and cross-docking.

H2: Blockchain technology can be effectively applied to address the challenges faced by traditional warehouse operations in Malaysia, improving processes related to receiving, put-away, storage, picking, shipping, inventory management, cycle counting, and cross-docking.

H3: The implementation of blockchain technology in warehouse operations in Malaysia will lead to potential benefits, such as improved inventory management, accurate cycle counting,
streamlined cross-docking processes, and enhanced efficiency in the contemporary role of the modern warehouse.

H4: While there may be limitations and drawbacks associated with the use of blockchain technology in warehouse operations, such as technical complexity and initial infrastructure setup, these challenges can be mitigated through appropriate strategies and solutions.

H5: The successful adoption and implementation of blockchain technology in warehouse operations in Malaysia will depend on key factors such as industry collaboration, regulatory support, skilled workforce, and the development of necessary infrastructure and facilities.

These hypotheses align with the research objectives outlined in the provided information and can serve as a foundation for the empirical investigation into the potential of blockchain technology in improving warehouse operations in Malaysia.

3. Methodology

This section discusses the method adopted in this study. The subsection discusses the research design, unit of analysis followed by the questionnaire design.

3.1 Research Design

The research design for this study will be a mixed-methods approach, with both qualitative and quantitative data collection methods. The qualitative method will be used to gather data on the current warehouse operations and the challenges faced, while the quantitative method will be used to collect data on the effectiveness of blockchain technology in addressing these challenges.

3.2 Unit of Analysis

The unit of analysis for this study will be warehouse operations, with a focus on receiving, put-away, storage, picking, and shipping, as well as inventory management, cycle counting, cross-docking, and the contemporary role of the modern warehouse.

3.3 Questionnaire Design

The questionnaire will consist of two parts. The first part will gather qualitative data on the current warehouse operations, including the challenges faced and potential solutions. The second part will gather quantitative data on the effectiveness of blockchain technology in addressing these challenges.

4. Discussion

The field of warehouse operations encounters a multitude of challenges, including inadequate transparency, suboptimal record-keeping practices, difficulties in managing inventory, and concerns regarding security. The utilisation of blockchain technology, which is a decentralised ledger that retains unalterable and open data, presents a promising solution to tackle the aforementioned issues and enhance the efficacy and financial gains of warehouse activities. The aim of this study is to the exploring the potential blockchain technology in the context of warehouse operations in Malaysia through a mixed-methods approach.

The implementation of blockchain technology has the potential to augment the perceptibility and traceability of commodities across the supply chain, thereby enabling warehouse operators to monitor the real-time location, status, and quality of products. The implementation of automated and digital processes has the potential to mitigate errors, delays, and expenses that are commonly associated with
manual and paper-based procedures. Additionally, it has the capacity to enhance customer satisfaction and foster loyalty (Prologis, 2022). The implementation of blockchain technology has the potential to facilitate the utilisation of smart contracts, which are characterised by their ability to self-execute agreements and automate transactions and payments in accordance with predetermined rules and conditions. The implementation of this technology has the potential to enhance the efficacy, precision, and safety of warehouse activities while also mitigating the occurrence of conflicts and deceit (Foley & Lardner, 2022).

However, blockchain technology also faces challenges and limitations in warehouse operations, such as scalability, interoperability, standardization, and regulation. Blockchain networks may have difficulty handling large volumes of transactions and data, which can affect the speed and performance of warehouse operations. Moreover, blockchain networks may not be compatible or integrated with existing systems and platforms, which can hinder communication and collaboration among different stakeholders in the supply chain. Furthermore, blockchain technology lacks universal standards and regulations that can ensure its quality, reliability, and compliance with legal and ethical requirements (Cyzerg, 2021).

Therefore, this paper will use a mixed-methods approach to investigate the current state of blockchain technology in warehouse operations in Malaysia, as well as the opportunities and challenges that it presents. The paper will conduct a quantitative survey among warehouse operators to assess their awareness, adoption, and perception of blockchain technology in their operations. The paper will also conduct a qualitative interview with experts and practitioners in the field of blockchain technology and warehouse operations to gain deeper insights and perspectives on the benefits and limitations of blockchain technology in warehouse operations. The paper will then analyse the data using descriptive and inferential statistics, as well as thematic analysis. The paper will conclude by discussing the implications and recommendations for future research and practice.

5. Conclusion

The deployment of blockchain technology in warehouses is studied conceptually in this research. To determine the perceived purposes of blockchain technology and its application in the Malaysian warehouse industry, the proposed study aims to establish and form a conceptual framework. Although earlier research focused on a variety of technologies, this study on blockchain technology appears to be the first of its kind in Malaysia. Since its initial public release in 2008, blockchain technology has the potential to be the most revolutionary technology in the last ten years, with the potential to have a significant impact on every industry.

The many blockchain applications have offered distinct routes for blockchain adoption. These complement and enhance existing organisational processes while lowering operational expenses, thus a major overhaul of business procedures is not necessary. In Malaysian Warehouse operators, blockchain technology is still relatively new. Blockchain technology appears to be an excellent sector for Warehouse Operations to venture into because they have the potential and capacity to collectively develop the general business climate in the nation. Warehouse Operators should investigate blockchain deployment and its potential advantages. Ripple, Stellar, Storj, Filecoin, VeChain, LuxTag, and numerous other national and international businesses are examples of blockchain initiatives that are ready for the market.

Acknowledgements

We would like to thank all the people who prepared and revised previous versions of this document.
References


Dickson, B. (2018). *Blockchain has the potential to revolutionize the supply chain*. https://techcrunch.com/2016/11/24/blockchain-has-the-potential-to-revolutionize-the-supply-chain/


Abstract: The utilization of smart contracts has attracted significant interest and is anticipated to undergo substantial growth, with a projected worth of USD 208.3 million by 2026. The surge in growth can be attributed to several factors, such as the rising implementation of blockchain technology, the necessity for automation and efficacy across diverse sectors, and the growing need for transactions that exhibit both security and transparency. The deployment of smart contracts presents a significant potential for the logistics industry, which is one of the industries poised to reap substantial advantages from this innovation. The logistics sector has the potential to optimize and mechanize diverse operations such as procurement, transportation, inventory management, and payment reconciliation. The implications of this development are such that it may incite a paradigm shift within the industry. The logistics sector encompasses a multitude of stakeholders and contractual arrangements, necessitating the adoption of smart contract technology to automate contract execution and prepare for forthcoming digital challenges. The present study is designed with a dual objective. Firstly, it aims to delve into the implementation of smart contracts in the logistics sector of Malaysia. Secondly, it seeks to assess the influence of perceived benefits and risks on the adoption of smart contracts in Malaysia. The present study posits a conceptual model aimed at scrutinizing the relationship between perceived risk and perceived benefit concerning the intention to use Smart contracts among logisticians in Malaysia.

Keywords: smart contracts, blockchain, logistics, smart logistics

1. Introduction

In the present era, the global community is witnessing a shift towards the fourth industrial revolution, which has sparked a new wave of digital transformation in the business sector. The emergence of cryptocurrencies, notably Bitcoin, and the integration of blockchain technology in various sectors such as finance, Internet of Things (IoT), cloud computing, and supply chain management have garnered significant global interest (Luu et al., 2016). According to Angstein and Parung (2022) Blockchain is one of the emerging digital technologies that offers a programmable environment and exhibits significant potential. A Blockchain refers to a decentralised digital ledger that is upheld by a network of nodes which provide a higher level of data security (Issaoui et al., 2020). The system records all transactions and subsequently executes them across the nodes and the transmission of this execution will occur between two distinct nodes. Blockchain technology has numerous applications that can be implemented, including the utilisation of smart contracts. Smart contracts are self-executing computer programmes in which the terms of the agreement between buyer and seller are directly entered into lines of code and intended to automatically enforce and implement the terms of a contract (Hasan et al., 2019).

In contemporary times, smart contracts have gained significant traction, especially in the realm of blockchain technology. As per the report by Markets and Markets, it is anticipated that the worldwide smart contracts market will experience substantial growth, reaching USD 208.3 million by 2026 from USD 13.7 million in 2020, with a Compound Annual Growth Rate (CAGR) of 53.7% from 2021 to 2026. The surge in growth can be attributed to several factors, such as the rising acceptance of
blockchain technology, the necessity for automation and efficacy across diverse sectors, and the escalating requirement for transactions that are both secure and transparent.

According to Armstrong and Associates (2021), it was projected that the worldwide third-party logistics industry had produced contracts worth $1.64 trillion in 2020. The aforementioned metric pertains to the monetary worth of logistics agreements entered into with third-party logistics providers, including entities engaged in freight forwarding, warehousing and distribution, and other logistics-related services. In addition, Alicke et al. (2020) logistics contracts may be relatively straightforward and require minimal negotiation however some logistics contracts can be quite complex, particularly when they involve multiple parties, international transactions, and the use of specialized logistics services. It is uncovered in the study that factors such as the level of customization, the number of service components, and the involvement of multiple parties contribute to the complexity of logistics contracts.

The logistics industry is one of the sectors that has significant potential for the adoption of smart contracts. The implementation of smart contracts has the capacity to revolutionise the logistics industry through the optimisation and automation of diverse procedures, such as procurement, transportation, inventory control, and payment reconciliation. This indirectly can help to streamline and automate many of the processes involved in the logistics industry. The advent of Industry 4.0 in Malaysia, facilitated by emerging technologies, has engendered a paradigmatic transformation that has digitised the logistics industry. Given the multitude of stakeholders and contractual agreements inherent in the logistics industry, it is imperative to implement smart contract technology to facilitate the automation of contract execution and ensure readiness for forthcoming digital challenges. Hence, the aim of the study is twofold: (i) to explore the utilization of smart contracts in the logistics industry of Malaysia; and (ii) to examine the perceived benefit and perceived risk influence in adopting Smart Contract in Malaysia.

2. Literature Review

2.1 Smart Contract

Contracts are traditionally written agreements between two or more parties that are legally binding (Abdelhamid & Hassan, 2019). They are often written in natural language and require the services of an intermediary, such as a lawyer or notary public, to verify their validity and enforceability (Foo Jia Yi & Harminderjit Kaur, 2022). According to Abdelhamid and Hassan (2019) for many decades, contracts were inked, marked up, and signed using analogue methods which was noted as costly, time-consuming, inefficient, and leads to security issues as single point of failure. Traditional contracts are typically enforced through the legal system, with parties seeking resolution through courts or arbitration in the event of a dispute. The procedure became more and more digitised with each step. Typewriters were supplanted by computers, and contracts were emailed, faxed, or scanned.

The term Smart Contract was first conceptualized by Szabo in 1995 with an intention of “securing relationships on public networks” (Bartoletti, 2020). Cong and He (2018) defined smart contracts as a “digital contracts allowing terms contingent on decentralized consensus that are tamper-proof and typically self-enforcing through automated execution”. Smart contracts are computer programmes that are self-executing and intended to automatically enforce and execute the conditions of a contract. This feature obviates the need for intermediaries and mitigates the likelihood of fraudulent activities or errors. Smart contracts are presently constructed on blockchains, which are decentralised, distributed, and public digital ledgers utilised to document transactions occurring across numerous computers worldwide. All transaction information is present in the smart contract and executed automatically.

The process of creating smart contracts typically involves the utilisation of a term sheet that incorporates human nuance to inform the programming code that is employed to generate the agreement. The contract is equipped with a programmable language called bytecode, which enables it to autonomously execute when specific external conditions are fulfilled. Upon the recognition by the programming that the external data satisfies the contractual obligations of all involved parties, the contract is deemed self-executing. The smart contract transaction scenario as illustrated by Issaoui et al. (2020) is presented in Figure 1.
One significant advantage of employing smart contracts is their ability to be drafted expeditiously, in contrast to conventional contracts that may take hours or even days to complete. In contrast to conventional contracts that necessitate manual payments, smart contracts facilitate automatic execution of payments. Moreover, smart contracts offer cost-saving benefits to the involved parties due to their predominantly digital nature, thereby reducing the need for third-party intervention. The automation of smart contracts is particularly significant as it reduces the likelihood of human errors and potential contract manipulation.

Smart contracts have been investigated in various sectors, such as finance, real estate, healthcare, and logistics industry. Table 1 summarizes the industry and the usage of smart contracts.

<table>
<thead>
<tr>
<th>Industry</th>
<th>Organization</th>
<th>Implication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Chain</td>
<td>Walmart has implemented a blockchain-based platform for supply chain management that includes smart contracts.</td>
<td>The smart contract allows Walmart to track and trace the origin of its products and ensure their quality and safety.</td>
</tr>
<tr>
<td>Insurance</td>
<td>AXA, a global insurance company, has launched a flight delay insurance product that uses smart contracts to automate claims processing.</td>
<td>The implementation of a smart contract facilitates the automatic initiation of a payment to the policyholder, thereby eliminating the requirement for manual processing of claims in the event of flight delays.</td>
</tr>
<tr>
<td>Real estate</td>
<td>Propy, a real estate platform, uses smart contracts to automate the process of buying and selling properties.</td>
<td>Smart contracts enable the transfer of ownership and payment between parties, ensuring a transaction that is both secure and transparent.</td>
</tr>
<tr>
<td>Energy</td>
<td>Power Ledger, an Australian energy company, uses smart contracts to enable peer-to-peer trading of energy.</td>
<td>Smart contracts facilitate the automation of trading procedures and guarantee secure and transparent transactions between purchasers and vendors.</td>
</tr>
<tr>
<td>Healthcare</td>
<td>The Estonian government has implemented a blockchain-based platform for healthcare data management that includes smart contracts.</td>
<td>The platform enables patients to manage their health information and grant consent for its utilisation by healthcare practitioners, while upholding the confidentiality and protection of the data.</td>
</tr>
<tr>
<td>Gaming</td>
<td>GamesDapps allows a gamer to use Smart Contracts to create, store, and transfer Non-Fungible Token (NFT).</td>
<td>Smart contracts enable the transfer of ownership and payment among parties, thereby obviating the necessity for intermediaries.</td>
</tr>
</tbody>
</table>
Government

The Dubai government has implemented a blockchain-based platform for government transactions that includes smart contracts. The platform facilitates secure and transparent transactions between government entities and citizens, thereby diminishing bureaucratic hurdles and enhancing operational efficacy.

2.2 Smart Contract in Logistics Industry

Currently, Enterprise Resource Management (ERM) systems that are centralised and operate within an organisation are often used to manage logistical supply chains (Wang et al., 2019). All the stakeholders, who may be from various organisations, must rely on the agreed-upon procedures (Augusto et al., 2019). The centralised architecture of such a system, which creates a single point of failure and leaves it open to both internal and external threats and attacks, is another drawback.

According to Alqarni et al. (2023), smart contract enabled by blockchain offers a highly consolidated approach for storing and managing logistic-related transactions. It is considerably different from the traditional information systems that are normally implemented within the walls of an organisation. A distributed, decentralised, and traceable method for recording, analysing, and carrying out transactions is provided by blockchain-based smart contracts. The following are the advantages offered by smart contracts in the logistics industry.

a. Increased Efficiency

Many procedures in the logistics business, including as procurement, transportation, inventory control, and payment reconciliation, can be automated using smart contracts. This automation can contribute to better efficiency, faster transaction times, and lower costs.

b. Improved Traceability

Smart contracts can improve the tracking and tracing of goods and materials across the supply chain, beginning with production and ending with delivery. This enhanced traceability can aid in the prevention of fraud, counterfeiting, and other supply chain concerns.

c. Greater Transparency

Smart contracts can give all stakeholders in the supply chain access to up-to-date information. This transparency can serve to build trust and lessen the risk of disagreements.

d. Enhanced Security

Smart contracts make use of blockchain technology to create secure and irreversible records of all transactions. This improved security can aid in the prevention of fraud, hacking, and other security breaches.

e. Automated dispute resolution

Smart contracts can be built with dispute resolution mechanisms, which can help to simplify the resolution process and eliminate the need for third-party intervention.

f. Cost savings

Smart contracts can assist to cut costs and boost efficiency in supply chain operations by eliminating the need for intermediaries.

Several logistics firms and emerging enterprises have explored the viability of utilising smart contracts in the management of logistics supply chains. The collaborative efforts of IBM and Maersk have resulted in the development of a blockchain-based platform called "TradeLens" that utilises smart contracts to automate various logistics processes. IBM Food Trust was launched by IBM and Walmart, with the participation of Nestle and Unilever among other industry stakeholders, with the aim of
enhancing transparency and security in the worldwide food supply chain. Walmart can monitor and trace the source of its merchandise, thereby guaranteeing its calibre and safety. ShipChain is a nascent organisation that has developed a platform that leverages blockchain technology and smart contracts to automate the transportation and logistics process. Gupta's (2018) illustration in Figure 2 provides a comprehensive and valuable point of reference for smart contracts within the logistics industry.

Despite the numerous advantages that Smart Contract technology offers to the logistics industry, its implementation in the domain of smart logistics is still relatively uncommon. The rationale behind its recent emergence, limited adoption, and perceived risk for most logistics practitioners and organization.

Figure 2. Blockchain Use and Smart Supply Chain Contracts (Gupta, 2018)

2.3 Smart Contract in Malaysia and Malaysian Logistics Industry

Malaysia is on course to achieve a digital economy contribution to gross domestic product (GDP) of at least 25.5 percent by 2025 (MIDA, 2021). The logistics sector in Malaysia plays a crucial role in the nation's economic landscape, accounting for 3.8 per cent of the Gross Domestic Product (GDP) in 2019 and projected to expand to 6.5 per cent by 2030 (OECD, 2021). According to the recently issued Logistics Performance Index (LPI) for 2023, Malaysia is the second-best performing ASEAN country after Singapore. The LPI 2023 edition provides a new set of key performance indicators built from a big data methodology, assessing the global speed of commerce. The indicators are based on technical breakthroughs in tracking actual high-frequency international movements of maritime shipping, containers, air freight, and postal parcels by trade channel and gateway. To keep up with the global trend, the Malaysian government has laid forth initiatives in the 12th Malaysia Plan to reform the logistics ecosystem for higher efficiency, which will improve prospects for the logistics industry over the next five years. Automation and digitalisation are both critical enablers for industrial players to compete in an increasingly complex environment.

According to Mordor Intelligence Pvt Ltd.’s Market report for 2023 to 2028 the Malaysian logistics market landscape are fragmented, with many players. It is worth to note that the Malaysia Logistics Industry is flooded with independent truckers and SMEs, who account for more than 70% of the market. Locally, domestic investors continue to show growing interest in storage expansion, cold chain facilities, last-mile delivery services as well as freight and supply chain technologies for efficient integration between shippers and third-party logistics (3PLs) companies. Most logistics businesses' attitudes towards digitalization have little impact on their organisation, resulting in them not embracing and accepting digital innovation since these organisations find it difficult to adopt and work effectively in the digital revolution (OECD, 2021). Given the, as well as other strategic advancements and paradigm
shifts pushed by the Malaysian government towards digitization, the local logistics industry must examine the many ramifications of smart contracts, which could be disruptive technology.

2.4 Theoretical Foundation and Conceptual Model

This research proposes the application of Perceived Risk and Perceived Benefit with regards to the Intention to Adopt Smart Contract by Malaysian Logistics Industry. The following is the conceptualization explanation for the proposed research model.

2.4.1 Perceived Risk and Intention to Use

In 1967, Bauer defined Perceived Risk as a "combination of uncertainty plus seriousness of outcome involved". In information system adoption decision, many researchers have come up with the idea of the causes of the adoption decision create: (i) conflict aroused in the consumer (Bettman, 1973); (ii) feelings of uncertainty; and (iii) discomfort and/or anxiety (Dowling & Staelin, 1994). In the research conducted by (Featherman & Pavlou, 2003), perceived risk reduces the intention to adopt new technologies. In the past, most of the studies directly measured perceived risk, and it was claimed that perceived risk is negatively associated with the new technologies' adoption (Ahmad et al., 2020; Kesharwani & Bisht, 2012; Tseng & Wang, 2016). As such, the first hypothesis of the study developed with regards to perceived risk and intention to use Smart Contracts.

Hypothesis 1: The perception of risk using the smart contract negatively affects logistics practitioner intention to use smart contract.

2.4.2 Perceived Benefits and Intention to Use

Perceived benefit, as defined by Leung (2013) refers to the individual's subjective assessment of advantageous consequences that arise from a specific behaviour or choice. Furthermore, the term "perceived benefit" pertains to the all-encompassing benefits that an individual links with the implementation of a particular technology, as stated by Kim and Olfman (2011). Porter and Donthu (2006) posit that the probability of users effectively overcoming obstacles related to the assimilation of novel information technology is greater when the advantages derived from said technology are substantial. Numerous studies have been conducted to evaluate perceived benefits, which have been proposed to exhibit a positive correlation with the adoption or intention to use new technologies (Ahmad, et al., 2020; Garg, Pet., 2021; Yazici et al., 2014). The study's second hypothesis pertains to the relationship between perceived benefit and intention to use Smart contract technology.

Hypothesis 2: The perception of benefits using the smart contract positive affects logistics practitioner intention to use smart contract.

The proposed conceptual model is graphically presented in Figure 3.

Figure 3. Conceptual Model - The Perceived Risk and Perceived Benefits on Intention to use Smart Contract (SC)
3. **Proposed Methodology**

The research objectives are: (i) to explore the utilization of smart contracts in the logistics industry of Malaysia; and (ii) to examine the perceived benefits and perceived risk influence in adopting Smart Contract in Malaysia. As such this research will utilise a blend of descriptive and explanatory approaches. The aforementioned research methodology is commonly known as "descriptor-explanatory." This method will help researcher to understand the current condition of Malaysian logistics firms in utilizing smart logistics and then to explain the influence of perceived risk and perceived benefits on the intention to use Smart Contract. The location for this research is Malaysia and the unit of analysis pertains to the individuals (logistics practitioners) who are employed within the logistics industry of Malaysia. As per the data provided by the Department of Statistics Malaysia (DOSM, 2019), an approximate of 437,926 individuals or practitioners are involved in the sector of logistics, transport, and storage services. Thus, the samples obtained are able to represent the logistics sector in Malaysia. The research will employ a simple random sampling, where the research will randomly select a subset of participants from the identified population. The quantitative approach will be employed and the data collection through the distribution of questionnaires will be chose. Self-administered questionnaire will be distributed using social media such as WhatsApp, LinkedIn, Facebook, and Instagram. IBM Statistical Package for the Social Sciences (SPSS) version 28 will be used to analyse the data.

4. **Conclusion**

The logistics industry in Malaysia is currently in its emerging phase of adopting the Industry Revolution 4.0 in its operational procedures. The incorporation of digitization in logistics contracts, coupled with the implementation of other cutting-edge technologies, will be a pertinent item on the agenda. Whilst smart contracts offer numerous benefits, there exist potential risks that are associated with the intention to utilise or adopt this technology. This study holds significance as it highlights the potential countermeasures that can be implemented to expedite the adoption of Smart Contracts. This study is focuses on a conceptual nature and aims to achieve its research objective by scrutinising the risk and benefit factors that may impact the intention to use Smart Contracts. Moreover, considering the substantial interest in Smart Contracts, it is crucial to conduct further research in the forthcoming period, with a particular emphasis on the legal concerns, infrastructure issues and managerial perceptive in utilising diverse adoption theories that could facilitate the advancement of technology in logistics industry. Given that this paper is purely conceptual in nature, researchers suggest that future research should focus on empirical studies that utilise the proposed conceptual model to further validate the identified variables.

**Acknowledgement**

The authors express their gratitude to the Malaysia University of Science and Technology for their support in the publication of this conference paper.

**References**


Cong, L. W., & He, Z. (2018). *Blockchain Disruption and Smart Contracts*.


Determinants of Individuals’ Behavior to Adopt Central Bank Digital Currency: Evidence from Vietnam

Thuy Tran Thi* & Khanh Thai Hong Thuyb
a,bFaculty of Finance and Accounting, Nguyen Tat Thanh University, Ho Chi Minh City
*tran.thuy@ntt.edu.vn

Abstract: The advent of blockchain technology and its application in the financial system has fueled debates, especially regarding digital currencies. Unlike digital currencies issued by private organizations that have no legal significance and are not recognized by governments, many countries around the world have been conducting research and development on central bank digital currency (CBDC). CBDC is seen as a possible next step in the evolution of money, offering a more stable unit of account, a more efficient medium of exchange, and a safer way to store value. Therefore, Vietnam must not be left behind. However, there is still no adequate research on individuals’ behavior regarding CBDC adoption. Based on the theoretical background, this study was developed through the extension of the Unified Theory of Acceptance and Use of Technology adding "Perceived Risk" and "Trust". The Statistical Package for the Social Sciences (SPSS) 23.0 and SmartPLS 4.0 software are used to analyze data collected from the survey questionnaires. The results suggest that the proposed theoretical framework is effective to explain the behavior of individuals, especially highlighting the role of beliefs in CBDC adoption. This study also offers important practical implications for fostering the application of CBDC in Vietnam.

Keywords: adoption, central bank digital currency, individuals’ behavior, trust

1. Introduction

Economists define money as anything that is generally accepted in payment for goods or services or in the repayment of debts. The history of more than four thousand years of birth and development of money shows its strong ability to evolve and adapt. With the invention and widespread use of electronic computers and the internet in the 1980s, a completely new form of currency appeared, which is digital money. Digital currency according to the concept of Bank for International Settlements (BIS) is “an asset expressed in digital form” (BIS, 2015), that is, does not have a definite physical form like paper money or coins. Digital currency is classified into two types, electronic currency, and virtual currency (IMF, 2016). According to the European Parliament and the Council, electronic currency is monetary value stored in electronic form, including magnetic form, expressed as a recourse against the issuer, issued in exchange for a sum of money for the performance of payment transactions and accepted by individuals or legal persons, besides the issuer. Virtual currency is a digital representation of value, not issued by a central bank, credit institution or electronic money institution, and in some cases can be used in place of money (ECB, 2012). Cryptocurrency is a subset of digital currency that has its own currency, different from cryptocurrencies, and relies on cryptographic techniques to reach consensus (World Bank, 2015).

Most countries warn about the risks of trading and investing in cryptocurrencies. For example, The Federal Financial Supervisory Authority (BaFin), People's Bank of China (PBOC), Reserve Bank of India (RBI), Bank of France (BDF), etc. have issued warnings about the possibility of using Bitcoin to money laundering and its risks such as lack of security and supervision by authorities (Khanh, 2021). The overwhelming majority of countries legally assert that Bitcoin does not meet the standards to be considered fiat currency or fiat money.
Although cautious about cryptocurrencies, most countries around the world are excited about blockchain technology. The recent development of cryptocurrencies has sparked debate over whether central banks should issue their own digital currency. To lessen the impact caused by private digital currencies, central banks across the world research the importance of introducing a central bank digital currency (CBDC) (Opare & Kim, 2020). The development of a CBDC started with an investigative study by China in 2014 with the intention of ultimately issuing a national digital currency based on Digital Currency Electronic Payment (DCEP) – Digital Yuan. A recent survey by Barontini and Holden (2019) on the issuance of CBDC of 63 central banks in countries and territories representing nearly 80% of the world’s population (including Vietnam) showed that 70% of central banks surveyed are (or will soon be) participating in the CBDC. Table 1 shows the status of CBDCs (Cbdctracker, 2023).

Table 1. Central Bank Digital Currencies Status

<table>
<thead>
<tr>
<th>CBDC Status</th>
<th>Launched</th>
<th>Pilot</th>
<th>Proof of Concept</th>
<th>Research</th>
<th>Cancelled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of countries/territories</td>
<td>2</td>
<td>15</td>
<td>21</td>
<td>93</td>
<td>6</td>
</tr>
</tbody>
</table>

In Vietnam, at Decision No. 942/QD-TTg dated June 15, 2021, the Government assigned the State Bank of Vietnam to research, build, and pilot a digital currency based on Blockchain technology in the 2021-2023 period. Thus, the Government as well as the State Bank have taken careful and steady steps in the research and development of Central Bank digital currency. Previous literature mainly focused on the design as well as the benefits and challenges of CBDC implementation. There are almost no studies looking at public perception of CBDC. Therefore, this study focuses on examining the factors affecting the individual's CBDC acceptance behavior, in which the mediating role of trust is suggested. It seeks to identify the factors which may promote public trust and adoption, implication for policymakers.

2. Conceptual Framework, Literature Review, and Hypotheses Development

2.1 Conceptual Framework

Due to the varying financial development stages and different missions and needs of countries, to date, there are many definitions of CBDC from a variety of perspectives with growing literature.

Copenhagen Business School (Bjerg, 2017) defines that CBDC is universally accepted electronic money which is issued by the central bank. Bank of England (Kumhof & Noone, 2018) explains that CBDC is an electronic central bank money which is more widely accessible than reserves, is interest bearing, has functionality for retail transactions, has a different operational structure as compared to other forms of money. CBDC is a digital form of central bank money that is different from balances in traditional reserves or settlement accounts (Bank for International Settlements (Auer et al, 2020). The European Central Bank (Bindseil, 2020) said that CBDC is a form of central bank money which is managed through electronic means and is accessible to the larger public. CBDC is simply a fiat currency issued by central banks in digital form (Allen et al., 2020). IMF (Kiff et al., 2020) defines CBDC as a digital representation of a sovereign currency issued by and as a liability of a jurisdiction’s central bank or the monetary authority. Ozili (2022) explains that a CBDC is simply the digital equivalent of a fiat currency. Bitter (2020) opines that a CBDC is a central bank liability that could be interest bearing. Unlike privately issued digital currencies, CBDC acts as a means by which government can assert control over the level of transparency, illicit activities, financial inclusiveness, and fiscal/monetary policies (Solberg & Benhayoun, 2022). CBDC is a virtual form of a nation’s fiat currency holding the same properties (Zhang, 2020). Central bank digital currencies possess similarities to cash (Ozili, 2022). Typically, CBDC should fulfil the following functions of money: store of value, unit of account, medium of exchange, and standard for postponed payments (Lee et al., 2021).
The benefits of CBDC include financial integration, security, cheaper transaction fees, promotion of virtual payments and enhancement of monetary policy (Ozili, 2022; Lee et al., 2021; Zhang, 2020). CBDC help promoting financial integration, improving transactions efficiency and security, and decreasing the cost of cross-border payments (MAS & Bank of Canada, 2019). Moreover, CBDC helps to reduce the cost of issuing, circulating, and monitoring physical currency. The use of digital currency may assist the central bank to more accurately account for the money supply, its structure, velocity, multiplier, time, and space distribution, thereby improving the accuracy of monetary policy operations. CBDC also helps to prevent the adoption of privately issued digital currencies, as it is backed by trusted governments (Lee et al., 2021).

One crucial advantage of CBDC is its inclusiveness. CBDC makes it possible to conduct payments through e-Wallets without the need for identities or accounts or even the Internet connection. CBDC enables the unbanked in the rural area, and the developing countries to gain easy access to financial services (Lee et al., 2021). Furthermore, the issue of digital currency can reduce the cost of traditional paper money issuance and circulation and save considerable expenditure on labour and materials. The digital currency will also help to reduce cross-border payment fees to a large extent (Lee et al., 2021).

Digital currency has a high level of safety and trust, helping to reduce risks for transactions and economic entities. This benefit is obtained by blockchain and encryption technology, digital currency transactions are verified as having high transparency, reliability, and security, much less risk than cash, can be retrieve transaction history (Luc, 2021).

Besides the benefits, CBDC implementation also has challenges and risks related to economic, technological, ethical, and legal aspects (Lee et al., 2021). Economically, unrestricted public access to digital currencies could limit banking activity as the need for deposits or reserves held by commercial banks will plummet. As for the technology, although CBDC eliminates the problem of ledger tampering and the possibility of transaction reversal, the blockchain technology as the bedrock of CBDC has technical scaling challenges and is vulnerable to cybersecurity risk. Legally, the central bank digital money may not have a solid legislative-backed regulation depending on the relevant country (Lee et al., 2021).

2.2 Research Hypothesis

Unified Theory of Acceptance and Use of Technology (UTAUT) advanced by Venkatesh, Morris (2003), is among the major theories/models on the acceptance of new forms of technology. The UTAUT comprises four major variables such as performance expectancy, effort expectancy, social influence, and facilitation conditions (Venkatesh & Morris, 2003).

The UTAUT has been applied in several information systems application research such as communication, general-purpose systems, office systems, and specialized business systems (Mensah & Mwakapesa, 2022). The utilization of the UTAUT model in these diverse fields of studies provides a testament to the relevance, reliability of this model to augment the comprehension of the elements driving the acceptance of new information systems/technology. This accounted for its utilization in this study to elucidate the adoption of CBDC in Vietnam.

2.2.1 Performance Expectancy (PE)

It is the degree to which people believe that the use of a particular technology system empowers them to accomplish job goals (Venkatesh & Morris, 2003). It involves appreciating the benefits that arise from using technology. The more benefits from using technology, the more people will be ready to adopt it. The same holds true about digital currency.
2.2.2 Effort Expectancy (EE)

It is defined as the extent of simplicity connected with the usage of a technology (Venkatesh & Morris, 2003). that is, the easier it is for users to operate a technology system, the more they are in readiness to use such a technology (Caviggioli et al., 2020). In other words, users will be unwilling to use a technology that they perceive to be hard to use.

2.2.3 Social Influence (SI)

It is defined as the influence of an individual by others on the practice of cryptocurrency (Arias-Oliva et al., 2019). The term “social influence” refers to efforts to alter another person’s thoughts, feelings, or actions, whether intended or not (Delfabbro et al., 2021). Individuals unfamiliar with digital currency might decide to try it based on the recommendations from people close to them.

2.2.4 Facilitating Conditions (FC)

Facilitating conditions refer to the degree to which “an individual believes that technical and organizational infrastructure exists to support the use of the system” (Venkatesh Morris et al., 2003). The more facilitating conditions, the more people accept the technology.

2.2.5 Perceived Risk (PR)

Perceived risk is understood as “any action taken by the buyer that may produce consequences that he or she cannot foresee, and some of which may be at least unpleasant” (Bauer, 1960). Perceived risk for new technology is not only loss or theft, but also related to technology risk, financial risk, operational risk in transaction, information risk. Especially with new technologies like CBDC, perceived risk plays an even more important role, negatively affecting individuals' trust in CBDC.

2.2.6 Trust (TR)

Previous studies highlight that entrepreneurs usually seek consumer trust to domesticate new technology like digital currency. Hence, trust in emerging disruptive technologies plays a leading role in its adoption (Kethineni & Cao, 2020). Corbet et al. (2018) adds that the availability of trust and ethics towards using a higher level of technical innovation dictates the successful facilitation of the blockchain cryptocurrency ecosystem. Han et al. (2016) argue that trust influences the establishment of attitudes, loyalty, relationships, purchase intention, decreasing privacy and security concerns. Al-Hussaini et al. (2019), concluded that users’ trust in adopting disruptive technology like blockchain cryptocurrency would derive from their trust in the intermediary platform. When consumers are convinced that the intermediary platform is reliable and obtain positive electronic words of mouth about such technology, that would automatically influence their trust. Koroma et al. (2022) explain that business owners consciously seek consumer trust before using new technology; this is applicable to digital currencies as well. The success of disruptive technologies and innovation is largely attributable to the level of trust expressed by users in the technology and the product itself (Schaupp et al., 2018). Koroma et al. (2022) argue that confidence in digital currency is increased and is most beneficial in a technology friendly environment.

According to the development and history of payment instruments and technology adoption, trust and confidence are hinted to be essential, it is the most relevant factor in triggering the acceptance and use of any payment system or technology (Koziuk, 2021; Solberg & Benhayoun, 2022).
Figure 1. The Proposed Model

Figure 1 illustrates the proposed adoption model and based on a review of the literature; the following hypothesis was established in this study:

H1: Performance expectancy positively affects trust.
H2: Effort expectancy positively affects trust.
H3: Social influence positively affects trust.
H4: Facilitating conditions positively affects trust.
H5: Perceived risk negatively affects trust.
H6: Trust positively affects behavioral adoption intention.
H7a: Trust mediates the relationship between performance expectancy and behavioral adoption intention.
H7b: Trust mediates the relationship between effort expectancy and behavioral adoption intention.
H7c: Trust mediates the relationship between social influence and behavioral adoption intention.
H7d: Trust mediates the relationship between facilitating conditions and behavioral adoption intention.
H7e: Trust mediates the relationship between perceived risk and behavioral adoption intention.

3. Research Methodology

3.1 Data Collection

Data for this study was collected from a questionnaire-based survey. The questionnaire used to measure the factors in the proposed model was referenced from previous studies (Chang & Polonsky, 2012; Davis, 1993; Fortes & Rita, 2016). The study sample was identified as Vietnamese citizens, aged between 18 and 65. Using an electronic survey, the study focused on respondents with internet access and technology literacy. The official survey results obtained 171 responses. The sample size used in
this study is based on the argumentation of Hair et al. (2014) who stated that a good sample size consists of 100 to 200 samples. Data was collected during March 2023.

This study used 30 indicators measured on a 5-point Likert scale, whereas 1 is the lowest point (strongly disagree) and 5 is the highest point (strongly agree). These 30 indicators are sorted into 7 variables: effort expectancy (3 items), performance expectancy (6 items), social influence (4 items), facilitating conditions (4 items), perceived risk (4 items), trust (4 items), behavioral adoption intention (5 items). Behavioral adoption intention (BAI) is the dependent variable in this study, whereas effort expectancy (EE), performance expectancy (PE), social influence (SI), facilitating conditions (FC), perceived risk (PR) are independent variables, and trust (TR) is a mediating variable.

3.2 Data Analysis

Structural Equation Modeling (SEM) was used to analyze the research data. The SEM approach is considered suitable since it is useful in validating models that are complex and have not been tested before (Jr & Matthews, 2017) (Alshurideh & Kurdi, 2020). There are two forms of SEM, covariance-based SEM (CB-SEM) and least squares-based SEM (PLS-SEM). While CB-SEM should be applied to assess how well-established theories fit reality, PLS-SEM is used for exploratory analysis and for testing developmental theories (Fornell & Bookstein, 1982). As a result, with newly added constructs in this study, PLS-SEM lends itself well for the purpose of exploration in this research. Furthermore, the PLS-SEM can work with any sample size so far as it meets the required minimum sample size (Du & 4Long, 2020). Fundamentally, SEM has two key aspects such as the measurement model and the structural model. The measurement model examines the relationships between the observed constructs/items, while the structural model describes the inter-relationships among variables, i.e., the hypothesized interaction among the latent constructs (Weston & Gore, 2006).

Accordingly, SPSS 23.0 and Smart PLS 4.0 were used to analyse the data. A systematic procedure for data analysis included analysis of demographic information, evaluation of the measurement model and evaluation of the structural model.

4. Results

4.1 Profile of Respondents

Table 2 presented the demographic information of respondents in terms of gender, age, education, occupation, and knowledge of CBDC.

<table>
<thead>
<tr>
<th>Demographics</th>
<th>Frequency</th>
<th>Percentage</th>
<th>Demographics</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td>Occupation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>69</td>
<td>40.40</td>
<td>Full-time employee</td>
<td>83</td>
<td>48.54</td>
</tr>
<tr>
<td>Females</td>
<td>102</td>
<td>59.60</td>
<td>Self – employed</td>
<td>7</td>
<td>4.09</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-25</td>
<td>57</td>
<td>33.33</td>
<td>Housewife/ retire</td>
<td>6</td>
<td>3.51</td>
</tr>
<tr>
<td>26-35</td>
<td>82</td>
<td>47.96</td>
<td>Other</td>
<td>28</td>
<td>16.37</td>
</tr>
<tr>
<td>36-45</td>
<td>27</td>
<td>15.79</td>
<td>Knowledge of CBDC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;45</td>
<td>5</td>
<td>2.92</td>
<td>Do Not Understand</td>
<td>50</td>
<td>29.24</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High school graduated</td>
<td>20</td>
<td>11.70</td>
<td>Understand the Average level</td>
<td>109</td>
<td>63.74</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Understand Very Well</td>
<td>12</td>
<td>7.02</td>
</tr>
</tbody>
</table>
Demographics | Frequency | Percentage | Demographics | Frequency | Percentage
--- | --- | --- | --- | --- | ---
Studying at university/college | 48 | 28.07 | Graduated from university/college | 75 | 43.86
Post-Graduate | 28 | 16.37

4.2 Measurement Model Assessment

The results measurement models are shown in Table 3. Outer loading, Cronbach’s alpha, composite reliability, and AVE (average variance extracted) were used to determine the construct reliability of the measurement model. Cronbach’s alpha and composite reliability are suggested to have values not less than 0.70 respectively (Hair et al., 2012). The AVE is recommended to have a measure of not less than 0.50 (Hair et al., 2010). As indicated in Table 3, all the measurement standards have been met since the values obtained for each of the reliability indicators such as AVE, composite reliability, Cronbach’s alpha, and outer loading were all above the recommended cut-off points.

Table 3. Outer Loading, Composite Reliability, and AVE

<table>
<thead>
<tr>
<th>Variable</th>
<th>Outer Loading</th>
<th>CA</th>
<th>CR</th>
<th>AVE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Performance Expectancy (PE)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PE01. I think CBDC’s transaction speed is fast</td>
<td>0.924</td>
<td>0.940</td>
<td>0.725</td>
<td></td>
</tr>
<tr>
<td>PE02. I think CBDC will help reduce transaction costs</td>
<td>0.842</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PE03. I think CBDC will make cross-border transactions easy</td>
<td>0.851</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PE04. I think CBDC will help with effective financial management</td>
<td>0.871</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PE05. I think CBDC will help transparent transactions</td>
<td>0.858</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PE06. I think CBDC will help reduce the cost of printing money, help reduce the risk of transportation, not be damaged, lost like cash</td>
<td>0.836</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Effort Expectancy (EE)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EE01. I think it's easy to find CBDC documentation</td>
<td>0.946</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EE01. I think it's easy to learn and understand about CBDC</td>
<td>0.927</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EE03. I think it's easy to use CBDC</td>
<td>0.889</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Social Influence (SI)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SI01. I will accept CBDC if the government encourages it</td>
<td>0.838</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SI02. I will accept CBDC if my family and friends suggest me to do so</td>
<td>0.909</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SI03. I will accept CBDC if the people I know do the same</td>
<td>0.876</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SI04. I will accept CBDC if people with a position in society suggest that it should be accepted</td>
<td>0.879</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Facilitating Conditions (FC)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FC01. I think the Government will build a solid legal framework related to CBDC</td>
<td>0.846</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FC02. I think Vietnam will have modern technology infrastructure and effective security methods related to CBDC</td>
<td>0.896</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FC03. I think that Vietnam will organize training and capacity building of financial experts, cryptography, and security experts on CBDC</td>
<td>0.801</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FC04. I think the Internet in Vietnam will cover a wide area</td>
<td>0.838</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Perceived Risk (PR)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PR01. I still accept CBDC even though my personal information may be exposed</td>
<td>0.808</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PR02. I still accept CBDC despite the risk of insecurity when the hard drive fails, data gets virus, files get stolen.</td>
<td>0.823</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PR03. I still accept CBDC even though incidents such as natural disasters, power outages, unavailable network connections, etc. may disrupt transactions.</td>
<td>0.854</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Proceedings of the 6th International Conference on Digital Innovation – Blockchain and Fintech

PR04. I still accept CBDC even though the Government can track every transaction I make at any time. 0.812

Trust (TR) 0.870 0.911 0.720
TR01. I believe that digital currency is the inevitable trend of the world. 0.852
TR02. I believe CBDC is safe, guaranteed 0.776
TR03. I believe CBDC benefits citizens 0.861
TR04. Overall, I trust CBDC 0.900

Behavioral Adoption Intention (BAI) 0.891 0.919 0.694
BAI01. I would rather accept CBDC than other digital currencies like Ethereum or Bitcoin (virtual currency) 0.787
BAI02. I look forward to CBDC being piloted and rolled out widely 0.881
BAI03. When CBDC is released, I will use it 0.851
BAI04. I will convert my bank deposit to CBDC when it is rolled out 0.843
BAI05. I will encourage everyone to accept CBDC 0.801

CA = Cronbach’s Alpha
CR = Composite Reliability
AVE = Average Variance Extracted

The Fornell-Larcker Criterion and Heterotrait-Monotrait (HTMT) are two measures of discriminating validity (Henseler et al., 2009). Table 4 describes the Fornell-Larcker criterion to demonstrate the discriminant validity. It shows that the value is diagonal and higher than the value below (Fornell & Larcker, 1981). Thus, there is discriminant validity in the measurement model. Likewise, Table 5 shows the HTMT, which describes the discriminant validity. The HTMT ratio also measures the discriminant validity. It shows that the value is no value is higher than 0.9 (Hair, 2010; Henseler et al., 2015). Therefore, the discriminant between latent variables in the model is good.

Table 4. Fornell-Larcker Criterion

<table>
<thead>
<tr>
<th></th>
<th>BAI</th>
<th>EE</th>
<th>FC</th>
<th>PE</th>
<th>PR</th>
<th>SI</th>
<th>TR</th>
</tr>
</thead>
<tbody>
<tr>
<td>BAI</td>
<td>0.833</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EE</td>
<td>0.400</td>
<td>0.921</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FC</td>
<td>0.436</td>
<td>0.634</td>
<td>0.845</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PE</td>
<td>0.316</td>
<td>0.751</td>
<td>0.712</td>
<td>0.851</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PR</td>
<td>-0.225</td>
<td>-0.366</td>
<td>-0.373</td>
<td>-0.439</td>
<td>0.825</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SI</td>
<td>0.348</td>
<td>0.573</td>
<td>0.757</td>
<td>0.669</td>
<td>-0.366</td>
<td>0.876</td>
<td></td>
</tr>
<tr>
<td>TR</td>
<td>0.484</td>
<td>0.630</td>
<td>0.741</td>
<td>0.625</td>
<td>-0.406</td>
<td>0.758</td>
<td>0.849</td>
</tr>
</tbody>
</table>

Table 5. Heterotrait-Monotrait Ratio (HTMT) - Matrix

<table>
<thead>
<tr>
<th></th>
<th>BAI</th>
<th>EE</th>
<th>FC</th>
<th>PE</th>
<th>PR</th>
<th>SI</th>
<th>TR</th>
</tr>
</thead>
<tbody>
<tr>
<td>BAI</td>
<td>0.422</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EE</td>
<td>0.481</td>
<td>0.719</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FC</td>
<td>0.334</td>
<td>0.817</td>
<td>0.799</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PE</td>
<td>0.242</td>
<td>0.403</td>
<td>0.429</td>
<td>0.482</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PR</td>
<td>0.368</td>
<td>0.634</td>
<td>0.852</td>
<td>0.735</td>
<td>0.403</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SI</td>
<td>0.526</td>
<td>0.712</td>
<td>0.839</td>
<td>0.696</td>
<td>0.454</td>
<td>0.850</td>
<td></td>
</tr>
</tbody>
</table>

Variance Inflation Factor (VIF) is a way to determine how many regression variables are linked together. A high VIF means that the independent variable related to it is very closely linked to the other variables in the model. VIF is acceptable if it is less than 10. Table 6 shows that all the weight of VIF is less than 5, and it is justified that this study is accepted.
Table 6. Collinearity Statistic (VIF)

<table>
<thead>
<tr>
<th></th>
<th>BAI</th>
<th>EE</th>
<th>FC</th>
<th>PE</th>
<th>PR</th>
<th>SI</th>
<th>TR</th>
</tr>
</thead>
<tbody>
<tr>
<td>BAI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EE</td>
<td></td>
<td>2.409</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FC</td>
<td></td>
<td>2.938</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PE</td>
<td></td>
<td>3.171</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PR</td>
<td></td>
<td>1.258</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SI</td>
<td></td>
<td>2.565</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TR</td>
<td></td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. Structural Model Assessment

The structural model and the latent structures are linked using partial least squares structural equation modelling (PLS-SEM) (Sohaib et al., 2019). When using PLS-SEM, the sample size was estimated using an observational t-value bootstrapping process and a p-value. However, even when t-values over 1.645 are statistically significant, the p-values of 0.05 and below are accepted or supported (Alharbi & Sohaib, 2021). This study uses normal bootstrapping with a range of 1,000 bootstraps and 171 cases to determine the value of the direction coefficients. Figure 2 demonstrates the structure model of the study and he path model is described in Tables 7 and 8.

Based on Table 7, the findings demonstrated that effort expectancy (β = 0.224, p-value < 0.026), social influence (β = 0.421, p-value < 0.000), facilitating conditions (β = 0.303, p-value < 0.004), perceived risk (β = -0.092, p-value < 0.013) significantly impacts trust. Thus, hypothesis H2, H3, H4, H5 were supported. However, opposite relations are observed in H1, where performance expectancy has a non-significant (β = −0.081, p-value <0.420) relationship toward trust. The findings also showed that trust has a significant and positive relationship with behavioral adoption intention (β = 0.484, p < 0.000).

The R-squared ($R^2$) value of trust is 0.672, which implied that 67.2% of individuals’ trust is affected by effort expectancy, social influence, facilitating conditions and perceived risk. While the ($R^2$) value of behavioral adoption intention is 0.235, which implied that 23.5% of adoption is affected by trust. The $f^2$ values were estimated based on the effect size of each construct to the R-square. Cohen’s study (1988) postulated that $f^2$ values more than 0.35 are considered for high-effect size, while 0.15 – 0.35 and 0.02 – 0.15 were considered for medium and small effect sizes. According to Table 7, effort expectancy ($f^2 = 0.063$), facilitating conditions ($f^2 = 0.095$) and perceived risk ($f^2 = 0.021$) have a small effect on trust. Social influence ($f^2 = 0.210$) has a medium effect on trust. Trust ($f^2 = 0.307$) has a significant moderation and a medium effect on behavioral adoption intention.
Table 7. Path Coefficients and Hypothesis Testing

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Relationship</th>
<th>Original sample (b value)</th>
<th>R²</th>
<th>t²</th>
<th>t-value</th>
<th>P values</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>PE -&gt; TR</td>
<td>-0.081</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Not Supported</td>
</tr>
<tr>
<td>H2</td>
<td>EE -&gt; TR</td>
<td>0.224</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Supported</td>
</tr>
<tr>
<td>H3</td>
<td>SI -&gt; TR</td>
<td>0.421</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Supported</td>
</tr>
<tr>
<td>H4</td>
<td>FC -&gt; TR</td>
<td>0.303</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Supported</td>
</tr>
<tr>
<td>H5</td>
<td>PR -&gt; TR</td>
<td>-0.092</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Supported</td>
</tr>
<tr>
<td>H6</td>
<td>TR -&gt; BAI</td>
<td>0.484</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Supported</td>
</tr>
</tbody>
</table>

Based on the summary results of mediating effect in Table 8, trust mediates the relationship between social influence (β = 0.204, t = 3.728), facilitating conditions (β = 0.147, t = 2.554), effort expectancy (β = 0.108, t = 2.012), perceived risk (β = -0.045, t = 2.255) and behavioral adoption intention. Thus, hypothesis H7b, H7c, H7d, H7e were supported. However, Performance expectancy and adoption are not mediated through trust (β = -0.039, t = 0.770), which does not support the H7a.

Table 8. Mediating Effect of Customer Satisfaction Towards Adoption

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Relationship</th>
<th>Original Sample (O)</th>
<th>T Statistics ([O/STDEV])</th>
<th>P Values</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>H7a</td>
<td>PE -&gt; TR -&gt; BAI</td>
<td>-0.039</td>
<td>0.770</td>
<td>0.441</td>
<td>Not Supported</td>
</tr>
<tr>
<td>H7b</td>
<td>EE -&gt; TR -&gt; BAI</td>
<td>0.108</td>
<td>2.012</td>
<td>0.044</td>
<td>Supported</td>
</tr>
<tr>
<td>H7c</td>
<td>SI -&gt; TR -&gt; BAI</td>
<td>0.204</td>
<td>3.728</td>
<td>0.000</td>
<td>Supported</td>
</tr>
</tbody>
</table>
6. Discussion

The purpose of this research is to assess the factors influencing the individual’s intention to accept CBDC, evidence in Viet Nam. In particular, the study based on the UTAUT model, expanding “perceived risk” and “trust” factors. Trust is referred to as the mediating effects toward PE, EE, SI, FC, PR, and BAI. Evaluation results of the measurement and structural models using PLS-SEM reveal that while the mediating effect hypotheses involving the four factors (i.e., EE, SI, FC, and PR) were supported, the one involving PE was not (Table 7) (Table 8). Additionally, trust improves the connection between PE, EE, SI, FC, PR (independent variables), and BAI (dependent variable).

The results showed that effort expectancy, social influence and facilitating conditions have positive effects on individual’s trust. Meanwhile, perceived risk has a negative impact. Research results also determine that trust has a direct impact on behavioral adoption intention. However, performance expectancy was found to not affect trust. These results are not surprising. Digital currency represents a relatively new technology, so not enough information is available to the general population. Individuals are expected to be influenced by others’ opinions. This increases the individual’s trust in CBDC. Facilitating conditions give people more confidence that everything is ready for the cbdc implementation, just sooner or later. Furthermore, individuals are attracted to technologies they can understand. When deciding to adopt CBDC, individuals are concerned about the security of their data and accounts. Perceived risk reduces their confidence in CBDC.

Therefore, to raise the awareness and belief of individuals about CBDC, Vietnam needs to:

a. Build and complete a legal corridor for the development of digital currency.
b. Develop a national payment system that ensures efficiency and limits risks for digital currency-related transactions.
c. Promoting the habit of non-cash payment combined with universalizing knowledge and raising awareness of people and businesses about digital currency and cashless payment.
d. Build and train a team of experts to accompany national programs on universalizing financial knowledge for the entire population.

6.1 Theoretical Implication

This study has successfully extended the UTAUT theory by adding perceived risk and trust factors. The study has included the core elements of the UTAUT theory into the model, but trust is considered as a mediating factor. Trust is an important factor in CBDC adoption. Effort expectancy, social influence, facilitating conditions and perceived risk also have an indirect impact on the intention to adopt CBDC through trust. Our study is the first to mediate trust, combined with five other factors to examine intent to accept CBDC. Therefore, this study validates that trust is a prerequisite for individuals to accept CBDC in the Vietnamese context.

Our findings also contribute to the literature on individuals’ trust by establishing relationships with effort expectancy, performance expectancy, social influence, facilitating conditions and perceived risk. Trust helps develop a positive relationship in CBDC adoption in Vietnam.

6.2 Practical Implications

The research results of this study also have some managerial implications for government, policymakers, and citizens as well vendors and software developers of CBDC payment systems. Vietnam is in the
research phase, so it is necessary to consider the citizens' acceptance of CBDC. Because CBDC is a relatively new concept, it is important to raise awareness and build people's trust about CBDC.

7. Limitations and Future Research Directions

This study still has certain limitations. First, in terms of sample size, our respondents represent only a small group, and are therefore not generalizable to individuals in Vietnam. Future studies should survey a larger number of respondents, being able to compare beliefs and intentions to accept across subject groups. Second, the drivers of CBDC adoption might not have been fully exhausted in this study, and thus, future studies are warranted to explore other underlying elements that encourages CBDC acceptance, such as transparency, transaction fees, and switching cost especially government support and regulations. Finally, this study has not investigated the effects of a few important moderators on the constructed model. It is an exciting idea and needs to be examined in further research.

8. Conclusion

This study aims to examine the factors affecting the intention to adopt CBDC of individuals in Vietnam, in which the mediating role of trust is emphasized. The results indicate that effort expectancy, social influence, facilitating conditions have a positive impact on individuals’ trust, while perceived risk has a negative effect, and performance expectancy have no effect. Trust positively affects the intention to accept CBDC. This means that the higher the trust, the more people's intention to adopt CBDC.

Acknowledgment

This research is funded by Nguyen Tat Thanh University, Ho Chi Minh city, Vietnam.

References


Fornell, C., & Larcker, D. F. (1981). Structural equation models with unobservable variables and measurement error: Algebra and statistics. Journal of Marketing Research, 18(382). https://doi.org/10.2 307/3150980


Henseler et al. (2015). Discriminant validity: Check out how to use the new HTMT criterion ! A primer on Partial Least Squares Structural Equation Modeling, PLS-SEM.


Embedded Finance in Vietnam –
Development Trends, Opportunities, and Challenges

Hang Nguyen Thi Thu*, Khanh Thai Hong Thu† & Anh Nguyen Lan‡

*a,b,c Faculty of Finance and Accounting, Nguyen Tat Thanh University, Ho Chi Minh City, Vietnam
†nguyen.hang@ntt.edu.vn

Abstract: Embedded Finance (EF) is becoming one of the important development trends in the global financial service supply sector. Currently, in the trade ecosystem in Vietnam, modern embedded financial products have begun to serve consumers of financial services, providing seamless experiences, and creating new and practical values in the digital economy. This study evaluates the current status and development of Embedded Finance in Vietnam in recent years. That assessment is done through the analysis of a set of statistics on embedded financial services offered by the 4 brands with the largest e-commerce platforms in Vietnam. Research results have shown the development status of non-financial companies on Vietnamese e-commerce platforms in the period 2017 to 2022, and the potential market of embedded finance. Besides, the research has also identified the challenges and development opportunities of embedded financial services in Vietnam.

Keywords: e-commerce, embedded finance, trade ecosystems, fintech in Vietnam, baas (Bank as a service), APIs

1. Introduction

Embedded Finance (hereinafter referred to as EF) is a concept that is not new, but this concept was not popular until now. At present, the current academic literature on the embedded finance field is not yet abundant. The management-monitoring mechanisms and related standards have not been established. In the last few years, this concept has become one of the widely mentioned keywords on economic and financial forums, mainly from companies in the field of financial innovation, digital banking, Fintech companies, or in recent white papers and statistical reports on financial service supply trends. Figure 1 shows, by the end of 2021, EF is one of the six most mentioned financial service supply trends.

The advent of financial technology (fintech) has brought challenges and opportunities to the financial services market, allowing parties to grasp technology and offer more optimal solutions. Embedded financial services already exist in many commercial areas, but financial service consumers and sellers, and investors have not had the concept or idea of EF. EF is simply that in a bank’s payment application, users can access many different services such as shopping, insurance, investment, airline tickets, and travel booking... And vice versa, when consumers make purchases on any e-commerce platform, consumers can easily access financial services such as payment via debit card, credit card, installment payment, Buy now pay later, opening a payment wallet, and even opening an online bank account. In the past, embedded financial services have appeared quite simply, as conventional financial services products in the form of co-brands, for instance in case a bank card integrated with student information, or service points in electronics stores that support installment loans in developing countries, where consumers often have a demand for installment electronic products. Banks and trading companies have coordinated to embed financial services in the company’s commercial process. However, thanks to breakthrough technologies, the financial services supply chain landscape has changed, distribution channels and complex business models, many new points have been created in the concept of EF, which is the application of technology to bring financial services to appear on the APIs (Application Program Interface) of non-financial companies. Through fintech, Traditional Banks can, directly or indirectly, embed financial instruments or services in the participants, providing a new option for customers.
What is the Embedded Financial technology platform? What is the operational status of the field of providing embedded financial services in the E-commerce market in Vietnam? How does EF affect the Vietnam E-commerce market? What are the opportunities and challenges of the Embedded Financial Market? In this article, the researcher will give a general and basic answer to all the above questions.

Figure 1. The World’s Interest Over Time Keywords in the Financial Services Sector

2. Conceptual Framework and Literature Review

2.1 Conceptual and Technology Platform of EF

On September 23, 2022, Embedded Finance is mentioned in the 2022 Vietnam Embedded Finance Summit as follows: Embedded Finance is the seamless integration of financial services used by non-financial companies. Another definition of EF is “Embedded finance is the integration of financial services like lending, payment processing or insurance into nonfinancial businesses’ infrastructures without the need to redirect to traditional financial institutions.” (McKinsey & Company).

The technology platform of EF is API (Application Program Interface) and BASS (Banking as a Service) model (Peterson K. Ozili). API is a programming interface that allows communication between software applications within an organization or between organizations. Accordingly, one software application may call one or more functions of another software application. Open application programming interfaces (Open APIs) are APIs that allow third parties to actively connect and exploit an organization’s internal data. The banking as a Service model is the provision of retail or wholesale banking products and services, in context, as a service using an existing licensed institution’s secure, regulated infrastructure with modern API-driven platforms. In the article, we also redefine the concept of EF which is considered from the perspective of enterprises; from the perspective of banks, banks using the BAAS model to provide services to customers through fintech, non-financial companies, and embedded finance can be understood more narrowly. EF can also be provided by non-bank financial institutions such as licensed Fintech companies. “BaaS is a key subset of EF which will enable brands, in all sectors and geographies, big and small, to enhance the value they can create for their customers and capture for
themselves. It provides a new tool to rejuvenate old business models that are being battered by digitalization. Financial technology is so powerful now, like mobile and the cloud before it, that brands can harness it to compete more effectively in a hyperconnected world” (Simon Torrance, Finatra Co). The study does not equate BAAS and EF, but in the case of Vietnam policy institutions, the study would like to analyze the direction of EF through BAAS.

2.2 Embedded Financial Market Participants

Embedded financial market participants through open APIs and BAAS include four components:

a. Licensed commercial banks as trusted platform providers (Providers);
b. Fintech companies with an integrated, technology-driven role (Enablers);
c. Non-financial companies that distribute financial services on their platforms (Distributors); and
d. Consumers of financial services and consumers of other products and services (Consumers).

In, licensed commercial banks (Providers) sometimes not only stand in the position of providing the platform, but in each specific case, this position can change flexibly according to the financial service provision model, and based on the legal institutions of each country - the importance of commercial banks therefore also varies in each market. Next are fintech companies (Enablers) with the role of integrators, driven by technology, who will act as intermediaries with the strength of technology background and technology human resources to support the embedding of the fintech financial services or traditional bank financial services into the platform of Distributors. Non-financial Companies (Distributors) embed financial-banking services directly into their existing customer journeys for retail or wholesale customers. A typical case is Embedding financial services into the trade ecosystem.

2.3 Applications of EF in the Field of Providing Financial Services

Ozili (2022) points out, one of the biggest applications of EF is embedded lending and five other applications are embedded insurance, embedded payments, embedded investment and trading, trade finance, or embedded trade. Hoffman (2022) shows that EF has the potential to align the opportunities disconnected from physical and financial supply chains, and this alignment will be a major factor in opening more financing for small and medium-sized enterprises (SMEs) involved in trade and may help in narrowing the global trade finance gap. And according to the cloud banking platform Mambu Embedded trade finance or embedding financial services into the trade ecosystem helps to (1) link more parties within the trade value chain, (2) exchange funds at various points in the logistical trade process and (3) ease some of the upfront burdens that financiers face in the trade finance process. Applications of EF permeate all aspects of commerce, following the standard of “goodbye products, hello experiences” (Brettking Bank 4.0, 2018). Brettking's Vision “The market banking ecosystem will enable consumers to access highly personalized services by leveraging data through open banking operations and APIs” is quite close to the arguments of the above studies. In a general way, the applications of EF in the field of providing financial services include 4 basic applications: Payment, Lending, Insurance, and Investment. Many other fields have applications of EF in sharing economy platforms such as transportation, healthcare, logistics. We can see that, the application of EF in the commercial ecosystem is not new but when mobile devices take the throne and become an indispensable part of life, along with Digital innovation: the BAAS platform combined with open APIs makes it possible for all Non-financial Companies to provide real-time financial services and seamless experience, and is protected by law There is a platform provided by a financial institution as a supplier, from which ecosystem parties benefit from “relational capital” and “Intellectual capital” in addition to “financial capital” and “human capital” (Anh Tuan, 2020). The application of EF to the E-commerce ecosystem in particular is increasingly clear and more opportunities open up than ever before for financial institutions, as financial institutions can flex their roles, as a trademark for Start-up companies or as an API provider, or as legal entity.
2.4 E-Commerce and the Application of EF in E-Commerce

The United Nations Organization for Economic Co-operation and Development (OECD) defines e-commerce: "E-commerce is roughly defined as commercial transactions based on the transmission of data over communication networks such as the Internet". According to the World Trade Organization (WTO), "E-commerce includes the production, advertising, sale, and distribution of products that are bought, sold and paid for on the Internet, but delivered physically, both delivery products as well as digitized information through the Internet”. One of the requirements for modern electronic commerce is to have electronic forms of payment. According to the Vietnam National Report on E-commerce Techniques of the Ministry of Commerce: Electronic payment should be understood in a broad sense, defined as the payment of money through electronic messages instead of cash handling.

In the commercial process, electronic payment is the top concern about "usability, security and risks" of both businesses and consumers. Not stopping at electronic payments on the bank's API platform, other digital financial products have also sprung up and sold well in the electronic payment step on the platforms of non-financial companies through E-commerce. Those digital financial services include Payment, Lending, Insurance, and Investment, in which especially payment lending (including BNPL, and some other forms). EF is an area that is said to have high potential, Any E-commerce platform that wants to integrate, "one-stop apps where users can make purchases, pay for utilities, and seek credit will soon become the norm" (Mulye, 2021). In addition, digital financial services such as Insurance, Investment also have the opportunity to appear and mature in the long term, when the basic utilities of financial and banking services are seamlessly coordinated, smooth, safe, and complete, with a clear legal framework.

In the context of society entering the digital age, priority is given to data development and analysis. Commerce is gradually moving online, creating opportunities to connect consumers and businesses with more tailored financial services.

3. Research Methods

The study would like to provide an overview of EF in case Vietnam through qualitative research. The study definite the concept, the components of embedded financial services, opportunities, and challenges of Vietnam's traditional banks in this sector. By the method of reference and synthesis of research documents in the world. We do analyzing-statistically- evaluating data related to the EF sector in Vietnam in two aspects:

a. Vietnam's E-commerce situation (2017 to 2022) and how EF existed and changed.

b. Statistics of embedded financial services provided on the 4 Vietnam largest E-commerce platforms.

4. Research Results

4.1 Vietnam's E-Commerce Situation (2017 to 2022)

According to the e-Conomy SEA 2022 report (Google & Temasek), Vietnam's digital economy will reach $23 billion by 2022 and is expected to reach 50 billion dollars by 2025, the fastest growing speed in the SEA region, thanks to the booming E-commerce sector. Notably, the compound growth rate (CAGR) of Vietnam's E-commerce averages over 35% per year, despite a slowdown in 2022 due to several macroeconomic factors, but still maintains the growth momentum for the years 2023 to 2025. The role of E-commerce is gradually becoming more important, according to the summary in Figure 2, including estimates collected from reliable statistical sites such as Google and Temasek, the official news site of the Vietnam Ministry of Finance, in January 2023: The estimated number of consumers
shopping online (millions of people), the estimated value of online shopping per person (USD), the proportion of B2C E-commerce revenue compared to total retail sales of consumer goods and services nationwide, percentage of people using the Internet. Notably, the proportion of revenue from e-commerce over the total retail sales of goods in the country reached 7.5%, doubling compared to 2017, and this rate is forecasted to be 10% in 2025.

Figure 2 shows data as of December 2022, Vietnam has nearly 75 million Internet users (accounting for 73.5% of the population). With this number, Vietnam is the country with the 12th highest number of Internet users worldwide, in addition, the summary data of the e-Conomy SEA 2022 report published by Google and Temasek amounts to 90% adoption across urban digital users for E-commerce (the percentage of digital users who accept E-commerce). According to the development of E-commerce, forms of payment when shopping online in Vietnam also have many timely changes, at the payment step is the end point of the e-commerce transaction cycle. However, this step is the starting point for banks and Fintech companies that can provide embedded financial services. The number of internet users to shop through e-commerce platforms is the number of financial service consumers in the future, they need financial services embedded in the consumption process - not only tangible products but also all services in life such as healthcare, education, transportation, food, and beverage through API platforms of non-financial companies. In contrast, with the brand and reputation in Vietnam, commercial banks connect through Fintech companies or directly based on the BAAS model, supporting non-financial companies with a transparent and secure platform, commercial banks have available credibility from consumers. According to the assessment of venture capital investors (VCs) in the e-Conomy SEA 2022 report, Vietnam's banking sector has many "rights to win" next to the Philippines in Southeast Asia in the digital transformation process, embedding financial services in life is also an important step in digital transformation and improving customer experience.

Figure 2a. B2C Commercial Revenue in Vietnam

### B2C Commercial Revenue in Vietnam 2013-2022 (Bill USD)

<table>
<thead>
<tr>
<th>Year</th>
<th>Revenue (Bill USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017</td>
<td>6.2</td>
</tr>
<tr>
<td>2018</td>
<td>8.1</td>
</tr>
<tr>
<td>2019</td>
<td>10.1</td>
</tr>
<tr>
<td>2020</td>
<td>11.8</td>
</tr>
<tr>
<td>2021</td>
<td>13.7</td>
</tr>
<tr>
<td>2022</td>
<td>16.4</td>
</tr>
<tr>
<td>2025 (Target)</td>
<td>39.0</td>
</tr>
</tbody>
</table>
According to SBV, in 2021, non-cash transactions have increased in both quantity and value, specifically, the amount increased by 30%, and the transaction value increased by 18%, which is especially prominent in the young generation with new consumption behavior. Besides, SBV said that by the end of 2022, 40% of Vietnam’s population has not yet had access to banking products and services, the potential for EF in the e-commerce ecosystem in Vietnam is huge, and E-commerce is a path to open up market share for banking and financial services under the model of “Banking Everywhere, Never at a Bank” (Brett King, Bank 4.0, 2018). An emerging online shopping transaction will be followed by a series of “payment-BNPL-investment-insurance-financial management” services, embedded in the E-commerce ecosystem that consumers can choose from.

4.2 The Level of Provision of Embedded Financial Services on the 4 Largest E-Commerce Platforms in Vietnam

As shown in Figure 3, there is a relatively large difference. While the revenue of Shopee and Lazada accounts for 94% of the market share, the revenue of domestic e-commerce platforms such as Tiki and...
Sendo only reaches 5% and 1% respectively. The survey table of 4 e-commerce platforms is given in the report of E-commerce Industry Ranking 2022, just announced by the Network Information Monitoring and Analysis System (Reputa), excluding the newly joined Tiktok Shop. Entering the market on April 28, 2022, the revenue of the top 4 E-commerce platforms accounted for 135 trillion VND, of which, according to the Vietnam Financial Times of the Vietnamese Ministry of Finance, the total retail sales of goods and consumer services nationwide in 2022 reached 5,679.9 trillion VND, the revenue of 4 E-commerce platforms accounted for 32% of the total revenue of Vietnam B2C E-commerce in 2022.

According to Table 1, embedded payments in the e-commerce ecosystem account for 100% of all leading E-commerce platforms in Vietnam, including payment via e-wallet, payment gateway linking digital banking application, payment via internet banking, transfer via merchant account goods on the e-commerce platform, credit/debit card. Particularly, Shopee has the Shopeepay e-wallet brand, connecting with 23 Vietnamese commercial banks, and Sendo has the Senpay e-wallet brand, connecting with 32 Vietnamese commercial banks. According to a survey by Statista in 2023, COD cash payment still accounts for 73% of payments in E-commerce due to the low consumer confidence in sellers and a few other reasons, followed by e-wallets, transfer via digital banking application. However, all the above-embedded payment methods have Vietnamese commercial banks and Napas (National Payment Corporation of Vietnam, SBV holds a key 49% share) acting as both the payment flow manager and cash flow reorder of the system participants.

Table 1. The Four E-Commerce Platforms with the Largest Market Share in Vietnam are Shopee, Lazada, Tiki, and Sendo, Respectively

<table>
<thead>
<tr>
<th>Service Provided</th>
<th>Shopee VN</th>
<th>Lazada VN</th>
<th>Tiki</th>
<th>Sendo</th>
</tr>
</thead>
<tbody>
<tr>
<td>There is a Fintech company</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Cash</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Electronic money (VNPT Money, Viettel Money)</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Transfer via merchant identification account on the e-commerce floor (new)</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>E-wallets (Momo, Shopee pay)</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Credit/debit card</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Payment gateway linked to digital banking applications (VNPAY)</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Buy and sell by credit card</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Buy now pay later</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Other financial services/financial management (Insurance, financial management)</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>The number of connected banks</td>
<td>23</td>
<td>18</td>
<td>34</td>
<td>32</td>
</tr>
<tr>
<td>Holding company</td>
<td>Sea Group, Singapore</td>
<td>Alibaba Group, China</td>
<td>Tiki LTD, Vietnam</td>
<td>Sen Do Technology JSC, Vietnam-Sendo is a subsidiary of FPT Corporation</td>
</tr>
</tbody>
</table>

(Source: Researcher's Compilation)
Also as shown in Table 1, BNPL is embedded in the e-commerce ecosystem: 100% of Fintech companies are embedded in the platforms of non-financial companies. Shoppeepay and SpayLater are provided by TPBank (Tien Phong Commercial Joint Stock Bank), TP Bank is an organization providing related credit services on the Shopee platform. Tiki and Lazada VN through Momo Postpaid Wallet, in which commercial banks play the role of a leader in providing credit services. This embedded financial service provider is also TP Bank. Sendo is providing BNPL services through Atome Singapore with which the partner bank is Standard Chartered. As can be seen, the traces of Vietnamese commercial banks in the financial market share embedded in the BNPL segment are still quite primitive. Research conducted by Twimbit in 2021 indicated that even though Vietnam's total e-commerce revenue amounted to approximately $13.7 billion, BNPL only accounts for 2% of the market share across payment methods, which brought in roughly $260 million in transaction volume last year. In a recent survey by Statista in June 2022 among nearly 3,000 Vietnamese consumers who shopped online in 3 months, just only 7% used BNPL services, despite the opinions of experts about the near future of BNPL, BNPL in Vietnam is still slow. This is partly because Vietnam does not yet have a clear legal framework regulating the method (Truong Lang, 2022). According to figures shared in Worldpay's 2022 Global Payments Report from the FIS program, between 2021 and 2025, BNPL deals are expected to grow at a CAGR of 40% and double the share of E-commerce transaction value, from 4% to 8%. BNPL is an example of an embedded financial service with a lot of potential for development that is evaluated by reports around the world. Publicis Sapient suggested: “Financial services, especially payments and credit products such as buy-now-pay-later (BNPL), have become standard elements of the retail e-commerce experience”.

Insurance and investment: in the four E-commerce platforms have not yet arisen. However, once the BNPL service is developed, the insurance and investment market share is a matter of sooner or later in the expectations of the leaders of financial institutions. In Vietnam, financial institutions such as OCB, represented by COMB (consumer loans for the mass customer segment of Orient Commercial Joint Stock Bank - OCB) and Bao Minh Insurance Company signed a cooperation agreement with Credify at EF Summit 2022; Haravan shook hands with KBank and Techcobank to provide EF on the Haravan platform; Military Commercial Joint Stock Bank (MBBank) and Grab. All of banks and Fintech have moved to connect to provide BNPL services soon, reaching the number of users as soon as they are generated daily consumption needs.

In general, in recent years, the Vietnam E-commerce market has been increasingly replicated. And now it has become a popular business method, known to businesses and people. E-commerce has become an important pillar in the Economic development process because of the diversity of operating models, participants, and the application of modern technology. Therefore, this is an opportunity for commercial banks in the development of EF. "High predicted growth for the e-commerce market in Vietnam" ( JP Morgan,2019) and statistics, analysis, and assessment of the financial situation embedded in the Vietnamese E-commerce ecosystem from 2017-2022. Along with the case of the 4 largest e-commerce platforms in the Vietnamese E-commerce market, it can be seen that EF in the payment segment is in the blossoming stage, BNPL is still in its infancy, a potential market but with many challenges if commercial banks want to be providers. Commercial banks play the role of providing the BAAS foundation, as well as providing credit for sellers or consumers in need of financial support, as well as a licensee. For the parties to have legal assurance, and management, increase trust and interest when participating in EF.

5. Discussion

5.1 Opportunities for Commercial Banks in the Trend of EF in Vietnam

Firstly, the initial results of the bank's digital transformation, and enhanced technology capabilities are an important driver for commercial banks to connect to E-commerce platforms quickly and securely. It is necessary to mention the initial achievements such as the upgrade of the core-banking system, which
can flexibly apply AI technology, blockchain, IoT, and Cloud computing. Emerging technologies facilitate the embedding of banking services into the platform of the non-financial company.

Second, innovation and digital connectivity are being timely supported by Vietnam’s political institution, the Government putting them on top for sustainable digital economic development. Legal documents on digital transformation such as Decision No. 1238/QD-NHNN dated July 8, 2020, of the Governor of the State Bank of Vietnam: promulgating the Action Plan of the Banking sector; Resolution No. 50/NQ-CP April 17, 2020, of the Government on many guidelines and policies for proactive participation in the Fourth industrial revolution (Industry 4.0); Decision No. 260/QD-NHNN dated March 4, 2021, of the Governor of the State Bank of Vietnam promulgating the Plan on information technology application, development of the digital government and assurance of cyberinformation security in the operations of the State Bank in 2021 to 2025, and an important twist is the draft revised Law on Electronic Transactions which is expected to be passed in May 2023.

Thirdly, the commercial banking brand has been established with consumers for many years, as evidenced by non-cash payment transactions increased, transactions carried out over the internet increased, new bank accounts remotely opened and online (eKYC). Loyalty to the banking system, which is sponsored by political institutions, and the stability of monetary and financial policies create Vietnamese people’s habits of consuming financial services. Consumers can have an e-wallet, a bank account, or a mobile money account and use embedded financial services on an E-commerce platform.

High rate of people accepting E-commerce, young population, increasing usage trend E-commerce is a large market that promises to explode if commercial banks promptly catch up with embedded financial trends in terms of payments, lending, insurance, and investments.

5.2 Challenges for Commercial Banks in the Trend of EF in Vietnam

Firstly, the legal system innovates slowly compared to breakthrough innovations, many management and guiding legal documents are still in the draft. One example is the revised Law on Electronic Transactions, next is the unclear legal corridor on "buy first, pay later", causing the market of BNPL services to develop rampantly, without strict control by the Government, which will easily lead to an increase in bad debts and serious impacts on credit scores of consumers, as well as secure liquidity for Fintech companies, commercial banks, and sellers.

Second, financial literacy is considered an important factor in developing a strong financial system and economy (OECD, 2013). In Vietnam, financial literacy is still not high, according to Agarwal, surveys show that about 70% of Vietnamese citizens are financially illiterate, which leads to the risk of being scammed or losing information from many sources. This problem can damage the reputation of Fintech, commercial banks, or vice versa, increasing the rate of credit risk, security risk, and insecurity of information for consumers of financial services.

Third, risks in ensuring the security of information systems and connected software architectures. Due to the characteristics of EF as Open API and BAAS, bringing the services of the parties to the platform of non-financial companies, commercial banks need to find a reliable partner, that strict but not rigid compliance and the most important issue for service providers is risk management and user protection (Dr. Pham Nguyen Anh Huy - RMIT FinTech-Crypto Center, RMIT).

In the end, Commercial banks will face the choice of hiding their brand name or will be sponsoring brand capital in the E-commerce ecosystem. Commercial banks need to choose the right strategy to catch up with competitors from foreign financial institutions and foreign Fintechs. The handshakes between Providers-Enablers-Distributors should be carefully considered in terms of technology, brand, capital, liquidity risk, and credit risk.
6. **Limitations and Future Research Directions**

Besides the contributions, this study also has certain limitations that need to be overcome. It is limited in terms of accessing statistical information about the e-commerce market and financial instruments embedded in the e-commerce platform. In addition, academic studies on embedded finance are also very rare, most of which are statistics and comments of banks and related survey companies, so the implementation of qualitative studies This article cannot cover all issues related to embedded finance such as finance embedded in sharing economy platforms, finance embedded in social networking platforms... This may lead to a lack of information, inclusiveness in assessing the potential as well as the challenges of the embedded finance sector. The limitations can be overcome in the next study if it is possible to collect data from many areas of the digital economy.

7. **Conclusion**

Embedded finance can simply be understood as “embedding” financial instruments or services into participants, providing a new option for customers. In this study, the author collected and analyzed the current situation of the e-commerce market in Vietnam from 2017 to 2022 and the degree of embedding financial services into e-commerce platforms. Accordingly, EF in Vietnam's e-commerce has arisen a long time ago, but it is only at the level of providing a full range of payment services and the initial level of payment credit services. The process of analyzing the data reveals wide opportunities and no less challenging for embedded financial trends. Since then, researchers hope to soon have more applied research on embedded finance in Vietnam, in addition to academic documents, and at the same time contribute to management-supervision policies, related to the application of embedded finance in the practice of commercial banks, fintech, non-financial companies with embedded financial integration.

**Acknowledgments**

We would like to thank all the people who prepared and revised previous versions of this document.

**References**


Brettking (2018), Bank 4.0 digital banking: Transact anywhere, not just at the bank. *Publishing House of Information and Communication*


Hải, N. (2020, September 11). Ngành ngân hàng: Tăng trưởng phí dịch vụ tạm thời yếu đi . Tạp chí Thị trường Tài chính Tiền tệ: https://www.google.com/search?q=thitruongtaichinhtiente&rlz=1C5CHFA_enMY959MY959&oq=thitruongtaichinhtiente&aqs=chrome.0.69i59j69i60l3.204j0j7&sourc e=chrome&ie=UTF-8


Factors Affecting Customer’s Intention to Use Self Service Banking: A Case Study in Vietnam

Binh Vu Duc\textsuperscript{a}\& Chau Tran Pham Huu\textsuperscript{b}
\textsuperscript{a}\textsuperscript{b}Faculty of Finance and Accounting, Nguyen Tat Thanh University, Vietnam
*vdbinh@ntt.edu.vn

Abstract: The study conducted the survey data of 268 customers who have access to self-service banking, then analyzed and processed the data through SPSS software, by testing the reliability of the Cronbach’s Alpha scale, analyzing the EFA exploratory factor, regression analysis and hypothesis testing. The analysis results show that ease of use has a positive effect on the self-service banking, convenience has a positive impact on the service, safety has a positive effect on the service, service fee has a positive impact on attitude towards the service, service quality has a positive effect on the intention to use. Based on the research findings, the authors make recommendations including promoting marketing activities for self-service banking, increasing security, create reasonable self-service banking fees, and improve the quality of self-service banking services.

Keywords: self-service banking, Vietnam

1. Introduction

Extensive international economic integration has created conditions for domestic banks to penetrate the international market, opening up opportunities for international cooperation in many fields such as monetary policy making, inspection and supervise risk prevention, payment field and develop new banking products and services, especially self-service banking. In Vietnam, the State Bank has submitted to the Prime Minister for approval the Non-cash Payment Scheme, which has been adjusted to suit the economic situation and the development of non-cash payment technology. Over the past time, non-cash payment activities have expanded in both scale and quality, with strong development in modern payment products, services and utilities based on information technology application. Currently, self-service banking is one of the inevitable trends of commercial banks to improve competitiveness among banks. Especially, when the Covid 19 pandemic occurred, digital payment grew even more strongly around the world in general and in Vietnam in particular, the non-cash payment has become a strong trend.

However, the practice of developing self-service banking services in Vietnam still has many limitations and difficulties. The number of customers using self-service banking services is still very small, so finding a solution to develop self-service banking in Vietnam is an urgent and highly practical issue. The authors study the factors affecting the intention of customers to use self-service banking with the desire to contribute to the development of self-service banking in Vietnam in the period of international integration and digital economic development today.

2. Literature Review

2.1 Overview of Self-Service Banking

Self-service banking is a transformation of all traditional banking activities and services into a digital environment (Sousa, 2018). Self-service banking is a highly technologically demanding including innovation in financial services for customers and commercial customers around mobile, digital, AI and payment strategies, data, block chain, API, distribution channels and technology (Sarma, 2017). In general, self-service banking is an operating model based on a technology platform to exchange information and conduct transactions between banks and customers. This process is done through digital
devices which are connected to computer software in the internet environment. Customers do not have to come to physical branches of banks to make transactions and vice versa, banks also do not have to meet with customers to complete transactions (signing documents, and tracking records).

According to Davis (1993) and Venkatesh (2000), the intention to use technology services is the awareness of ability to use services of customers. Customers’ intentions to use the service, will be influenced by several motivating factors leading to the intention (Fortes & Rita, 2016). Research on the intention to use technology services service is often anchored on technology acceptance model (TAM) and the various models developed from the TAM model (King & He, 2006). In the TAM model, the intention to use through the lens of theory of rational action and theory of planned behavior is affected by factors such as: ease of use, perceived usefulness, attitude to service (Davis, 1989). In addition, the TAM model has also been extended to include several new factors such as perceived risk, trust and convenience (Fortes & Rita, 2016).

This study is intended to investigate the intention to use self-service banking using the following factors:

a. Ease of use  
b. Convenience  
c. Safety  
d. Service fee  
e. Service quality

2.2 Hypotheses

Ease of use is a customer's level of trust in using the service that will bring freedom and comfort (Davis, 1989; 1993). Self-service banking makes it easier for customers to access and use banking services than traditional counter services. Many existing studies show that the ease of using the service affects customers’ perceptions of the service’s usefulness (Phan & Bui, 2019; Venkatesh, 2000; Venkatesh et al., 2003) and their attitude towards the service (Davis, 1993; Venkatesh, 2000). Therefore, hypothesis is proposed as follows:

**H1: Perceived Ease of Use Has a Positive on the Intention to Use the Service.**

Convenience improves access to services easily with efficiency equal to or better than other services. Convenience can be demonstrated by saving transaction time and reducing technical errors (Chen et al., 2016; Seiders et al., 2007). There are studies that show how convenient it is to find or access services. Increasing convenience will help increase customers' intention to use the service by minimizing time and reducing errors during transactions (Chang & Polonsky, 2012).

**H2: Convenience Has a Positive Impact on the Intention to Use the Service.**

Safety of customers is a factor showing that customers feel secure when using the service without having to care about risks or other issues (Gefen et al., 2003; Nguyen et al., 2019). Page and Luding (2003) think that a high level of safety is an important motivation for self-service banking (Page & Luding, 2003). Stewart (2003) also suggests that at a sufficient amount of safety.

**H3: Safety Has a Positive Impact on the Intention to Use the Service.**

According to Venkatesh et al. (2012), the service fee is customers’ comparative perception of the cost that they have to pay to use a new service with the benefits that the service brings. The types of costs that the users often pay when using self-service banking in Vietnam are transfer fees and statement printing fees. According to Liao and Cheung (2002), service fees show that there is a constraint on the actual use of self-service banking. Through self-service banking, customers can take advantage of the reduced transaction time, then the low prices together with price incentives will encourage customers to use self-service banking. Polatoglu and Ekin (2001) also confirm that self-service banking users are
significantly satisfied with the cost savings when using this service. Similarly, Migliore et al. (2022) also found evidence of a positive effect of cost savings on the behavioral intention to use self-service banking. Therefore, Hypothesis is stated as follows:

**H4: Service Fee Has a Positive Impact on the Intention to Use the Service.**

Service quality makes a noticeable difference in the service business. Maintaining a high level of service is a requirement to meet customers’ expectations. Customers expect quality service based on their past experiences, word of mouth and advertising services. After the service, customers can compare the services experienced against what they have previously perceived. Good service quality can reduce perceived risk (Chen et al., 2013). Therefore, hypothesis is stated as follows:

**H5: Service Quality Has a Positive Impact on the Intention to Use the Service.**

Research model and hypothesis are shown in Figure 1.

---

### Table 1. Questionnaire

<table>
<thead>
<tr>
<th>Factors</th>
<th>Contents</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ease of Use</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Simple and clear steps to make transactions</td>
<td>Jamil et al. (2018)</td>
<td></td>
</tr>
<tr>
<td>The instructions for using self-service banking are easy to understand</td>
<td>Pikkarainen et al. (2004)</td>
<td></td>
</tr>
<tr>
<td>You conduct transactions at the self-service bank regularly successfully</td>
<td></td>
<td></td>
</tr>
<tr>
<td>You can easily make transactions according to your needs</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The use of self-service banking services is completely under control.

You find it very easy to learn how to use self-service banking services

**Convenience**

Transactions are made 24/7

You can save time by using self-service banking services.

You have many benefits when using self-service banking services

You use self-service banking services to help you perform your job more smoothly

*You use self-service banking services to increase your life efficiency

**Safety**

Transactions made through self-service banking services trust-worthy

Your personal information is kept confidential

You feel secure when providing confidential information

The bank is constantly updating its technology applications modern to increase the confidentiality of customer information

*You do not see any fraudulent loss of money when using self-service banking services

**Service Fees**

Self-service banking services with attractive fees

Fees when using self-service banking services are competitive compared to over-the-counter transactions

You are satisfied with the fee commensurate with the service used

Transaction fees of self-service banking services are appropriate

You find that the self-service bank offers many free services

**Service Quality**

Transactions at self-service banks are conducted correctly

You conduct transactions at a self-service bank quickly

Online staff provide enthusiastic support for issues related to transactions at self-service banks

When there is an error while using the bank service self-service goods, the bank supports to handle in time

**Intention to Use the Self-Service Banking**

You will refer others to self-service banking

You will continue to use self-service banking.

You will use self-service banking services regularly

You expect to choose to use self-service banking services when there is a need for banking services

Khaliq Ahmad (2016)

Pikkrainen et al. (2004)

Jamil et al. (2018)

Chan & Lu (2004)

Areeba Toor et al. 2016)

Poon (2008)

Areeba Toor et al. (2016)

Fortes & Rita (2016)

Clegg (2010)

### 3.2 Sample and Data

The research sample was identified as customers using self-service banking in Vietnam. Convenient sampling methods were then applied to collect data. The official survey results obtained 268 responses. This sample size was demonstrated to reach reliability according to most sampling rules (Tabachnick & Fidell, 2006). The results show that the number of male customers surveyed is 101, accounting for 37.7% and female with 167, accounting for 62.3%. The highest age group is between 18 and 30 (155 people accounting for 57.8%); and the smallest group is over 55, with 52 people at 19.4%. Young customers tend to use self-service banking more than other age groups. Older customers tend to use less because of lower access to technology. About education, most of the self-service banking users obtain bachelor’s degrees (129 people, 48.1%), followed by master degrees (32.5%), and high school (19.4%). Main occupations of respondents were officer worker with 141 people at 52.6%, business 34.3%, students 9%, other occupations accounted for 4.1%. Regarding income, the largest income group from 10 to 20 million with 151 people at 56.3%, followed by the group of over 20 million per month with 70 people at 26.1%. The smallest was the income below 10 million with 47 people at 17.5%.
Table 2. Descriptive Results

<table>
<thead>
<tr>
<th>Demographic description of respondents</th>
<th>Frequency</th>
<th>Percent %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>167</td>
<td>62.3</td>
</tr>
<tr>
<td>Male</td>
<td>101</td>
<td>37.7</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-30</td>
<td>155</td>
<td>57.8</td>
</tr>
<tr>
<td>31-55</td>
<td>61</td>
<td>22.8</td>
</tr>
<tr>
<td>&gt;55</td>
<td>52</td>
<td>19.4</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;= High school</td>
<td>52</td>
<td>19.4</td>
</tr>
<tr>
<td>Bachelor</td>
<td>129</td>
<td>48.1</td>
</tr>
<tr>
<td>Master</td>
<td>87</td>
<td>32.5</td>
</tr>
<tr>
<td>Career</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Officer</td>
<td>141</td>
<td>52.6</td>
</tr>
<tr>
<td>Student</td>
<td>24</td>
<td>9.0</td>
</tr>
<tr>
<td>Business</td>
<td>92</td>
<td>34.3</td>
</tr>
<tr>
<td>Others</td>
<td>11</td>
<td>4.1</td>
</tr>
<tr>
<td>Income (million/month)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;10</td>
<td>47</td>
<td>17.5</td>
</tr>
<tr>
<td>10-20</td>
<td>151</td>
<td>56.3</td>
</tr>
<tr>
<td>&gt;20</td>
<td>70</td>
<td>26.1</td>
</tr>
<tr>
<td>Total</td>
<td>268</td>
<td>100</td>
</tr>
</tbody>
</table>

4. Results

4.1 Evaluating Reliability

The Cronbach’s Alpha coefficient of this survey were shown in Table 3. The Cronbach’s Alpha was calculated to test the reliability of questionnaires. From table 3, The results of scale reliability show that all of Cronbach’s Alpha coefficients are larger than 0.6 and the correlation coefficient of all items is greater than 0.3. In particular, Cronbach’s Alpha coefficients of SA, US, CO, QA, FE, SE are 0.847; 0.914; 0.813; 0.820; 0.770 and 0.777 respectively. Therefore, the scale and collected data in this study ensure the reliability of the following analysis. According to the results in Table 3, the scale of independent variables includes: (1) SA, (2) US, (3) CO, (4) QA, and (5) FE with observed variables with Cronbach's system. Alpha > 0.6 and the corresponding coefficients > 0.3, all 25 initially observed variables will be included in the next EFA factor analysis. The scale of measuring the goal of using self-service banking services remains the same with 5 observed variables. Thus, the scale of independent and dependent variables has high reliability.

4.2 Exploratory Factor Analysis

Based on the research model and hypothesis, the author conducts explore factor analysis for independent and dependent variables. Through the results of the exploratory factor analysis, the KMO and Bartlett's Test coefficients of the scale are quite large at 0.863 value greater than 0.5, with a significance level of 0.000 showing that exploratory factor analysis is very appropriate. 05 factors were extracted with Eigenvalues greater than 1 equal to 64.952%, showing that the extracted variance is standard (greater than 50%). However, the FE5 and QA4 variables were excluded from the model due to a factor load factor < 0.5. Continue to include the remaining 23 observation variables in the second exploratory factor analysis.

Table 3. Cronbach Alpha

<table>
<thead>
<tr>
<th>Cronbach Alpha</th>
<th>Item</th>
<th>Corrected Item-Total Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>SA</td>
<td>SA1</td>
<td>.625</td>
</tr>
<tr>
<td></td>
<td>SA2</td>
<td>.683</td>
</tr>
<tr>
<td></td>
<td>SA3</td>
<td>.697</td>
</tr>
<tr>
<td></td>
<td>SA4</td>
<td>.659</td>
</tr>
<tr>
<td></td>
<td>SA5</td>
<td>.616</td>
</tr>
<tr>
<td>US</td>
<td>US1</td>
<td>.787</td>
</tr>
<tr>
<td></td>
<td>US2</td>
<td>.774</td>
</tr>
<tr>
<td></td>
<td>US3</td>
<td>.786</td>
</tr>
<tr>
<td></td>
<td>US4</td>
<td>.768</td>
</tr>
<tr>
<td></td>
<td>US5</td>
<td>.783</td>
</tr>
<tr>
<td></td>
<td>US6</td>
<td>.661</td>
</tr>
<tr>
<td>CO</td>
<td>CO1</td>
<td>.606</td>
</tr>
<tr>
<td></td>
<td>CO2</td>
<td>.613</td>
</tr>
<tr>
<td></td>
<td>CO3</td>
<td>.605</td>
</tr>
<tr>
<td></td>
<td>CO4</td>
<td>.582</td>
</tr>
<tr>
<td></td>
<td>CO5</td>
<td>.615</td>
</tr>
<tr>
<td>QA</td>
<td>QA1</td>
<td>.668</td>
</tr>
<tr>
<td></td>
<td>QA2</td>
<td>.766</td>
</tr>
<tr>
<td></td>
<td>QA3</td>
<td>.642</td>
</tr>
<tr>
<td></td>
<td>QA4</td>
<td>.500</td>
</tr>
<tr>
<td>FE</td>
<td>FE1</td>
<td>.478</td>
</tr>
<tr>
<td></td>
<td>FE2</td>
<td>.666</td>
</tr>
<tr>
<td></td>
<td>FE3</td>
<td>.631</td>
</tr>
<tr>
<td></td>
<td>FE4</td>
<td>.569</td>
</tr>
<tr>
<td></td>
<td>FE5</td>
<td>.370</td>
</tr>
<tr>
<td>SE</td>
<td>SE1</td>
<td>.610</td>
</tr>
<tr>
<td></td>
<td>SE2</td>
<td>.694</td>
</tr>
<tr>
<td></td>
<td>SE3</td>
<td>.584</td>
</tr>
<tr>
<td></td>
<td>SE4</td>
<td>.451</td>
</tr>
</tbody>
</table>

4.2 Exploratory Factor Analysis

Based on the research model and hypothesis, the author conducts explore factor analysis for independent and dependent variables. Through the results of the exploratory factor analysis, the KMO and Bartlett's Test coefficients of the scale are quite large at 0.863 value greater than 0.5, with a significance level of 0.000 showing that exploratory factor analysis is very appropriate. 05 factors were extracted with Eigenvalues greater than 1 equal to 64.952%, showing that the extracted variance is standard (greater than 50%). However, the FE5 and QA4 variables were excluded from the model due to a factor load factor < 0.5. Continue to include the remaining 23 observation variables in the second exploratory factor analysis.

Table 4. The Result of the Second Exploratory Factor Analysis

<table>
<thead>
<tr>
<th>Factor</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>US3</td>
<td>.833</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>US4</td>
<td>.809</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
As can be seen from Table 4, the KMO test value is 0.857, which is greater than 0 and less than 1, showing that exploratory factor analysis is consistent with the data. The results of Bartlett’s test indicate probability or significance value is 0.000, that means the variables are adequately correlated and accommodates an acceptable basis for factor analysis. The results of Exploratory Factor Analysis extracted five factors consistent with the research model originally proposed.

4.3 Multiple Regression Analysis

Table 5. Regression Model Summary

<table>
<thead>
<tr>
<th>Independent Variables (Factors)</th>
<th>Coefficient</th>
<th>t-Statistic</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>.416</td>
<td>1.900</td>
<td>.059</td>
</tr>
<tr>
<td>US</td>
<td>.146</td>
<td>3.458</td>
<td>.001</td>
</tr>
<tr>
<td>FE</td>
<td>.146</td>
<td>2.595</td>
<td>.010</td>
</tr>
<tr>
<td>QA</td>
<td>.271</td>
<td>4.871</td>
<td>.000</td>
</tr>
<tr>
<td>CO</td>
<td>.133</td>
<td>2.301</td>
<td>.022</td>
</tr>
<tr>
<td>SA</td>
<td>.182</td>
<td>3.869</td>
<td>.000</td>
</tr>
</tbody>
</table>

Total Variance Explained 33.637  45.593  56.035  62.033  66.906

Kaiser-Meyer-Olkin 0.857

Note: R-Square = 0.472; Adjusted R-Square = 0.462; F-Value = 46.811; Sig. F= 0.000.
Dependent Variable: intention to use the self-service banking
The regression model is provided below:

\[ \text{Intention to use service} = f \{ \text{easy of use, convenience, safety, service fee, service quality} \} \]

The regression results in Table 5 presents Adjusted R2 value is 0.462, meaning that independent factors explained 46.2% of the variation of the dependent variable Intention to Use Self-Service Banking. Analysis of ANOVA variance showed that F = 46.811 and statistically significant (Sig. = 0.000), proving the regression model is consistent with the data and variables in the analysis model.

Table 5 shows that factors specifically ease of use, service fee, service quality, convenience, safety have significant positive impacts on intention to use service. This leads to the acceptance of 1, 2, 3, 4 and 5 hypotheses. The beta coefficients of each independent variable in this regression show that the extent and direction of change in standard deviation of the dependent variable with a unit change in standard deviation of each independent variable. We can see that the intention to use self-service banking in Vietnam depends mainly on these factors: ease of use, service fee, service quality, convenience, safety. With the standardized correlation coefficient of 0.271 (sig. = 0.000 < 0.05), service quality has the strongest impact on the intention of customer to use self-service banking in Vietnam; safety (β = 0.182, sig. = 0.000 < 0.05) stands in the second place; next to as ease of use (β = 0.149); service fee (β = 0.146) and convenience (β = 0.133).

5. Conclusion

Based on the research results, the authors affirm the important role of self-service banking in the digital banking development strategy in Vietnam. Research on factors affecting customers’ intention to use self-service banking - the case in Vietnam is very important and needs attention to contribute to the development of digital banking in Vietnam. Based on the research findings, in order to develop self-service banking, the authors make recommendations including promoting marketing activities for self-service banking, increasing security confidentiality, create reasonable self-service banking fees and improve service quality.

References


The Impact of Digital Banking on the Performance of Commercial Banks in Vietnam by Using the CAMELS Ratio Framework

Hoang Trinh Xuan a*, Khanh Thai Hong Thuy b, Lan Nguyen Mai c

a,b,c: Finance and Accounting, Nguyen Tat Thanh University, Ho Chi Minh City

*txhoang@ntt.edu.vn

Abstract: Vietnam has 31 banks, in which there are more than 27 banks with audited annual published financial statements. Up to the present time (2023), there have been 06 banks converted on the banking application into digital banking, the remaining banks are still electronic banks (E-Banking). The financial ratios in this study including: Capital Adequacy, Asset Quality, Management Efficiency, Earnings, Liquidity, and Market Risk Sensitivity which are collectively known as CAMELS rates and digital banking adoption. This study aims to evaluate the performance of the banking sector and the impact of digital transformation on the performance of commercial banks in Vietnam in terms of Efficiency and empirical significance in terms of Panel regression mode. Therefore, pooled data of 28 the banks operating in Vietnam from 2007 to 2022 have been employed. Methods used in the study are the panel data regression methods including fixed effect model, random effect model then use Hausman test, autocorrelation test to select the best model. The results of this model are intended to help banks identify the factors that affect their performance and devise strategies to apply digital banking that are appropriate for their banks.

Keywords: CAMELS model, digital banking, listed commercial banks, Vietnam

1. Introduction

Bank profits usually come from two main sources: credit activities and other financial service activities. Credit activities in recent years accounted for a large proportion of the bank's profits, mainly lending to real estate, or using real estate as collateral. However, from 2020 until now, the cooling of the real estate market has caused real estate prices to decrease, thereby affecting credit activities. Some previous real estate mortgage loans are gradually becoming into bad debt because the market value of the real estate is falling below the credit balance. This requires that banks, instead of focusing on credit activities as before, need to gradually switch to other financial services (Alnemer, 2022; Dang, 2022). Electronic banking applications (E-banking) and Digital banking are two key customer service methods in financial services because of the popularity and convenience of smartphones (Nguyen, 2020). Up to the time of the study (2023), out of 31 joint stock commercial banks in Vietnam, six banks have converted from E-banking to Digital Banking. Up to the time of the study (2023), out of 31 joint stock commercial banks in Vietnam, 6 banks have converted from E-banking to Digital Banking, in which the digital transformation bank is as early as 2017. The nearest digital conversion bank is in 2022.

The CAMEL framework was issued by the Uniform Financial Institutions Rating System (UFIRS) and was approved by the Federal Financial Examination Council (FFIEC) in 1979. As revised by UFIRS in 1997, this framework added a sixth element and is now known as CAMELS. The CAMELS framework includes six essential components to assess a bank's financial health: Capital Adequacy (C), Asset Quality (A), Management Efficiency (M), Earnings (E), Liquidity (L) and Market Risk Sensitivity (S). The ratings of these six components are based on a scale of 1 to 5. Where the highest rating of 1 indicates the best performance, best risk management has been implemented and therefore the lowest level of monitoring concern. The lowest is a rating of five, which represents the worst performance, inadequate risk management has been implemented and therefore requires the highest level of monitoring attention.
The purpose of this study is to analyze the performance of banks using the CAMELS ratio framework and the bank's transition to digital banking. The results of this study are intended to help banks identify the factors affecting their performance and devise a digital banking application strategy that is suitable for their banks.

2. Literature Review

2.1 Performance of Commercial Banks

When banks effectively use resources in meeting their goals and manage to generate more revenue than they cost, they generate profits. When banks use resources efficiently to meet their goals and management generates more revenue than costs, they generate profits. In studies, profitability is used to evaluate the performance of banks. The most common performance measures of Banks are ROCE - rate of return on capital employed, NIM - net profit margin (Gul et al., 2011; Kumar & Malhotra, 2017). There are also two commonly used metrics, ROA, and ROE (Hibba Saeed et al., 2019; Hewaidy et al., 2020).

2.2 Capital Adequacy

Capital adequacy is a source of capital that is expected to maintain the stability of banking operations. At the same time, Capital adequacy maintains and increases customers' confidence in the event of risks such as credit risk, market risk and liquidity risk. This expected capital will absorb possible bank losses (UFIRS, 1997; Dang, 2011). Capital Adequacy is measured by the ratio of total equity to total loans (Muhammad and Hashim, 2015), total regulatory capital on risk weighted assets (Hewaidy et al., 2020) and equity to total assets (Hibba Saeed et al., 2019; Magoma et al., 2022).

H1: There is a significant relationship between capital adequacy (CA) and bank performance.

2.3 Asset Quality

In the banking sector, asset quality refers to the assessment of the credit risk of any asset. One of the most important asset classes is the loan portfolio. These are the biggest risks that banks face is the risk of loan loss arising from overdue loans. This requires the bank to have provisions for possible losses. These losses will be erased from the capital and reduce the bank's operational efficiency. To assess the impact of Asset Quality on bank's performances, two commonly used ratios are non-performing loans on Total Loans (Al Zaidani, 2020; Hibba Saeed et al., 2019) and Provisions for Loan Losses on Total Loans (Hewaidy et al., 2020; Muhammad & Hashim, 2015).

H2: There is a significant relationship between asset quality (AQ) and bank performance.

2.4 Management Efficiency

Effective management aims to ensure the bank's stable, safe, and efficient operation. Management efficiency is the ability of the board of directors, the bank's leaders, to identify and measure risk management at a bank with the aim of reducing risk and increasing the bank's operational efficiency. Management efficiency can be measured in terms of total earnings per employee, operating profit per employee (Hewaidy et al., 2020) or a ratio of total loans to total deposits (Gautam, 2020).

H3: There is a significant relationship between management efficiency (MQ) and bank performance.
2.5 Earning Quality

The Earnings quality depends on the effectiveness of the bank’s asset and liability management. An increase in earnings quality will increase the confidence of depositors, creditors, investors, and the public. Earnings quality is usually measured by NIM -net interest margin, the ratio of net interest to total assets. (Muhmad & Hashim, 2015) and the ratio of operating expenses to income (Hewaidy et al., 2020).

H4: There is a significant relationship between earning quality (EQ) and bank performance.

2.6 Liquidity

Liquidity is understood as the assurance that cash or assets can be easily converted into cash to meet the needs of paying current and future financial obligations. Liquidity risk is a bad thing that no bank or business wants to happen, because in that situation the bank's cost of capital will be higher, thereby reducing the operational efficiency of the organization. Abundant cash and cash equivalents will help the bank perform better payment activities, thereby contributing to increased income from non-interest activities. Therefore, liquidity is also a criterion to evaluate the bank's performance. To measure this criterion, there are several ratios such as cash to customer deposits (Muhmad and Hashim, 2015), cash to total assets (Kumar & Malhotra, 2017; Magoma et al., 2022).

H5: There is a significant relationship between liquidity (LIQ) and bank performance.

2.7 Sensitivity to Market Risk

This is the sixth factor in the CAMELS model, reflecting how changes in interest rates and stock prices can affect the capital and income of the bank. Although bank performance is affected by price changes and financial market fluctuations, many studies have been omitted from the CAMELS framework because of difficulties in accounting and financial measurement. Therefore, in the study of Roman and Sargu (2013), is decided as the size of the bank and is calculated by the ratio of that bank's assets to the total assets of the banking sector.

H6: There is a significant relationship between sensitivity to market risk (SR) and bank performance.

2.8 Digital Banking

The digital banking system can perform all the services that traditional banks can perform without customers needing to go to the bank. Meanwhile, E-banking is understood as an expanded service including money transfer and account balance management. Digital banking benefits customers and enables banks to deliver more financial products quickly and reduce transaction costs. Thus, saving the cost of providing services to customers and increasing the bank's operational efficiency (Alnemer, 2022).

H7: There is a significant relationship between digital banking and bank performance.

3. Data and Methodology

3.1 Sample and Data
The data in this study is collected from 28 banks out of 31 joint stock commercial banks in Vietnam and those that have published their audited annual financial statements for the period 2007 to 2022 (16 year). However, among these banks, there are banks that were established after 2007 and there are some banks that have not published their audited financial statements for 2022. Therefore, the data of this study includes 438 observations. and is unbalanced panel data.

Estimation methods: Pool OLS, Fixed Effect Model, and Random Effect Model. Model error checking included: (i) Test of multicollinearity: VIF coefficient used to test; (ii) Variance test; and (iii) Autocorrelation test: Using Wooldridge test to check correlation phenomenon. If the model defects occur, the handling measures are applied: For the case of multicollinearity, remove the variables with the possibility of multicollinearity; for the phenomenon of variance and autocorrelation, make corrections by FGLS estimation method to overcome this phenomenon.

3.2 The Regression Model

To estimate the relationship between the six components of CAMELS and the impact of digital banking transformation on the performance of the banking industry according to the following regression equation:

\[
ROA_{it} = a_0 + \beta_1 CA_{it} + \beta_2 AQ_{it} + \beta_3 MQ_{it} + \beta_4 EQ_{it} + \beta_5 LIQ_{it} + \beta_6 SR_{it} + \beta_7 Digitalbanking_{it} + \epsilon_{it} \tag{1}
\]

\[
ROE_{it} = a_0 + \beta_1 CA_{it} + \beta_2 AQ_{it} + \beta_3 MQ_{it} + \beta_4 EQ_{it} + \beta_5 LIQ_{it} + \beta_6 SR_{it} + \beta_7 Digitalbanking_{it} + \epsilon_{it} \tag{2}
\]

\[
\epsilon_{it}=v_i + u_{it}
\]

Table 1. Definition and Measurement of Variables

<table>
<thead>
<tr>
<th>Definition</th>
<th>Variable</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bank Performance</td>
<td>ROA</td>
<td>Profit after tax / total assets</td>
</tr>
<tr>
<td></td>
<td>ROE</td>
<td>Profit after tax/owner’s equity</td>
</tr>
<tr>
<td>Capital Adequacy</td>
<td>CA</td>
<td>Total Equity / Total Assets</td>
</tr>
<tr>
<td>Asset Quality</td>
<td>AQ</td>
<td>Provision ratio for loan loss / (Customer loans + Interbank loans)</td>
</tr>
<tr>
<td>Management Efficiency</td>
<td>MQ1</td>
<td>Operating expenses/total assets ratio</td>
</tr>
<tr>
<td></td>
<td>MQ2</td>
<td>Net income/Total loan</td>
</tr>
<tr>
<td>Liquidity</td>
<td>LIQ</td>
<td>cash/customer deposit</td>
</tr>
<tr>
<td>Earning quality</td>
<td>EQ</td>
<td>Net interest income/total assets</td>
</tr>
<tr>
<td>Sensitivity to market risk</td>
<td>SR</td>
<td>Size of bank’s Assets = Bank assets/total assets of the banking sector.</td>
</tr>
<tr>
<td>Digital Banking</td>
<td>Digital Banking</td>
<td>is a dummy variable that takes the value = 1 for banks that have converted to digital banking, = 0 for the remaining banks</td>
</tr>
</tbody>
</table>
Researchers will apply by estimating the squared method of POOL - OLS method, fixed effect (FEM) and random effect (REM) on Stata 15 software. In FEM, \( v_i \) is the estimated parameter, which represents unobserved factors that vary between subjects but do not change over time. While REM, \( u_i \) is assumed to be random, \( u_i \) represents unobservable factors that vary between subjects but change over time. If the FEM and REM models suffer from phenomena such as Heteroskedasticity or autocorrelation, the Researchers will apply the estimation method is generalized least squares (GLS).

4. Results

4.1 Characteristics of Research Sample

According to Table 2, dependent variables are two variables ROA, ROE has 438 observations with mean values of 1% and 11%, respectively, with the lowest return range of 0%, the largest being 6% for the variable ROA belonging to the variable ROA. about Lien Viet in 2008 and the biggest ROE belonged to TPBanks at 82% in 2011.

Table 2. Descriptive Statistics of Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Obs</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROA</td>
<td>438</td>
<td>1%</td>
<td>1%</td>
<td>0%</td>
<td>6%</td>
</tr>
<tr>
<td>ROE</td>
<td>438</td>
<td>11%</td>
<td>8%</td>
<td>0%</td>
<td>82%</td>
</tr>
<tr>
<td>CA</td>
<td>438</td>
<td>10%</td>
<td>7%</td>
<td>4%</td>
<td>81%</td>
</tr>
<tr>
<td>AQ</td>
<td>438</td>
<td>1%</td>
<td>1%</td>
<td>0%</td>
<td>4%</td>
</tr>
<tr>
<td>MQ1</td>
<td>438</td>
<td>2%</td>
<td>1%</td>
<td>-2%</td>
<td>5%</td>
</tr>
<tr>
<td>MQ2</td>
<td>438</td>
<td>6%</td>
<td>3%</td>
<td>0%</td>
<td>44%</td>
</tr>
<tr>
<td>LIQ</td>
<td>438</td>
<td>2%</td>
<td>3%</td>
<td>0%</td>
<td>26%</td>
</tr>
<tr>
<td>EQ</td>
<td>438</td>
<td>3%</td>
<td>1%</td>
<td>-1%</td>
<td>8%</td>
</tr>
<tr>
<td>SR</td>
<td>438</td>
<td>4%</td>
<td>5%</td>
<td>0%</td>
<td>25%</td>
</tr>
</tbody>
</table>

The Capital Adequacy (CA) is calculated as a ratio of equity to Total assets with an average value of 10%. The Asset Quality (AQ) is calculated as the ratio of provision for loan loss to total loans to customers and deposits/interbank loans, because not only on customer credit balance, this ratio should has an average value of 1% and is less than the required reserve ratio for the reserve requirement that the central bank requires for the amount of loans to customers.

Management Efficiency (MQ), which is expressed as 02 variables MQ1 (Operating Cost Ratio to Total Assets) with an average value of 2% and variable MQ2 (net income/total loan) with an average value of 6%. Although MQ1 and MQ2 have the same assessment of management efficiency, they are different in nature because MQ1 evaluates the cost ratio, while MQ2 evaluates the income ratio.

Earning quality (EQ) is calculated as net interest income on total assets with an average value of 3%. The Liquidity variable (LIQ) is calculated as a ratio of cash to total customer deposits with an average value of 2%. Sensitivity to market risk (SR) is an assessment of bank size calculated as the ratio of each bank’s assets to the total assets of the banks in the sample each year with an average value of 4% and a maximum of 4%. 25%.

4.2 Regression Results

Before entering the regression model, we will evaluate the pairwise correlation of the variables and the VIF coefficients of the variables to avoid multicollinearity in the model. Table 3 below shows the degree of similarity of each variable, pairs and VIFs of the variables.
Table 3. Correlation Matrix

<table>
<thead>
<tr>
<th>Variables</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
<th>(8)</th>
<th>(9)</th>
<th>(10)</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) ROA</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2) ROE</td>
<td>0.741</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.52</td>
</tr>
<tr>
<td>(3) CA</td>
<td>0.336</td>
<td>-0.203</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.92</td>
</tr>
<tr>
<td>(4) AQ</td>
<td>-0.140</td>
<td>0.017</td>
<td>-0.302</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.66</td>
</tr>
<tr>
<td>(5) MQ1</td>
<td>0.174</td>
<td>0.126</td>
<td>0.131</td>
<td>0.128</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.24</td>
</tr>
<tr>
<td>(6) MQ2</td>
<td>0.545</td>
<td>0.204</td>
<td>0.554</td>
<td>-0.122</td>
<td>0.206</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2.06</td>
</tr>
<tr>
<td>(7) EQ</td>
<td>0.549</td>
<td>0.352</td>
<td>0.233</td>
<td>0.152</td>
<td>0.420</td>
<td>0.542</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td>1.91</td>
</tr>
<tr>
<td>(8) LIQ</td>
<td>0.151</td>
<td>0.100</td>
<td>0.101</td>
<td>-0.172</td>
<td>-0.008</td>
<td>0.058</td>
<td>-0.012</td>
<td>1.000</td>
<td></td>
<td></td>
<td>1.06</td>
</tr>
<tr>
<td>(9) SR</td>
<td>-0.001</td>
<td>0.268</td>
<td>-0.317</td>
<td>0.516</td>
<td>0.021</td>
<td>-0.074</td>
<td>0.126</td>
<td>-0.026</td>
<td>1.000</td>
<td></td>
<td>1.59</td>
</tr>
<tr>
<td>(10) Digital</td>
<td>0.243</td>
<td>0.211</td>
<td>-0.016</td>
<td>0.150</td>
<td>0.052</td>
<td>0.118</td>
<td>0.205</td>
<td>-0.082</td>
<td>-0.003</td>
<td>1.000</td>
<td>1.13</td>
</tr>
</tbody>
</table>

After analyzing the correlation matrix and VIF. The researcher runs regression for two models ROA (1) and ROE model (2), respectively, and performs tests such as: variance change Heteroskedasticity test, VIF, autocorrelation (Autocorrelation in panel data test) according to the estimation methods POOL-OLS, Fixed Effect (FEM), Random Effect (REM). Results obtained are as follows:

ROA (1) model: All the VIF coefficients of the independent variable are less than 2, this shows that the model does not have multicollinearity. The Hausman test between FEM and REM methods shows the results of the model. FEM method has better estimation results because chi2 = 15.86 and p-value = 4.4%. The variables in the model have not detected autocorrelation (Autocorrelation in panel data) because F (1,27) = 3.77 and P-value = 6.72%. In addition, all estimation methods show that the model suffers from Heteroskedasticity.

ROE (2) model: All the VIF coefficients of the independent variable are less than 2, this shows that the model does not have multicollinearity. The Hausman test between FEM and REM methods shows the results of the model. FEM method has better estimation results because chi2 = 16.2 and p-value = 3.43%. The variables in the model have not detected autocorrelation (Autocorrelation in panel data) because F (1,27) = 2.964 and P-value = 9.66%. In addition, all estimation methods show that the model suffers from heteroskedasticity.

Both the ROA model (1) and the ROE model (2) show that the FEM estimation method is a reliable estimator. However, both regression models have heteroskedasticity when estimating FEM and do not suffer from autocorrelation. Therefore, the researcher uses FGLS estimation method to overcome this phenomenon. FEM and FLGS estimation results are presented in Table 4.

According to the regression results in Table 4, it helps us to assess the impact of the factors in the CAMELS model and the digital transformation on the performance of the joint stock commercial bank in Vietnam.

Table 4. Regression Results

<table>
<thead>
<tr>
<th>Variables</th>
<th>FEM</th>
<th></th>
<th></th>
<th>FGLS</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ROA</td>
<td>ROE</td>
<td></td>
<td>ROA</td>
<td>ROE</td>
<td></td>
</tr>
<tr>
<td>CA</td>
<td>0.0175**</td>
<td>-0.325***</td>
<td></td>
<td>0.00783</td>
<td>-0.427***</td>
<td></td>
</tr>
<tr>
<td>AQ</td>
<td>-0.291***</td>
<td>-3.358***</td>
<td></td>
<td>-0.174***</td>
<td>-2.579***</td>
<td></td>
</tr>
<tr>
<td>MQ1</td>
<td>-0.0164</td>
<td>0.644</td>
<td></td>
<td>-0.224***</td>
<td>-1.706***</td>
<td></td>
</tr>
<tr>
<td>MQ2</td>
<td>0.0250*</td>
<td>0.141</td>
<td></td>
<td>0.0717***</td>
<td>0.787***</td>
<td></td>
</tr>
<tr>
<td>EQ</td>
<td>0.253***</td>
<td>1.959***</td>
<td></td>
<td>0.270***</td>
<td>2.047***</td>
<td></td>
</tr>
<tr>
<td>LIQ</td>
<td>0.0288**</td>
<td>0.274*</td>
<td></td>
<td>0.0283***</td>
<td>0.213***</td>
<td></td>
</tr>
</tbody>
</table>
Capital Adequacy (CA) has a negative effect on ROE ($\beta = -0.427$) and no effect on ROA. This shows that equity is an important factor contributing to ensure stable operation of the bank. However, if banks do not know how to take advantage of large equity capital to promote their role in credit intermediaries to mobilize deposits and payments to create an advantage in market share in the industry, this is also a minus point. At the same time, the results of the regression equation also confirm the hypothesis:

**H1:** There is a significant relationship between Capital Adequacy (CA) and bank performance.

Asset Quality (AQ) as measured by Loan Loss Provision Ratio on Loans to Customers and Interbank Loans/Deposits has a negative effect on ROE ($\beta = -2.58$) and ROA ($\beta = -0.17$). If the bank continues to expand loans without paying attention to the quality of the credit, it will increase the bad debt, which will also increase the loan loss provision. Therefore, banks need to gradually shift to seek profit in other financial and payment services that will contribute to the quality of asset utilization. Regression results also accept hypothesis:

**H2:** There is a significant relationship between Asset Quality (AQ) and bank performance.

Management Efficiency (MQ), MQ1 is the ratio of operating expenses that has a negative impact on ROE ($\beta = -1.7$) and ROA ($\beta = -0.22$). Meanwhile, MQ2 is the ratio of income that has a positive effect with ROE ($\beta = 0.78$) and ROA ($\beta = 0.07$). Banks need to actively transform digitally to cut operating costs as well as increase income, which will increase ROA and ROE. This result also accepts the hypothesis.

**H3:** There is a significant relationship between Management Efficiency (MQ) and bank performance.

Earning quality (EQ) as measured by net interest income on total assets has a significant impact on ROE ($\beta = 2.04$) and ROA ($\beta = 0.27$). This shows that the efficiency of Vietnamese banks over the period 2007 – 2022 still largely depends only on credit activities but still has not focused on developing other financial activities outside of credit activities. With the Beta coefficient in the results, the hypothesis is also accepted.

**H4:** There is a significant relationship between Earning quality (EQ) and bank performance.

Liquidity (LIQ) measured as the ratio of cash to total customer deposits has a positive effect with both ROE ($\beta = 0.21$) and ROA ($\beta = 0.03$). This shows that cash contributes to efficiency increase, performance of the bank because when this amount of money is not involved in lending activities, cash will participate in other financial services of the bank. This result proves the hypothesis.

**H5:** There is a significant relationship between Liquidity (LIQ) and bank performance.
Sensitivity to market risk (SR) is an assessment of bank size calculated by the ratio of each bank’s assets to the total assets of the banks in the sample by year. SR represents the size and market share of the bank. Goods have a positive impact on ROA and ROE. The results of the regression equation (table 4) also accept the hypothesis.

\textit{H6: There is a significant relationship between Sensitivity to market risk (SR) and bank performance.}

Digital Banking has a positive effect on ROA and ROE with more than 99% reliability, indicating that the application of Digital banking has the effect of increasing the bank's operational efficiency. The results of the regression equation also accept the hypothesis.

\textit{H7: There is a significant relationship between Digital Banking and bank performance.}

5. Conclusion

This study has confirmed the impact of 06 CAMELS Framework factors on the performance of Vietnamese joint stock commercial banks, including: Capital Adequacy (CA), Asset Quality (AQ), Management Efficiency (MQ), Earnings (EQ), Liquidity (LIQ) and Market Risk Sensitivity (SR). Thereby also assessing the impact of the application of digital banking on the performance of joint stock commercial banks in Vietnam. In addition, the results of the coefficients in the regression equation also show that, in the period 2007 - 2022, the performance of Vietnamese joint stock commercial banks largely depends on credit activities. Because the EQ is quite large, it is measured by net interest income on total assets.

Liquidity coefficient (LIQ) has a positive effect on ROA, this result is contrary to the study in Malaysia by Muhmad & Hashim (2015). However, this shows that Vietnamese joint stock commercial banks have gradually moved to service activities such as payment services for individuals and organizations such as payment for electricity and water bills, shopping, money for buying tickets for means of transport, etc., have contributed to operational efficiency.

Asset Quality (AQ) as measured by Loan Loss Provision Ratio on Customer Loans and Interbank Loans/Deposits has a negative effect on ROE and ROA. This result is similar to the study in Kuwait by Hewaidy and Kayed (2020). It also shows that joint-stock commercial banks in Vietnam should not be excessively widening their credit lines at present because this will lead to loss provision. loans increased. Instead, banks gradually shifted to other service activities besides the traditional credit segment.

Moreover, Digital Banking has a positive effect on ROA and ROE with more than 99% confidence. Although the number of observations in the sample is quite modest, only 25 observations out of 438 of 06 banks have digitally converted. Out of a total of 28 joint stock commercial banks, it has been shown that the application of Digital banking has the effect of increasing the bank's operational efficiency. As reckon the E-banking is just an additional product that helps customers transfer money and manage accounts. Meanwhile, Digital Banking can perform all transactions like a traditional counter on the internet. This allows digital banking to have the potential to provide payment services or financial services and financial management beyond what e-wallets or E-Banking can provide as investment management services.
Acknowledgement

The research is funded by Nguyen Tat Thanh University, Ho Chi Minh City, Vietnam. Sincere thanks for the support of the Faculty of Finance - Accounting, a group of research students in the banking and finance industry include: Duong Thuy Duy – 2100010323, Cai Thi Thuy Trinh – 2100009277, Nguyen Huu Nghia – 2000000764 assisted us in collecting data from audited financial statements of banks. We would like to thank all the people who prepared and revised previous versions of this document.

References


Factors Affecting Intentions and Behavior of Students to Use Mobile Payment

Thuy Gia Phan-Bui*, Hoa Ngoc Nguyen & Khanh Thuy Hong Thai
Faculty of Finance & Accounting, Nguyen Tat Thanh University, Vietnam
*Corresponding author. Email: pbgthuy@ntt.edu.vn

Abstract: This study aims to determine the factors that affect behavioural intention and usage behaviour of mobile payments by extending the unified theory of acceptance and use of technology. This quantitative study used covariance-based structural equation modelling to analyze a unique sample of 983 students using mobile payments at Nguyen Tat Thanh University. The findings indicate that perceived enjoyment, performance and effort expectancy, and social influence positively impact behavioural intention to use mobile payment and a positive relationship between behavioural intention and usage behaviour of mobile payment. Besides, perceived enjoyment indirectly affects the intention to use mobile payment through the mediating role of performance and effort expectancy. The findings enable mobile payment service providers and marketers to consider core factors in developing a mobile payment platform and ecosystem.

Keywords: behavioural intention, mobile payment, perceived enjoyment, social influence, use behaviour

1. Introduction

Information and communication technology development has resulted in several business processes moving to an electronic basis, creating a need to improve the payment process. At the same time, computerized payment systems were created. The e-commerce process is done through mobile payments, allowing for greater automation and security. In recent years, Asia-Pacific has seen the most significant growth in mobile payment usage worldwide (Bansal et al., 2018). The factors influencing users’ decisions about mobile payments are a popular analysis topic. Customers make decisions about using mobile payments based on key features of the system provided. Over the past three decades, many models have been developed for analytical purposes, which researchers can further tailor to their research needs.

The research subject of this paper is user attitudes towards the functional characteristics of the mobile payment they have used. The unified theory of acceptance and use of technology (UTAUT) was used to determine factors affecting students’ behavioural intention and usage of mobile payments. This study conducted an online survey using Google Forms between the 15th and 22nd of March, 2023. The study aims to identify the effects of perceived enjoyment, performance and effort expectancy, and social influence on behavioural intention to use mobile payment and the indirect impact of perceived enjoyment on the intention to use mobile payment through the mediating role of performance and effort expectancy.

The remainder of this paper is organized as follows. Section 2 reviews the literature and suggests a research framework and the formulation of the hypotheses. Section 3 outlines the data and methodology. Section 4 presents the findings of the study. Section 5 concludes the paper.

2. Literature Review

2.1 Mobile Payment

Mobile payment is a method by which a transaction can use a portable electronic device such as a tablet or smartphone to pay for certain products, services, or bills (Dahlberg et al., 2008). Also, mobile
payments refer to a transaction made by connecting to a server system via a mobile device and performing authentication, permission, follow-up payments, and completion guarantee (Lin et al., 2020). In other words, mobile payment comprises technology systems that authorise users to perform payment transactions on mobile devices.

2.2 Unified Theory or Acceptance and Use of Technology (UTAUT)

The UTAUT model, formulated by integrating theoretical framework, motivation models and social cognitive theories, aims to explain user intentions to adopt new technology and subsequent usage behaviour. The model contributed to a 70% progress in forecasting efficiency in the behavioural intention to use the technology (Venkatesh et al., 2003). Several theories have been used to develop a study framework related to mobile payment, and UTAUT is among the most often applied by earlier studies.

Ignoring moderating effects, the researchers focused on four crucial constructs determining the original UTAUT model: performance expectancy, effort expectancy, social influence and facilitating condition, and a perceived enjoyment construct from the extended UTAUT model.

2.3 Flow Theory

After being introduced by Csikszentmihalyi in the 1970s, flow theory was explored to understand how people feel when one experiences the most enjoyment and why. As Chen et al. (2018) cited, “the main idea of flow is enjoyment.” In a flow experience, a sense of immersion or telepresence is created by modifying the interaction process. Flow can be formed when there is a balance between skill and challenge levels. At the same time, in an imbalanced situation, a person may perceive either tedium or anxiety (Csikszentmihalyi, 1975). Perceived enjoyment is crucial in mobile services (Chen et al., 2018; Lew et al., 2020). Therefore, this study used the flow theory to integrate perceived enjoyment that measures the flow level of users’ mobile payments.

2.4 Performance Expectancy

According to Venkatesh et al. (2003), performance expectancy is the degree to which an individual believes that using a system will help one to enhance job performance. Performance expectancy is how users believe mobile payments make it more convenient, efficient, profitable, and faster to complete a transaction.

Besides effort expectancy, social influence and facilitating conditions, performance expectancy is one of the antecedents of behavioural intention in the UTAUT model. The positive influence of performance expectancy on the adoption intention of mobile payments has been supported by previous studies (Abrahão et al., 2016; Nu & Panggabean, 2021). Therefore, the following hypothesis was proposed:

H1: Performance expectancy significantly affects behavioural intention to use mobile payments.

2.5 Effort Expectancy

Effort expectancy is the level of comfort related to using the system (Venkatesh et al., 2003). Effort expectancy is how users believed that learning mobile payments would be simple, that they would be skilled at using them, and that their interaction and navigation with them would be straightforward and obvious.
Although prominent researchers found no relationship between effort expectancy and behavioural intention to use mobile payments (Patil et al., 2020; Lin et al., 2020), several studies have regarded effort expectancy as an essential construct influencing the user’s behaviour or intention to adopt mobile payments (Abrahão et al., 2016; Nu & Panggabean, 2021). Consequently, the hypothesis was proposed as follows:

H₂: Effort expectancy positively influences behavioural intention to use mobile payments.

2.6 Perceived Enjoyment

Perceived enjoyment is one of the fundamental reasons driving technology adoption and use and serves as a proxy for hedonic motivation (Venkatesh et al., 2012). Individuals who enjoy using new technology tend to have more excellent intentions than others (Balog & Pribeanu, 2010). Enjoyment is an inherent reward from the usage of learned techniques. In other words, if individuals think mobile payment technology is a delight, they are more willing to use it. Alfany et al. (2019) found a positive relationship between perceived enjoyment and intention to use mobile payment.

In addition, extending the UTAUT, Esawe (2022) found the positive impacts of perceived enjoyment on performance expectancy and effort expectancy, meaning that perceived enjoyment is a significant external element of the UTAUT model. Therefore, the hypotheses were built as follows:

H₃: Perceived enjoyment positively associates with users’ intention to use mobile payments (H₃a), performance expectancy (H₃b), and effort expectancy (H₃c).

2.7 Social Influence

Social influence refers to essential people (e.g., friends, colleagues, or relatives) who influence users’ behaviour and intention to use a particular technology (Venkatesh et al., 2003). Suppose an individual lives and works where mobile payment technology is encouraged, promoted, and used frequently. In that case, that individual will be more inclined to access and use that technology.

Many studies have shown that social influence significantly affects behavioral intention toward mobile payment technology (Al-Okaily et al., 2020; Oliveira et al., 2016). Therefore, this can lead to the hypothesis as follows:

H₄: Social intention positively and significantly affects behavioural intention.

2.8 Facilitating Conditions

Facilitating conditions are people’s perceptions of all available resources and support for certain behaviours (Venkatesh et al., 2003). Individuals believe that technological infrastructure exists to support the adoption of the system. A supporting infrastructure will increase people’s intention to adopt new technologies (Oliveira et al., 2016). Many studies revealed that facilitating conditions positively and significantly impact the behavioural intention to use a specific technology (Gupta et al., 2019; Gupta & Arora, 2020; Mensah et al., 2020; Patil et al., 2020).

Moreover, Venkatesh et al. (2003) supposed that facilitating conditions affect user behaviour more than it affects the user’s behavioural intention. Supporting to study of Venkatesh et al. (2003) and Esawe (2022) found that facilitating conditions positively affect user behaviour. Therefore, the following hypothesis is formulated:
H₅: Facilitating conditions positively influence the user’s intention to use mobile payment (H₅a) and the usage behaviour of mobile payment (H₅b).

2.9 Behavioral Intention to Use Mobile Payments and User Behavior

In the UTAUT model, behavioural intention is a mediator, depending on several variables’ effects. All behavioural intention variables reflect a user’s belief or personal attitude. Behavioural intention is the degree to which an individual has framed prearranged plans regarding whether to execute a specified future behaviour (Chai & Dibb, 2014). In other words, behavioural intention refers to the motivational aspects that influence a given behaviour. The more vital the intention to achieve the behaviour, the more likely the behaviour will be achieved. In most studies, behavioural intention significantly and positively impacts user behaviour. Esawe (2022) obtained such results when analysing user attitudes to e-wallets, as did Tomić et al. (2023) when analysing user attitudes to electronic payment systems. Consequently, the following hypothesis was proposed:

H₆: Behavioural intention positively influences the usage behaviour of mobile payment.

Based on the theoretical assumptions of the UTAUT model, the literature review, and empirical studies, an expanded UTAUT model for this study is presented in Figure 1.

3. Data and Methodology

3.1 Data

This study was carried out at Ho Chi Minh City to determine factors affecting students’ behavioural intention and usage of mobile payments by extending the UTAUT model. The researchers conducted the online survey using Google Forms between the 15th and 22nd of March 2023 and collected 1335 answers from Nguyen Tat Thanh University students. After the data was synthesized and cleaned, the number of respondents was 983.
3.2 Measures

To maintain content validity, statements adapted from previous studies to assess the study’s seven constructs of the expanded UTAUT model were used. The survey questionnaire is structured in three parts: the first part consists of demographic questions; the second part collects information about the students’ previous purposes, preferences, and used services for performing mobile payments; and the third covers UTAUT constructs and perceived enjoyment containing a total of 29 questions answered through a five-point Likert scale with one indicating “totally disagree” and five indicating “totally agree”.

3.3 Methodology

The covariance-based structural equation modelling (CB-SEM) technique was employed to analyze user intention to usage behaviour of mobile payments. In the expanded UTAUT model of this study, the researchers expect that performance expectancy, effort expectancy, and behavioural intention constructs play the mediator role.

<table>
<thead>
<tr>
<th>Construct</th>
<th>Items</th>
<th>Statements</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance Expectancy (PE)</td>
<td>PE₁</td>
<td>Mobile payment makes payments easier.</td>
<td>Venkatesh et al. (2003)</td>
</tr>
<tr>
<td></td>
<td>PE₂</td>
<td>Mobile payment makes payments faster.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PE₃</td>
<td>Mobile payment will be an advantage when making payments.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PE₄</td>
<td>Mobile payment is a useful means of payment.</td>
<td></td>
</tr>
<tr>
<td>Effort Expectancy (EE)</td>
<td>EE₁</td>
<td>Learning how to use a mobile payment is easy.</td>
<td>Venkatesh et al. (2012)</td>
</tr>
<tr>
<td></td>
<td>EE₂</td>
<td>It is not difficult to master the mobile payment.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>EE₃</td>
<td>The steps to use the mobile payment are simple.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>EE₄</td>
<td>Overall, I found the mobile payment very easy to use.</td>
<td></td>
</tr>
<tr>
<td>Perceived Enjoyment (ENJ)</td>
<td>ENJ₁</td>
<td>I find using mobile payment enjoyable.</td>
<td>Nur &amp; Panggabean (2021), Esawe (2022)</td>
</tr>
<tr>
<td></td>
<td>ENJ₂</td>
<td>I have fun using mobile payment.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ENJ₃</td>
<td>I get excited when using mobile payment.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ENJ₄</td>
<td>The actual process of using mobile payment is pleasant</td>
<td></td>
</tr>
<tr>
<td>Social Influence (SI)</td>
<td>SI₁</td>
<td>The important people suggested that I use mobile payment.</td>
<td>Venkatesh et al. (2012)</td>
</tr>
<tr>
<td></td>
<td>SI₂</td>
<td>The important people support me using mobile payment.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SI₃</td>
<td>The important people influence my decision to use mobile payment.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SI₄</td>
<td>The trend of using mobile payment influences my decision to use this technology.</td>
<td></td>
</tr>
<tr>
<td>Facilitating Conditions (FC)</td>
<td>FC₁</td>
<td>I have the necessary conditions (smartphone, tablet, wifi) to use mobile payment.</td>
<td>Venkatesh et al. (2012)</td>
</tr>
<tr>
<td></td>
<td>FC₂</td>
<td>I know needfull to use mobile payment.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FC₃</td>
<td>I got help to use mobile payment.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FC₄</td>
<td>Mobile payment application is compatible with other technologies I have used.</td>
<td></td>
</tr>
<tr>
<td>Behavioral Intention (BI)</td>
<td>BI₁</td>
<td>I intend to use mobile payment in the future.</td>
<td>Venkatesh et al. (2012)</td>
</tr>
<tr>
<td></td>
<td>BI₂</td>
<td>I plan to use mobile payment in the future.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BI₃</td>
<td>I am willing to use mobile payment when given the opportunity.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BI₄</td>
<td>I recommend mobile payment to my friends.</td>
<td></td>
</tr>
<tr>
<td>User Behavior</td>
<td>UB₁</td>
<td>I regularly use mobile payment.</td>
<td>Venkatesh et al. (2012)</td>
</tr>
<tr>
<td></td>
<td>UB₂</td>
<td>I use many functions of mobile payment application.</td>
<td></td>
</tr>
</tbody>
</table>
4. Results

4.1 Characteristics of Research Sample

Table 2 below presents the demographic characteristics of the 983 Nguyen Tat Thanh University students. Table 2 shows a significant difference between female and male students. The number of female students participating in the survey accounted for just over twice that of male students, with 68.3% and 31.7%, respectively. Considering academic years, there are 552 freshmen (56.2%), 345 sophomores (35.1%), 83 juniors (8.4%), and three seniors (0.3%) participated in the survey. For discipline, students studying business account for the most significant percentage (77.3%). The second largest percentage is the number of students studying in the engineering sector (12.8%). Finally, students majoring in social sciences account for the smallest percentage (1.6%).

Table 2. Profile of Respondents

<table>
<thead>
<tr>
<th>Demographic attribute</th>
<th>Category</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Female</td>
<td>671</td>
<td>68.3%</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>312</td>
<td>31.7%</td>
</tr>
<tr>
<td>Academic Year</td>
<td>Freshman</td>
<td>552</td>
<td>56.2%</td>
</tr>
<tr>
<td></td>
<td>Sophomore</td>
<td>345</td>
<td>35.1%</td>
</tr>
<tr>
<td></td>
<td>Junior</td>
<td>83</td>
<td>8.4%</td>
</tr>
<tr>
<td></td>
<td>Senior</td>
<td>3</td>
<td>0.3%</td>
</tr>
<tr>
<td>Discipline</td>
<td>Engineering</td>
<td>126</td>
<td>12.8%</td>
</tr>
<tr>
<td></td>
<td>Health</td>
<td>39</td>
<td>4.0%</td>
</tr>
<tr>
<td></td>
<td>Business</td>
<td>760</td>
<td>77.3%</td>
</tr>
<tr>
<td></td>
<td>Social Sciences</td>
<td>16</td>
<td>1.6%</td>
</tr>
<tr>
<td></td>
<td>Arts</td>
<td>42</td>
<td>4.3%</td>
</tr>
</tbody>
</table>

4.2 Analysis of Measurement Model

According to Hu and Bentler (1999) and Hair et al. (2009), the measurement model analysis includes testing reliability and convergent and discriminant validity. Table 3 below presents the model fit measure for confirmatory factor analysis (CFA).

Table 3. Model Fit Measure for Confirmatory Factor Analysis

<table>
<thead>
<tr>
<th>Measure</th>
<th>Estimate</th>
<th>Threshold</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMIN/df</td>
<td>3.770</td>
<td>CMIN/df &lt; 5.00</td>
<td>Acceptable&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>CFI</td>
<td>0.972</td>
<td>CFI &gt; 0.95</td>
<td>Excellent&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>SRMR</td>
<td>0.038</td>
<td>SRMR &lt; 0.08</td>
<td>Excellent&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>RMSEA</td>
<td>0.053</td>
<td>RMSEA &lt; 0.06</td>
<td>Excellent&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>PClose</td>
<td>0.129</td>
<td>PClose &gt; 0.05</td>
<td>Excellent&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>a</sup>Cut off criteria according to Hu and Bentler (1999);  <sup>b</sup>Cutoff criteria according to Hair et al. (2009)

Table 3 shows that the CMIN/df cutoff is at the acceptable threshold (CMIN/df = 3.770 < 5). Moreover, the CFI, SRMR, RMSEA, and PClose cutoffs are at the excellent threshold (CFI = 0.972 > 0.95; SRMR = 0.038 < 0.08; RMSEA = 0.053 < 0.06; and PClose = 0.129 > 0.05). With a collected data set, this measurement model with the input data meets the requirements of the CFA model.
After considering the overall fit of the CFA model, this study evaluates the quality of the observed variable. Table 4 below presents the convergent validity and reliability assessment of constructs. Note that the principal axis factoring method with promax rotation combined factors Performance Expectancy (PE) and Effort Expectancy (EE) into a new construct (PEE) and removed the construct Facilitating Conditions (FC). The rest of the constructs remain unchanged, including four constructs ENJ, SI, BI, and UB.

Besides, all factor loading values are higher than 0.5; the minimum Cronbach’s alpha (α), composite reliability (CR), and average variance extracted (AVE) values are 0.786 (> 0.7), 0.814 (> 0.7) and 0.575 (> 0.5), respectively. In addition, AVE values are more significant than the maximum shared variance (MSV). These results confirm that the CFA model satisfies the conditions of convergent validity and reliability assessment.

<table>
<thead>
<tr>
<th>Table 4. Convergent Validity and Reliability Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construct</td>
</tr>
<tr>
<td>--------------------------------------------------------</td>
</tr>
<tr>
<td>Performance and Effort Expectancy (PEE)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Perceived Enjoyment (ENJ)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Social Influence (SI)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Behavioral Intention (BI)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>User Behavior (UB)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

Next, Table 5 below presents Fornell and Larcker criterion and Heterotrait-Monotrait Ratio (HTMT) to measure the potentially overlapping constructs used to ensure discriminant validity (Fornell & Larcker, 1981; Henseler et al., 2015).

<table>
<thead>
<tr>
<th>Table 5. Discriminant Validity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construct</td>
</tr>
<tr>
<td>--------------------------------</td>
</tr>
<tr>
<td>Panel A. Fornell and Larcker</td>
</tr>
<tr>
<td>criterion</td>
</tr>
<tr>
<td>PEE: Performance and Effort</td>
</tr>
<tr>
<td>Expectancy</td>
</tr>
<tr>
<td>ENJ: Perceived Enjoyment</td>
</tr>
<tr>
<td>SI: Social Influence</td>
</tr>
<tr>
<td>BI: Behavioral Intention</td>
</tr>
</tbody>
</table>
Panel B. Heterotrait-Monotrait Ratio (HTMT)

PEE: Performance and Effort Expectancy

<table>
<thead>
<tr>
<th>Constructs</th>
<th>HTMT</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENJ: Perceived Enjoyment</td>
<td>0.674</td>
</tr>
<tr>
<td>SI: Social Influence</td>
<td>0.734 0.678</td>
</tr>
<tr>
<td>BI: Behavioral Intention</td>
<td>0.684 0.745 0.606</td>
</tr>
<tr>
<td>UB: User Behavior</td>
<td>0.631 0.726 0.637 0.740</td>
</tr>
</tbody>
</table>

*** p-value < 0.001; ** p-value < 0.01; * p-value < 0.05

According to statistics in Panel A, all the square roots of AVE (bold values) are more significant than 0.5 (from 0.599 to 0.884). In each factor, the square root of AVE is higher than the correlation coefficient of other factors in the same column. Moreover, the HTMT values of the elements in Panel B are all less than 0.85 (the maximum HTMT value is 0.745). Therefore, all constructs attained discriminant validity.

4.3 Analysis of Structural Model

After evaluating the quality of the observed variable, reliability, convergent and discriminant validity of the construct, this study estimates the SEM model. Table 6 below illustrates the estimated coefficients and p-values using the 2000 times Bootstrapping technique.

Table 6. Hypotheses Testing Results

<table>
<thead>
<tr>
<th>Effects</th>
<th>Standardized Estimate</th>
<th>p-values</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEE → BI</td>
<td>0.275 **</td>
<td>0.000</td>
<td>Supported</td>
</tr>
<tr>
<td>ENJ → BI</td>
<td>0.547 **</td>
<td>0.000</td>
<td>Supported</td>
</tr>
<tr>
<td>ENJ → PEE</td>
<td>0.685 **</td>
<td>0.000</td>
<td>Supported</td>
</tr>
<tr>
<td>ENJ → PEE → BI</td>
<td>0.188 **</td>
<td>0.001</td>
<td>Supported</td>
</tr>
<tr>
<td>SI → BI</td>
<td>0.114 **</td>
<td>0.000</td>
<td>Supported</td>
</tr>
<tr>
<td>BI → UB</td>
<td>0.844 **</td>
<td>0.000</td>
<td>Supported</td>
</tr>
</tbody>
</table>

*** p-value < 0.001; ** p-value < 0.01; * p-value < 0.05

The estimated results in Table 6 show that, first, the standardized estimates of performance and effort expectancy, PEE (0.257; p-value < 0.001), perceived enjoyment, ENJ (0.547; p-value < 0.001), and social influence, SI (0.114; p-value < 0.001) have positive and significant effects on behavioural intention, BI at the 0.1% significance level.

Second, behavioural intention positively and significantly related to user behavior (UB) at the 0.1% significance level (0.844; p-value < 0.001). Moreover, the standardized estimate coefficient of behavioural intention has the most outstanding value, leading to the most substantial effect of behavioural intention on user behaviour.

Finally, referring to the relation between ENJ, PEE, and BI, the findings confirm the positive effect of ENJ on PEE (0.685; p-value < 0.001) and the indirect effect of ENJ on BI through the mediator PEE (0.188; p-value < 0.001). This leads to an indirect effect of perceived enjoyment on the intention to use mobile payment through the mediating role of performance and effort expectancy.
Figure 2 presents the hypotheses testing results, which shows that all hypotheses were supported. These findings can be observed from the sign of standardized estimate (> 0) and p-value (< 0.001).

5. Conclusion

This study provides insights by expanding UTAUT to include new relationships and improving understanding of the factors influencing students’ behavioural intentions and acceptance of mobile payments.

The study results illustrate that perceived enjoyment, performance and effort expectancy, and social influence positively impact behavioural intention to use mobile payment and a positive relationship between behavioural intention and usage behaviour of mobile payment. Besides, perceived enjoyment indirectly affects the intention to use mobile payment through the mediating role of performance and effort expectancy.

Practically, this study has revealed several significant implications for practitioners. First, mobile payment service providers should create mobile payment applications that can maintain users’ positive perceived enjoyment to increase the perception of performance and effort expectancy, thereby enhancing the intention to use mobile payment. And then, positive word-of-mouth activities regarding non-cash transactions towards consumers should be promoted to increase the intention to use mobile payment.

Acknowledgements

This research is funded by Nguyen Tat Thanh University, Ho Chi Minh City, Vietnam.

References


Factors Impacting E-Wallet User Acceptance for Customers of Small Businesses towards A Cashless Society in Malaysia: The Moderating Role of Government Implementation and Enforcement

Anthony Vaz\textsuperscript{a} & Deepak Ram\textsuperscript{b}

\textsuperscript{a}School of Transport and Logistics, Malaysia University of Science and Technology
\textsuperscript{b}Boost Biz, Axiata Digital eCode Sdn Bhd
*anthony@must.edu.my

Abstract: This research investigates the level of user acceptance of e-wallet payment systems adopted by small businesses in Malaysia. The study is grounded in the Technology Acceptance Model and its extensions, which provide a theoretical framework for understanding the factors that influence user acceptance of technology. The research objective is to identify the factors that influence user acceptance of e-wallet payment systems for small businesses in Malaysia and to develop strategies to address these challenges. The study focuses on user acceptance of e-wallet payment systems adopted by small businesses in Malaysia. While the primary focus is on user acceptance of payment systems, users will also be asked whether they use other payment mechanisms such as cash, debit card, credit card and online transfer since these payment systems are also payment alternatives. The units of analysis are customers of small businesses, who have signed up for the wallet payment system but have not fully accepted the technology. The moderating variable is local government and enforcement of such payment systems. By examining these different payment mechanisms, the study provides a comprehensive analysis of the factors influencing user acceptance of digital payment technologies in Malaysia. The study will review factors such as the lack of awareness, ease of use, usefulness, trust and government implementation and enforcement support as major factors influencing user acceptance of e-wallet payment systems among small businesses in Malaysia and compare the findings with cash, debit card, credit card and online transfers used. The study will recommend strategies to address the challenges of e-wallet payment systems for customers and include targeted education and training programs, increased regulatory enforcement, and improved technical and customer support. The study also has implications for the government, private companies, small businesses and mid-size businesses in promoting the adoption of e-wallet payment systems, achieving a cashless society in Malaysia. The findings contribute to the literature on technology acceptance and provide insights into the challenges of adopting new technologies in small businesses.

Keywords: cashless society, digital payments, e-wallet payment systems, payment mechanisms

1. Introduction

The introduction defines digital payment systems and reviews the background of the digital payment industry in Malaysia, the problem statements, and the research questions and objectives of this study.

1.1 Background of the Study

The use of digital payment systems is becoming increasingly popular in many parts of the world. In Malaysia, the government has launched initiatives to encourage the adoption of cashless payment systems, and many small businesses have responded by signing up for e-wallet payment systems. While there has been a positive reception to e-payment adoption, the results of the campaign have been mixed,
leading to the need for this study. According to Digital News Asia (2023), the country has achieved 221 e-payments per capita in 2021. However, the new objective of increasing e-payment transactions by a minimum of 15% annually is expected to raise the number of respondents to 400 by 2026.

A cashless society refers to a society where all financial transactions are conducted electronically, with no physical exchange of cash. A user scans the Quick Response (QR) code presented in a small business using an e-wallet app on the shopper’s phone and the QR code data is then sent to an e-wallet organization in a payment request for processing (Figure 1).

The move towards a cashless society has been driven by the increasing use of mobile devices, advances in payment technologies, and a desire for greater convenience, security and efficiency in financial transactions. In Malaysia, the government has actively promoted the use of e-payment systems to achieve a cashless society by 2030. As part of this effort, e-wallet payment systems have been developed and promoted by both the government and private companies. However, despite the widespread availability of these systems, the level of user acceptance has been low, particularly among small businesses in Malaysia (Razor Merchant, 2019). Some factors on non-user’s perceptions of e-wallet systems have been illustrated in Figure 2.
1.2 Problem Statement

Despite the high number of small businesses signing up for e-wallet payment systems in Malaysia, only about 41% of them are actively using the application (Ismail, 2021). This low adoption rate raises questions about the factors influencing user acceptance of wallet payment systems. The following section highlights the problems of user acceptance of payment system technology within the industry.

a. Lack of Awareness of Knowledge

Firstly, one problem is the lack of awareness and knowledge among customers of small businesses on the benefits of e-wallet payment systems. Many customers of small businesses in Malaysia are not familiar with the technology and its benefits and may not see the value in accepting these systems. They may also perceive the use of such systems as time-consuming and may lack the necessary technical expertise to use the system.

b. Low Level of Trust

Secondly, another problem is the low level of trust in wallet payment systems among customers of small businesses. These customers may be concerned about the security and reliability of the system and may fear that the system could be vulnerable to fraud or hacking. They may also be hesitant to provide personal information and banking details required to use these systems, which could lead to privacy concerns.

c. Lack of Government Implementation and Enforcement

Thirdly, a lack of government implementation and enforcement may also contribute to the low level of user acceptance of e-wallet payment systems for small businesses. While the government has actively promoted e-payment systems, there may be a lack of enforcement and regulation in the implementation of these systems. Small businesses may also face difficulties in complying with the regulations and requirements for using these systems, leading to a lack of confidence in the technology among users.

d. Limited Availability of Technical Support and Customer Service

Lastly, the limited availability of technical support and customer service may also contribute to the low level of user acceptance of e-wallet payment systems among customers of small businesses. Small businesses and their customers may face difficulties in troubleshooting technical issues or obtaining customer support, leading to frustration and reluctance of users to use the systems.

Therefore, the goal of this research is to identify the factors influencing user acceptance of e-wallet payment systems for small businesses in Malaysia and to develop strategies to address these challenges.

1.3 Research Questions and Objectives

The primary research question for this study is:

What factors influence user acceptance of e-wallet payment systems among small businesses in Malaysia?

The research objectives are as follows:

a. To identify influencing user acceptance of e-wallet payment systems among small businesses in Malaysia.

b. To determine the moderating effect of local government implementation and enforcement
between the factors and user acceptance of e-wallet payment systems.

2. Literature Review

This section reviews the literature on user acceptance of technology and the development of conceptual framework and hypotheses.

2.1 Theories of User Acceptance of Technology

Several theories explain user acceptance of technology. The Technology Acceptance Model (TAM) proposes that perceived usefulness and perceived ease of use are the primary factors influencing user acceptance (Davis, 1989). The Unified Theory and Acceptance and Use of Technology (UTAUT) expands on TAM and includes four additional factors: performance expectancy, effort expectancy, social influence and facilitating conditions (Venkatesh et al., 2003). The Diffusion of Innovations (DOI) theory proposes that users adopt new technologies based on their perceptions of the innovation’s relative advantage, compatibility, complexity, trialability, and observability (Rogers, 2010).

2.2 Perceived Usefulness and Perceived Ease of Use

Perceived usefulness and perceived ease of use are essential factors that influence user acceptance of technology. Perceived usefulness refers to the degree to which users believe that the system will improve their performance, such as making payments during a transaction. Perceived ease of use refers to the degree to which users believe that the system, such as the payment system, is easy to use. These two factors were first proposed in the TAM and have been widely adopted in subsequent studies.

2.3 Trust

Trust is an essential factor that influences user acceptance of e-wallet payment systems. Trust refers to the confidence that users have in the security and reliability of the system. Users may be hesitant to adopt the system if they have concerns about the security of their personal and financial information. Trust can be enhanced through the implementation of security measures and the provision of information about the system’s security and reliability.

2.4 Social Influence

Social influence is another factor that may influence user acceptance of e-wallet payment systems. Social influence refers to the impact of others’ opinion and experiences on users’ decisions. Users may be more likely to adopt the system if they see that others such as friends and family are using the -wallet system.

2.5 Recent Studies

Recent studies have identified additional factors that influence user acceptance of digital payment systems, including perceived security, perceived convenience, and social influence. Additionally, the impact of government policies and regulations on user acceptance has been investigated. For instance, Tsai et al. (2019) found that the clarity and enforcement of government policies were significant factors affecting user adoption of mobile payment services.

2.6 Conceptual Framework

Based on the literature, the conceptual framework developed for this study is shown in Figure 3.
2.7 Hypotheses

The hypotheses developed for this study are:

H1a: Perceived Ease of Use has an impact on User Acceptance for e-wallet systems in Malaysia.

H1b: Government Implementation & Enforce moderates the impact between Perceived Ease of Use and User Acceptance of e-wallet systems in Malaysia.

H2a: Perceived Usefulness has an impact on User Acceptance for e-wallet systems in Malaysia.

H2b: Government Implementation & Enforce moderates the impact between Perceived Usefulness and User Acceptance of e-wallet systems in Malaysia.

H3a: Trust has an impact on User Acceptance for e-wallet systems in Malaysia.

H3b: Government Implementation & Enforce moderates the impact between Trust and User Acceptance of e-wallet systems in Malaysia.

H4a: Social Influence has an impact on User Acceptance for e-wallet systems in Malaysia.

H4b: Government Implementation & Enforce moderates the impact between Social
Influence and User Acceptance of e-wallet systems in Malaysia.

3. **Methodology**

This section covers the methodology that will be employed in this study.

3.1 **Unit of Analysis and Potential Users Involved in the Study**

The unit of analysis and potential users involved in the study are customers of small business owners and traders who have signed up for and used the e-wallet payment system as payment mechanisms. The study aims to collect data from a sample of customers of these small business owners and traders to identify the factors influencing their acceptance of different payment systems.

3.2 **Types of Statistical Tests**

The study will use descriptive statistics to analyze the demographic characteristics of the sample. The study will use inferential statistics, specifically multiple analysis, to identify the factors influencing user acceptance of the e-wallet payment systems. The moderating variable of local government implementation and enforcement will be included in the regression analysis.

3.3 **Questionnaire**

The questionnaire will have a cover page, section A (demographic section), and Section B, four- or five-line items related to the dependent variable, moderating variable and all the 4 independent variables. The cover page will contain information about the purpose of the study, the confidentiality of the responses, and the consent form. Section A will collect information about the participants' age, gender, education, and household income. Section B will include 5-point Likert Scale responses ranging from Strongly Disagree to Strongly Agree. This section will include questions related to the dependent variable such as:

a. How frequently do they use e-wallet payment systems?

b. How satisfied are they with the e-wallet payment system?

For the moderating variable (Local Government Implementation and Enforcement), the questions are:

a. To what extent do they believe that the government policies and regulations related to e-wallet payment systems are clear and easy to understand?

b. How frequently do they see the government enforcing policies and regulations related to e-wallet payment systems?

For the independent variables, the questions will be:

a. Perceived Usefulness: To what extent do they believe that the e-wallet payment system improves their performance as a patron of small businesses?

b. Perceived Ease of Use: To what extent do they believe that the e-wallet payment system is easy to use?

c. Trust: To what extent do they trust the security and reliability of the e-wallet payment system?
d. Social Influence: To what extent do their friends, family and other people in society’s opinions and experiences influence their decision to use the e-wallet payment system?

Acknowledgements

We would like to thank everyone who has helped with this study.

References


Hedonic Valuation Technique and Regression Model Valuation of Land in Ho Chi Minh City

Khanh Thai Hong Thuy a*, Hai Nguyen Xuan b & Trang Le Thi Doan c
a,b,c Faculty of Finance and Banking, Nguyen Tat Thanh University, Vietnam
*nxhai@ntt.edu.vn

Abstract: In accounting terms, land prices will always rise since it is an especially valuable resource for all nations and does not increase on its own. As a result, there is a rise in the demand for residential land. Thus, while buying property, especially during the real estate bubble, it is crucial to value it and identify essential elements that affect land prices. In Ho Chi Minh City, 460 survey samples and 172 samples of successfully transferred land prices were used in the study. The majority of current research on land valuation solely employs the Hedonic model, or buyer's perceived valuation, which does not take into account equivalent land parcels with different prices but equal perceived values (same distance from the center). The research results particularly apply to how the government manages the property, how private investors make investment decisions, and how real estate enterprises operate. Additionally, it is essential to have a tool that can be used to value the chosen land plot by individuals who intend to purchase property or those who want to have further information. All steps must be carefully studied from sample selection, scale testing, EFA analysis, Regression analysis combined with the model testing system, and finally create that tool.

Keywords: land valuation, hedonic model, regression model, land valuation software

1. Introduction

The Constitution of Vietnam (2013) stated, "Land is an extremely valuable resource, a special means of production, an internal resource, a great capital of the country, and an important leading component of the environment." Land cannot naturally arise under normal circumstances, and the growing annual population leads to a shift in the relationship between supply, demand, and price, thus an increase in the cost of land will be indispensable. Ho Chi Minh City (HCMC), which is governed centrally, is the most significant economic player in Vietnam, contributing 22% of the country's GDP and 27% of the whole national budget income. In 2022, the General Statistics Office reported that Ho Chi Minh City had the highest average population density in the nation at 4,375 persons per square kilometer, spread among 16 districts, 1 city, and 5 districts, with a total area of 2,095 km². The high demand for immigrants from other areas to this location can be attributed to the concentration of colleges, hospitals, and commercial centers in HCMC. Housing demand and population expansion in HCMC are caused by structural changes in other locations, which raise land prices in the region. The precise valuation of land cost in HCMC's districts, cities, and towns must be ascertained. Land prices are frequently driven up by speculators in Vietnam's big cities, including HCMC, according to Khanh (2021). On the other hand, Vietnam possesses thorough information system and database on land prices, however, those are not close to the market price. There are now still two different sorts of land price in Vietnam: the state land price and the market land price. This system has not managed to reach the level of dependability needed to meet both the demands of state administration and land buyers yet. Due to the aforementioned factors, the need for a market land valuation tool is imperative in this modern society.

Specifically in Vietnam, there are recently five techniques for valuating land, and they are all included in Article 4 of Decree 44/2014/ND-CP, which the government released on 15/5/2014. These methods are the direct comparison method, subtraction method, income method, surplus method, and land price adjustment coefficient method. Multivariable linear regression analysis (MRA), a well-known statistical technique with several applications, including regulating land price forecasts using regression models, is widely used for valuating land in the modern world (Benjamin et al., 2004). To determine the value, the land price regression model employs variables that affect land prices as independent variables.
The Hedonic Pricing Method (HPM) is a widely used approach to determine the market price of a certain product, making it crucial to identify the independent variables impacting the land price in the regression model.

In the world, many countries use the Hedonic method to determine the factors affecting land prices such as Portugal (Couto et al., 2021), France (Gouriéroux et al., 2009), England (Cebula., 2009), China (Nakagoshi et al., 2007), Colombia (Lozano et al., 2011), Sweden (Englund et al., 1998), USA (Morales et al., 2019), (Park et al., 2015), (Ottenmann et al., 2008), (Zhou et al., 2008), Austria (Helbich et al., 2013), Malaysia (Noor et al., 2015), Nigeria (Oud, 2017), and Indonesia (Alfiyatin et al., 2017).

However, the use of the Hedonic method to identify factors affecting land prices in each region will be different, typically: The primary determinants of land prices that are frequently considered in studies are (1) the parcel's location, (2) its proximity to other significant plots, (3) its characteristics, and (4) its environment and security circumstances (Reniger et al., 2013). Real estate's value relies on its location (Alonso, 1964). A mathematical model known as the Hedonic model is used to assess a product's equilibrium market value and calculate its worth (Rosen, 1974). The consequences of population density, educational resources, and air pollution levels are shown by land prices calculated using conventional spatial regression methods (Mostafa, 2018). The hedonic model predicts that three factors would have an impact on real estate values: (1) Structural characteristics, (2) Residential characteristics, and (3) Location characteristics (Mohd Sanusi et al., 2019). What about in HCMC of Vietnam?

2. Theoretical Basis and Research Methods

2.1 Theoretical Basis

Hedonic method: It is an approach to determining property value by preference. A preference pricing model relies on the idea that property buyers value the characteristics of the property more than the property in general. This means that property prices reflect the prices of characteristics of the property, including location variables. In real estate studies, the hedonic regression function can be indicated as in the expression: \( p = f(x_1, x_2, ..., x_n) \). Where \( p \) is the price of the property and \( x_1, x_2, ..., x_n \) are the characteristics of the property. \( f \) can be linear or nonlinear (Zubeida et al., 2019).

According to Tabachnick et al. (2019), to evaluate the factors affecting land prices, the sample size is satisfactory: greater than or equal to \( 8 \times n + 50 \). The quality inspection of the scale must satisfy two requirements: Cronbach's Alpha coefficient of overall \( > 0.6 \) and corrected item-total correlation \( > 0.3 \). The exploratory factor analysis (EFA) test system according to Hair J. et al.: Testing the suitability of EFA, \( 0.5 \leq KMO \leq 1 \). Testing the linear correlation of the observed variables in each scale When the Significance (Sig.) of the Bartlett test \( \leq 0.05 \). Factor loading coefficient according to Gerbing and Anderson, the observed variables in each scale must have an appropriate factor loading factor. The measure of factor loading coefficient (Factor loading, FL) depends on the sample size of the study, if the sample size is larger than 350, then FL\( > 0.3 \), if the sample size is 100 \( \leq n \leq 350 \), then FL\( > 0.55 \), if the sample size less than 100, then FL \( > 0.75 \).

Regression model testing system: Test the partial correlation of the regression coefficients to see if the independent variables are significantly correlated with the dependent variable or not (consider each independent variable separately) through the T-test (Green, 2003) Level of significance (Significance, Sig.) of regression coefficient \( \leq 0.10 \). The test of the explanatory level of the model is to use the adjusted R2 measure (Adjusted R square), then with the adjusted R2, it shows that the % change of the dependent variable is explained by the independent variables of the model. The closer this number is to 100%, the higher the explanatory degree of the model becomes. Test The relevance of the model is the degree of relevance of the model. In general, the independent variables are linearly correlated with the dependent variable with the F-Test and the significance level (Sig.) \( \leq 0.05 \) or a confidence level of 95%. Analysis of Variance (ANOVA). The test for collinearity is to test the phenomenon that the independent variables are linearly correlated with each other, and the VIF (Variance Inflation Factor) measure requires less than 10.
State land price: In Vietnam, the state land price is the land price promulgated by the state as a basis in the following cases: Calculating land parcel use fees when the State recognizes residential land use rights; Calculating land use tax; Calculation of fees and charges in land management and use; Calculating fines for administrative violations in the field of land; Calculating compensation to the State when causing damage in the management and use of land; the value of land use rights to be paid to those who voluntarily return the land. The land price list in HCMC during the period from 2020 to 2024, which has just been approved by the People's Committee of HCMC (Decision No. 02/2020/QD-UBND) on January 16th, 2020, and became effective from on January 26th, 2020, Unit: million VND/m².

Limitations of using land parcel: In the law of Vietnam, when building any project, it is very necessary to be based on: The set of standards on design of high-rise buildings and the set of standards on construction techniques and construction planning of the Ministry of Construction on housing construction and design. Regulations on calculating construction density of separate housing projects in HCMC area, this construction density depends on the area (according to the scale: less than 50 m², 50 to 75 m², 75+ to 100 m², 100+ to 200 m², 200+ to 300 m², 300+ to 500 m², 500+ to 1000+ m²), of the area (02 types of area: Inner city district including 16 districts, namely District 1, 2, 3, 4, 5, 6, 7, 8, 10, 11, Phu Nhuan, Binh Thanh, Tan Binh, Tan Phu, Go Vap, and suburban districts including 8 districts, namely District 9, 12, Thu Duc, Binh Tan and the districts of Hoc Mon, Binh Chanh, Nha Be, Cu Chi), Unit: %, this index is the maximum allowable construction rate on the land area.

Water standards: In Vietnam, domestic water standards must follow the national technical regulation as promulgated in QCVN 01-1: 2018/BYT of the Ministry of Health. Water standards only have 2 types, 01: Pass or 0: Failed. Dr. Dung - Director of the Center for Preventive Medicine in Ho Chi Minh City warned about the risk of microbial re-infection in drinking and living water in Districts 2, 6, 7, District 8, District 10, District 11, Tan Binh District, Tan Phu District, Binh Tan District, Hoc Mon District, Binh Chanh District.

Air standard: Air Quality Index (AQI) standard AQI (Air Quality Index) measures air pollutants PM2.5 and is measured in micrograms per cubic meter (μg/m³): from 0 to 5 as followed, 0: Good (0-12 μg/m³), 1: Moderate (15.1-35.4 μg/m³), 2: Unhealthy for sensitive groups (35.5- 55.4 μg/m³), 3: Unhealthy (55.5-150.4 μg/m³), 4: Very unhealthy (150.5-250.4 μg/m³), 5: Dangerous (250.5+ μg/m³).

Distance to market/hospital: This is the shortest distance by cars from the location of the land plot to the market/hospital calculated in kilometers (km)/meters (m), this indicator can be determined by google map or other methods, unit: km/m.

3. Research Methods

3.1 Research Order

The group of authors use a combination of research methods: qualitative research and quantitative research and use SPSS 20.0 for analysis conducting in the following order:

Step 1: Identify factors and observe their impact on land prices: Using reference documents domestically and internationally.

Step 2: Determine the sample size to survey (Tabachnick et al., 2019) and conduct the survey.

Step 3: Test the scale (Cronbach's Alpha, Corrected Item - Total Correlation). Discard if the observation is not appropriate.

Step 4: Run the exploratory factor analysis model (EFA) with the Rotated Factor Matrix to ensure that the model reaches 0.5 ≤ KMO ≤ 1. Eliminate inappropriate observations and find out the factors assessed by land parcel buyers in HCMC as having an impact on land prices.
Step 5: All founding factors take the regression model, then determine the sample size to collect data and conduct sampling.

Step 6: Use linear regression model with the test system: T Test (Green, 2003), Significance level (Significance, Sig.), Model explainability test (Adjusted R square), Model fit test F test (Green, 2003), Analysis of variance (Analysis of variance, ANOVA), Test of the phenomenon of collinearity VIF (Variance Inflation Factor).

Step 7: After getting the results, start writing software with Python programming language on the basis of Visual Studio Code.

Step 8: Check the results and apply the software for use in the Ho Chi Minh City area, expand the test with neighboring provinces.

3.2 Model, Sample Identification and Survey

The authors, after referring to previous documents, have built a model consisting of 05 factors and 23 observations affecting land prices, as specifically shown in Table 1.

<table>
<thead>
<tr>
<th>No</th>
<th>Factor</th>
<th>Observe</th>
<th>Reference source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The land parcel of location</td>
<td>Distance to center, Distance to market, Distance to school, Distance to hospital, Distance to Commune People's Committee, Distance to police station, Distance to post office</td>
<td>Renigier-Bilozoz et al. (2013), Helbich et al. (2013), Bujanda et al. (2017), Lozano et al. (2011), Babawale. (2011), Ottensmann et al. (2008)</td>
</tr>
<tr>
<td>3</td>
<td>Population characteristics of land parcel</td>
<td>Population density, Education level of the population, Income and consumption of the population</td>
<td>Abidoye et al. (2016), Noor et al. (2015), Nguyen Quoc Nhi. (2012), Tran Thu Van et al. (2011)</td>
</tr>
<tr>
<td>4</td>
<td>Security and environmental conditions of land parcel</td>
<td>Communication systems, Air quality, Water quality, Sound environment, Security system</td>
<td>Deng et al. (2018), Abidoye et al. (2017), Renigier et al. (2013)</td>
</tr>
</tbody>
</table>

According to Tabachnick, the sample size is satisfactory if: greater than or equal to 8 x observations + 50. Therefore, to evaluate the factors affecting the price of residential land in HCMC, at least 234 samples (8 x 23 + 50) were needed, I surveyed 460 samples. In which, 270 people bought land in Ho Chi Minh City (HCMC) accounting for 59%, 150 people plan to buy land parcel in HCMC, accounting
for 32%, the remaining 9% are those who bought land in neighboring provinces of HCMC. All observations use a 5-level Likert scale (Likert RA, 1932) to find out the factors affecting land prices.

After determining the factors affecting land prices in HCMC, to build a forecasting model to determine urban land prices in HCMC, at least 106 samples (8 x 7 +50) are needed, I have surveyed 172 samples. With specific scales for each relevant factor. For example: land price valuation with unit: million VND/m², Distance from the land parcel to the nearest market or hospital in km, Land use density is a certain percentage for land area, Air quality measures from 0 to 5, specifically, 0: Good, 1: Moderate, 2: Unhealthy for sensitive groups, 3: Unhealthy, 4: Very unhealthy, 5: Dangerous. Water standards have only 2 types, 01: Pass, 0: Failed. Land price is regulated by the State: million VND/m².

General model:

\[ Y = b_0 + b_1X_1 + b_2X_2 + \ldots + b_iX_i \]

\( Y \) : Valued land price (dependent variable)

\( X_i \) : Factors affecting land price (independent variable)

Python is a programming language widely used in web applications, software development, data science, and machine learning (ML). Developers use Python because it is efficient, easy to learn, and can run on a variety of platforms. Python software is free to download, integrates well with all types of systems and increases their development. Guido Van Rossum, a computer programmer in the Netherlands, created Python. He began developing the language in 1989 at Centrum Wiskunde and Informatica (CWI), initially as a pastime project to help him pass the time during Christmas. The name of this language was inspired by the BBC TV show called Monty Python's Flying Circus because Guido Van Rossum is a "die-hard fan" of this show.

4. Result

4.1 Examining the Scale

According to the results of the analysis and testing of the scale of 5 factors with 23 observations, the overall Cronbach's Alpha value of the scale is guaranteed according to the set standards (Cronbach's Alpha > 0.6). Apart from the Cronbach Alpha criterion, we also consider the correlation coefficient of the total variable (Correct Item - Total Correlation). According to the standard, any coefficient < 0.3 is rejected based on Table 2. Specific test results are as follows:

| Table 2. Results of Scale Testing of 05 Factors and 23 Observations, Type of 02 Observations |
|-----------------------------------------------|-----------------|-----------------|-----------------|-----------------|
| Factor                                        | Alpha Coefficient | Observation is Disqualified | Reason                                          | Alpha Coefficient After Adjustment |
| Location of the parcel of land                 | 0.776            | Distance to post office     | Corrected Item - Total Correlation 0.107        | 0.814                        |
| Features of the parcel of land                 | 0.869            |                              |                                               | 0.850                        |
| Population characteristics                    | 0.819            |                              |                                               | 0.819                        |
| Security and environmental conditions          | 0.793            |                              |                                               | 0.793                        |
| Legality of the land plot                      | 0.693            | Status of land agreement     | Corrected Item - Total Correlation 0.049        | 0.850                        |
4.2 Exploratory Factor Analysis (EFA)

After removing 02 observations that do not meet the requirements for testing the scale, put the remaining 21 observations in and continue to run the exploratory factor (EFA) to determine the factors affecting the land pricing. After the first run, the KMO result reached 0.792. Then conduct the following tests: Test the relevancy of Hair J. et al. (2006) with the requirement of \(0.5 \leq \text{KMO} \leq 1\), Test the linear correlation of the observed variables in each scale with Significance (Sig.) of Bartlett's test \(\leq 0.05\), considering the rotation matrix (Rotated Factor Matrix) with the loading factor (Factor loading, FL) having a value greater than 0.3 because the sample size is 460 samples while according to Gerbing and Anderson (1988) only need to be greater than 350, the FL only needs to be > 0.3. Removing unsatisfactory observations, after 11 times of doing that, the final results are: There are 03 groups of factors with and 07 observations that have an impact on land prices, with the achieved KMO is 0.585. Specifically, according to Table 3 as follows:

**Table 3. Final Rotation Matrix After Removing Failed Observations**

<table>
<thead>
<tr>
<th>Code</th>
<th>Rotated Factor Matrixa</th>
<th>Factor</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>AN_MT3</td>
<td>Water quality</td>
<td>0.947</td>
<td>Characteristic</td>
</tr>
<tr>
<td>AN_MT2</td>
<td>Air quality</td>
<td>0.702</td>
<td></td>
</tr>
<tr>
<td>DD1</td>
<td>Land area</td>
<td>0.359</td>
<td></td>
</tr>
<tr>
<td>VT5</td>
<td>Distance to market</td>
<td>0.810</td>
<td>Location</td>
</tr>
<tr>
<td>VT6</td>
<td>Distance to hospital</td>
<td>0.796</td>
<td></td>
</tr>
<tr>
<td>PL2</td>
<td>Government Land Price</td>
<td>0.931</td>
<td>Juridical</td>
</tr>
<tr>
<td>PL3</td>
<td>Limitations of land parcel</td>
<td>0.596</td>
<td></td>
</tr>
<tr>
<td>More</td>
<td>Extraction Method: Principal Axis Factoring.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information</td>
<td>Rotation Method: Varimax with Kaiser Normalization.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a Rotation converged in 5 iterations.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Figure 1. Results of KMO and Bartlett's Test**

<table>
<thead>
<tr>
<th>KMO and Bartlett’s Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kaiser-Meyer-Olkin Measure of Sampling Adequacy</td>
</tr>
<tr>
<td>Bartlett's Test of Sphericity</td>
</tr>
<tr>
<td>Approx Chi-Square: df: Sig.</td>
</tr>
</tbody>
</table>

4.3 Evaluate the Influence of the Factors by Regression Model

Statistically significant variables for inclusion in the regression model involve 7 factors (Independents) that have an impact on land prices (Dependent) in HCMC according to Table 4.

**Table 4. Factors Expected to Affect the Price of Land to be Valued**

<table>
<thead>
<tr>
<th>No</th>
<th>Location</th>
<th>Variable code</th>
<th>Content</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dependent variable</td>
<td>P_CT</td>
<td>Price of land</td>
<td>Million/m(^2)</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>LA</td>
<td>Land area</td>
<td>m(^2)</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>DTM</td>
<td>Distance to market</td>
<td>Kilometer</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>DTH</td>
<td>Distance to hospital</td>
<td>Kilometer</td>
</tr>
</tbody>
</table>
The results are as follows:

![Table]

**Model Summary**

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
<th>Change Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>.901</td>
<td>.812</td>
<td>.804</td>
<td>46.6409</td>
<td></td>
</tr>
</tbody>
</table>

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| a. Predictors: (Constant), Government Land Price (million/m²), Limitations of land use planning (%), Air quality, Distance to hospital (km), Distance to market (km)  

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
</table>
| b. Dependent Variable: Price of land (million/m²)  

**Figure 2. Summary Results of the Regression Model**

Test of model’s degree of explanation: Figure 2 shows that the adjusted R² (Adjusted R square) of the model is 0.804 with the F test, sig. <0.05. This indicates that there are 80.4% change in land price explained by 7 independent variables of the model.

![Table]

**Coefficients**

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig</th>
<th>95% Confidence Interval for B</th>
<th>Correlations</th>
<th>Collinearity Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
<td></td>
<td>115.545</td>
<td>45.925</td>
<td>2.532</td>
<td>.011</td>
<td>43.145</td>
</tr>
<tr>
<td>Land area (m²)</td>
<td>.01</td>
<td>.017</td>
<td>.065</td>
<td>1.769</td>
<td>.075</td>
<td>-.033</td>
<td>.065</td>
</tr>
<tr>
<td>Distance to nearest hospital (km)</td>
<td>-11.963</td>
<td>8.013</td>
<td>1.114</td>
<td>-1.394</td>
<td>.155</td>
<td>-28.971</td>
<td>4.946</td>
</tr>
<tr>
<td>Limitations of land use planning (%)</td>
<td>10.872</td>
<td>12.126</td>
<td>0.871</td>
<td>1.281</td>
<td>.201</td>
<td>107.025</td>
<td>155.202</td>
</tr>
<tr>
<td>Air quality</td>
<td>-49.446</td>
<td>10.349</td>
<td>4.709</td>
<td>-4.394</td>
<td>.000</td>
<td>-55.983</td>
<td>25.996</td>
</tr>
<tr>
<td>Water quality</td>
<td>35.022</td>
<td>12.625</td>
<td>2.808</td>
<td>2.808</td>
<td>.048</td>
<td>49.995</td>
<td>66.300</td>
</tr>
<tr>
<td>Government Land Price (million/m²)</td>
<td>6.034</td>
<td>5.333</td>
<td>.005</td>
<td>1.132</td>
<td>.000</td>
<td>4.902</td>
<td>7.187</td>
</tr>
</tbody>
</table>

**Figure 3. Impact Results of Each Factor in the Model**

Partial correlation test of the regression coefficients: Figure 3 shows that through the t test (Green, 2003). Significance level (Significance, Sig.) of the regression coefficient ≤ 0.10, then all 06 The independent variable has a significant correlation with the dependent variable with a confidence level of 90% and above, 01 independent variable has a significant correlation with the dependent variable with a confidence level of 80% and above (the opinion of the author himself is to keep this variable). Specifically, according to Table 5 as follows: LA (Land Area) is significant for land price and 92.5% confidence level. DTM (Distance from site to nearest market) is significant for land price and 99% confidence level. DTH (Distance from site to nearest hospital) is significant for land price and 83.5% confidence level. LLP (Land Use Density) is significant for land price and 93.7% confidence level. AQ (Air Quality) is significant for land price and 99% confidence level. WQ (Water Quality) is significant for land price and 95.1% confidence level. P_GOV (State land price) is significant with land price and 99% confidence level.

Test of collinearity: As can be seen in Figure 3, when testing the phenomenon of independent variables linearly correlated with each other, the measure VIF (Variance Inflation Factor) requires less than 10, then all factors are guaranteed (the lowest is WQ: 1.284 and the highest is DTM: 6.826).
Figure 4. ANOVA Table of the Model

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Regression</td>
<td>2966314.103</td>
<td>7</td>
<td>422187.738</td>
<td>1009.05</td>
<td>.000b</td>
</tr>
<tr>
<td>Residual</td>
<td>886181.152</td>
<td>164</td>
<td>4184.031</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>3044195.315</td>
<td>171</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Dependent Variable: Price of land (million/m²)
b. Predictors: (Constant), Government Land Price (million/m²), Limitations of land use planning (%), Water quality, Land area (m²), Air quality, Distance to hospital (km), Distance to market (km)

Test the relevance of the model: According to Figure 6, analysis of variance (ANOVA) requires significance level (Sig. ≤ 0.05) or 95% confidence level, while the model’s confidence level is 99% (Sig. 0.01), thus the authors conclude that the theoretical model is consistent with the actual data and that the independent variables (07 factors) are linearly correlated with the dependent variable (land price).

4.4 Results of Linear Regression Model

Based on Figure 3, we can see that the regression coefficients are not standardized (UnStandardized Coefficients), then we have the regression equation as follows:

\[ P_{CT} = 155.55 + 0.03 \times LA - 24.44 \times DTM - 11.86 \times DTH + 80.87 \times LLP - 45.45 \times AQ + 25.02 \times WQ + 6.03 \times P_{GOV} \]

\( B_{X1} = 0.03 \). It suggests that: LA (Land area) has a positive relationship \( P_{CT} \) (land price in HCMC, referred to as land price). If the land area increases by 1 m², the land price will increase to 0.03 million VND.

\( B_{X2} = -24.44 \). It suggests that: DTM (Distance from the land plot to the nearest market) has a negative relationship with \( P_{CT} \) (land price in HCMC, referred to as land price). If the distance from the land to the nearest market increases by 100 m, the land price will decrease by VND 2,444 million.

\( B_{X3} = -11.86 \). It suggests that: DTH (Distance from the land plot to the nearest hospital) has a negative relationship with \( P_{CT} \) (land price in HCMC, referred to as land price for short). If the distance from the land to the nearest hospital increases by 100 m, the land price will decrease by 1,186 million VND.

\( B_{X4} = 80.87 \). It suggests that: LLP (Land Use Density %) has a positive relationship with \( P_{CT} \) (land price in HCMC, referred to as land price). If the density of land use increases by 1%, the land price will increase to 0.8087 million VND.

\( B_{X5} = -45.45 \). It suggests that: AQ (Air Quality) is negatively related to \( P_{CT} \) (land price in HCMC, referred to as land price). If the air quality increases by 1 level (bad), the land price will decrease by 45.45 million VND.

\( B_{X6} = 25.02 \). It suggests that: WQ (Water Quality) has a positive relationship \( P_{CT} \) (land price in HCMC, referred to as land price). If water quality increases by 1 level (good, 0: Failed, 1: Pass), the land price will increase to VND 25.02 million.

\( B_{X7} = 6.03 \). It suggests that: \( P_{GOV} \) (State land price) has a positive relationship with \( P_{CT} \) (land price in HCMC, referred to as land price). If the state land price increases by VND 1 million, the land price will increase to VND 6.03 million.
When we use the Standardized Coefficients, we see Beta X1 = 0.069; Beta X2 = -0.349; Beta X3 = -0.116; Beta X4 = 0.076. Beta X5 = -0.209. Beta X6 = 0.076. Beta X7 = 0.605. Standardized Coefficients show the importance of significant variables with the dependent variable Land price.

Table 5. Level of Influence of Factors on Land Price to be Valued

<table>
<thead>
<tr>
<th>No</th>
<th>Variable</th>
<th>Absolute Value Beta</th>
<th>%</th>
<th>Order of influence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(X1) Land area</td>
<td>0.069</td>
<td>4.60%</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>(X2) Distance to market</td>
<td>0.349</td>
<td>23.27%</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>(X3) Distance to hospital</td>
<td>0.116</td>
<td>7.73%</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>(X4) Land use density</td>
<td>0.076</td>
<td>5.07%</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>(X5) Air quality</td>
<td>0.209</td>
<td>13.93%</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>(X6) Water Quality</td>
<td>0.076</td>
<td>5.07%</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>(X7) State land price</td>
<td>0.605</td>
<td>40.33%</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
<td>1.5</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

Table 5 shows that it is surprising that land area has the lowest impact on residential land prices in HCMC, accounting for only 4.6%. Meanwhile, State land prices have a great impact on residential land prices in HCMC. From the group's point of view, this can be explained by the fact that land buyers acknowledge the costs as well as benefits after purchasing the land. In Vietnam, the state land price still exists as a basis for calculating costs as well as compensation according to the concept in 2.1.

4.5 Evaluation of the Land Valuation Program

Based on the results obtained from the linear regression analysis, the authors build a land valuation program with Python programming language based on Visual Studio Code as shown in Figure 5, the user enters information about: Land area, distance to market, distance to hospital, air quality, water quality, land price regulated by the state, only the density of land use is regulated by the state up to the maximum with a reference frame. Therefore, the user can only choose 50%/65%/70%/75%/80%/85%/90%/100% according to the code in Figure 6.
After checking 10 samples of land prices that have been traded in Ho Chi Minh City, the results have a margin of difference compared to the price set by the valuation program at 28.34% x 2, the lowest deviation in the samples is 3.79% with the transaction price at 44.02 million VND/m² in Binh Chanh district, Ho Chi Minh City, Vietnam, the valuation by the program is at 42.35 million VND/m². The margin of deviation of the land price offered by the program is larger than that of the land price because such a survey can result from many factors. In addition, the authors estimate that the prices of some land plots offered for sale on websites are mostly lower than the offering price. For example, Figure 7: A land area of 108 m² which is equivalent to about 50.93 million VND/m². After using the valuation program, the land is valued at about 5.2 billion VND, equivalent to 48.19 million VND/m², which is 5.69% lower than the offering price.

5. Conclusion

As previously mentioned, there is a significant deviation between the program's land price and the surveyed land price, which might be caused by several reasons. The authors speculate that the objective cause can be the lack of precise and complete responses to the survey's mandatory questions from the participants, or the deviation when using google map to calculate the distance between the location of land and the hospital or market. The subjective cause of the author group may be that the author group
retains the factor that does not pass the T-test as DTH (Distance to Hospital), the T-test requires the significance level (Significance, Sig.) of the regression coefficient, ≤ 0.10 while the Sig. of DTH is at 0.165, the explanation for the aforementioned action is because the authors find that the proximity to the hospital is extremely important in the present society, especially those who have encountered life and death, their time is measured in minutes while it will take us a long time to travel to the hospital.

Vietnam’s 63 provinces and cities publish state land prices as a tool for land financial management, especially for the receivables and spendings between two parties—local housing managers and land users. According to the model, the state land price established by the People's Committee of Ho Chi Minh City is around six times less valuable than the real transfer price for land in the market, which is compared to the market's actual land price. Due to lower taxes, levies, and compensation relative to the actual land price, land users will gain benefits from the establishment of this state land pricing for Ho Chi Minh City and Vietnam in general.

The model determined that seven independent variables accounted for 80.04% of the variation in land prices, but further study is required to pinpoint the precise model in order to calculate the exact land prices. As a result, the remaining 19.96% of the model are additional elements that will affect land prices. In the next study, the group of authors will utilize sub regression modeling and Durbin-Watson statistics to examine the autocorrelation test.

Acknowledgement

This research is funded by Nguyen Tat Thanh University, Ho Chi Minh city, Vietnam.

References


Proceedings of the 6th International Conference on Digital Innovation – Blockchain and Fintech

chgate.net/publication/25447595_The_Hedonic_Pricing_Model_Applied_to_the_Housing_Market_of_the_City_of_Savannah_and_Its_Savannah_Historic_Landmark_District


SUPPLY CHAIN, TRANSPORTATION & LOGISTICS
Internet of Things (IoT) Impact on Oman's Road Freight Sector: The Importance of Perceived Utility

Shahid Imran*, Nor Bakhriah Binti Sarbanib & Charles Tsikada

*Malaysia University of Science and Technology, Malaysia
bMalaysia University of Science and Technology, Malaysia
‘Middle East College, Oman

*shahid.imran@phd.must.edu.my

Abstract: The growth of the global supply chain has brought numerous complications, particularly in freight transportation. Long lead times, high operational costs, and poor end-to-end visibility are examples of this. Modern technology must be included by freight businesses to streamline operations and maintain competitiveness. The freight transportation industry could change because of the Internet of Things (IoT). The way the road freight business operates has changed dramatically because of the IoT. By providing real-time tracking, predictive maintenance, improved security, and increased productivity, it has ushered in a new era for the road. Adopting the Internet of Things in Oman will guarantee long-term competitive advantage and future success in a dynamic road freight sector. The skills gap is one of the issues preventing IoT implementation. There hasn't been much research done on how the Internet of Things is being used and how it is affecting the Omani road freight industry. The overarching goal of this study was to document the potential impact of IoT on the road freight industry via the lens of perceived utility in Oman. A total of 203 structured questions were distributed online to workers in Oman's road freight sector. For the analysis of quantitative data in the study, structural equation modeling is used. Results show that the adoption of IoT in the road freight sector is a continuous trend. Further findings show that the relationship between IoT and operational effectiveness is considerably and favorably mediated by perceived usefulness. Improved operational effectiveness is the primary impact of IoT on the road freight sector. Managers are informed that smart sensor technologies can be used with the IoT to allow asset visibility and save operational costs. By outlining the Internet of Things (IoT) technologies used in Oman's road freight business, the paper adds to the body of knowledge on logistics management.

Keywords: road freight industry, internet of things; operational effectiveness, and perceived usefulness

1. Introduction and Research Contextualization

The Internet of Things (IoT) has had a significant impact on how the logistics industry operates. According to Zhou et al. (2015), the term "IoT" refers to a digital network of interconnected devices that communicate with one another via wireless technical systems. The Internet of Things (IoT) is defined similarly by Boyes et al. (2018) as a network of physical objects that are combined with sensors, software, and other technologies to connect and exchange data with other devices and systems over the internet. 5.18 billion people, or 64.6% of the world's population, are reportedly using the Internet as of April 2023 (Internet World Stats, 2023). Internet use in the road freight sector has become inevitable. As a result of the IoT's growth, there is a strong demand for supply chain transparency and integrity management (Barreto et al., 2017). According to Al-Fuqaha et al. (2015), the Internet has fundamentally changed how businesses organize and carry out their activities via networked common objects. IoT enables seamless communication between smart things while also orchestrating and integrating workflows (Lesch et al., 2023).

IoT facilitates communication between vehicles, people, and infrastructure in the road freight sector, enhancing visibility and decision-making (Dong et al., 2021). The introduction of autonomous freight
tracking and tracing as well as temperature monitoring and maintenance of items in transit brought about a revolution in the road freight business thanks to IoT. Since it makes up the majority of the first and last miles of freight transit, road freight transportation is significant in logistics.

According to Macioszek (2018), a sizeable share of the cost of freight transit is incurred by road freight transportation. According to Tayyeb et al. (2019), freight transportation in Oman is essential to the development and expansion of the country’s economy. To become the preferred logistics hub in the area, Oman seeks to grow and modernize. In Oman, demand for road freight transportation services has grown over time. The road freight sector experiences changes because of technical advancements. However, the road freight sector has several difficulties, including inefficient cold chain transportation, high transportation costs, and personnel management. Numerous other issues, including traffic jams, collisions, and environmental carbon dioxide gas emissions, are also attributed to the transportation of freight by road. To reduce operational expenses and waste, it is crucial to manage road freight operations carefully. To address these issues and boost the road freight sector's competitiveness, research is needed. The road freight transportation sector has a chance to manage operations and enhance decision-making thanks to IoT.

The Federal Transit Administration (2017), the impact of emerging technologies on freight transportation (Dong et al., 2021), IoT as one of the technologies when achieving smart mobility cities (Zahraei, Kurniawan & Cheah 2019), IoT enabled green logistics (Chhabra et al., 2021), and adoption of digitalization in certain industries are some of the studies that discuss the advantages and challenges associated with IoT implementation and developing an intelligence platform for shared freight services utilizing ToT (Heinbach et al., 2022). Unfortunately, there has only been a little amount of research done so far on how the Internet of Things (IoT) is affecting the road freight sector (Lee & Lee, 2015; Mishra et al., 2021). By examining the potential consequences of deploying IoT on the road freight business through the mediation of perceived usefulness in Oman, this study aimed to close the gap. The following research issues were so addressed:

a. What different IoT technologies are used by Oman's road freight industry?
b. What effect will IoT technology implementation have on Oman's road freight industry?

2. Literature Review

2.1 Road Freight Industry

Road freight transportation is a versatile means of transportation that offers door-to-door services, according to Farquharson et al. (2021). Road maintenance is less expensive than that of other forms of transportation, such as sea and air. According to Xu et al. (2019), there are several issues facing freight transport firms, including those related to safety, efficiency, quality, dependability, flexibility, and punctuality. This increases the need for cost-effective fleet management with low empty mileage. IoT technologies can be used to address and mitigate the difficulties mentioned above. According to Ebrahim (2019), IoT technology adoption has altered the transportation sector, which ultimately promotes economic growth and development. According to Manavalan and Jayakrishna (2019), the use of ToT technology lowers the risk of shipment delays by alerting users to potential travel-related disruptions such poor road conditions. Systems in the road freight sector should exchange information with one another and with other applications, according to Choosakun et al. (2021). Road freight delays could result in significant operational costs for the business.

2.2 Internet of Things (IoT) for Road Freight Industry

IoT has recently seen rapid expansion with a wide range of applications across many industries. The road freight industry is one that has shown a lot of interest in IoT applications. According to Hwang, Lee, Park, and Chang (2017), the internet and information systems are employed in the internet of things to connect physical and digital devices. According to Haddud et al. (2017), physical objects may
perceive, analyze data, and perform particular tasks by cooperating on decisions and sharing knowledge. Along with other intelligent objects, they can also communicate and connect with people (Ding et al., 2021). Al Fuqaha et al. (2015) claim that the addition of information technology systems, processing networks, sensors, and internet protocols transforms these inanimate items into intelligent ones. Visibility of all supply chain operations is made possible by the effective collection, analysis, and transformation of data from smart objects into useable information (Ben-Daya et al., 2019). This provides early notice of situations that can be fixed straight away. IoT can hasten the process of gathering data and making decisions, according to Ellis et al. (2015). As a result, management is more agile and responsive and can react to developments fast.

As IoT technology components, the FTA (2017) included sensors, gateways, networks, standards, and data analysis tools. According to Xu et al. (2014), one of the fundamental IoT technologies is radio frequency identification (RFID). RFID allows readers to track and keep an eye on items that have RFID tags by using microchips to wirelessly transfer data. Position and condition data are provided by sensors and GPS tracking devices (Gao et al., 2020). The ability to track cargo in real-time makes it easier for businesses to manage their supply chains by improving visibility and reducing the likelihood of lost goods. Real-time performance monitoring of vehicles and equipment, according to Al-Mashari et al. (2018), enables organizations to spot potential issues before they become serious problems. By doing so, safety may be improved while potentially reducing maintenance costs and downtime. Ben-Daya et al. (2019) and Lee et al. (2015) identified five IoT technologies: (1) which permits monitoring and tracing capabilities; (2) wireless sensor network (WSN) used to track and monitor various devices, such as temperature and position; and (3) which enables the usage of IoT devices to do various tasks; (4) Cloud computing; (5) IoT applications that enable device to device and human to device communication; and (3) middleware that permits interaction with devices like RFID tags. RFID tags, smart room controls, smart load sensors, activity trackers, fuel management sensors, navigation systems, and smart route sensors are just a few of the IoT-based applications that Farquharson et al. (2021) mentioned. The road freight sector may undergo a transformation thanks to IoT’s real-time tracking, predictive maintenance, and other benefits. However, companies must be equipped to deal with issues related to data security and infrastructure integration (Kshetri, 2018). As technology continues to improve, it will be essential for logistics companies to stay on top of the most recent trends and developments (Wang et al., 2020).

As was mentioned before, the road freight sector makes use of a few IoT technologies. This study was unable to examine how widely these technologies have been used. IoT devices such RFID tags, smart room controls, smart load sensors, activity trackers, fuel management sensors, navigational systems, and smart route sensors were specifically picked for the study. These IoT innovations were used in Oman.

2.3 Operational Effectiveness

The main objective of any organization is better performance, which depends on operational effectiveness. Operational effectiveness is the ability to outperform competitors at similar tasks. Efficiency is one possibility, but it is not the only one (Porter, 1996). According to Pekuri et al. (2011), operational performance focuses on procedures that enable businesses to utilise input more effectively. Because they utilise technologies, certain businesses can make better use of their input (McFarlane, 1984). The rising use of IoT and access to data has produced several benefits (Monje, 2016). These include the possibility of using robotics to automate freight delivery, which can increase efficiency and allow transportation managers to better track cargo in real time. Implementing a fully autonomous vehicle has the potential to drastically minimize accidents, vehicle losses, and infrastructure damage. IoT can be utilized to ease traffic congestion in South Africa, according to Ebrahim (2019). According to Haddud et al. (2017), one of the benefits of IoT for logistics firms in the road freight industry is increased openness and visibility of information and material flow across the supply chain. IoT technology, according to Shao et al. (2019), offers accurate real-time information, enables tracking and tracing capabilities for items in transit, gives vehicle journey history, and permits the execution of routing plans. According to Bogataj et al. (2017), IoT-based apps can be used to measure ambient parameters including temperature, humidity, and gas concentration. This finally helps to lower supply
chain post-harvest loss. IoT has many features, including location sensing and sharing, as mentioned by Chen et al. (2014).

Included in this is data on the location obtained through GPS, cell-ID, and RFID. IoT applications also include mobile asset tracking, which keeps track of and monitors goods via communication and location-sensing technology. Fleet management is one application of IoT technologies (Chen et al., 2014). In addition to getting real-time information on the position of the vehicle and traffic information systems, this can schedule drivers and cars. Through the tracking of the vehicle's location, traffic conditions are made known. Insight into sales data, operational and supply chain efficacy, enhanced customer service, higher driver safety and job satisfaction, and long-haul efficiencies are all measured in this study.

2.4 Perceived Usefulness

According to Hua et al. (2017), perceived usefulness (PU) assesses how much a user believes using a particular technology would enable them to perform their duties and jobs more effectively. If a user sees value in a system, they are more likely to be satisfied with it than if they do not (Al-Jabri, 2015). According to Chen et al. (2015), a system that completes tasks benefits users and enhances their performance and pleasure. According to Tan and Teo (2000), an innovation's PU has a significant role in deciding how effectively it is accepted. A system is more likely to be embraced if people believe it to be useful. Perceived benefits include things like lower transaction costs, more cash flow, increased productivity, and better customer service (Beatty et al., 2001; Al-Qirim, 2004; Awa et al., 2016). Managers in the road freight sector will only adopt IoT in this scenario if they think it will be more advantageous than using the existing methods. They must think that using IoT would either create new company possibilities or solve existing problems.

3. Hypothesis Development

3.1 Relationship between Internet of Things and Perceived Usefulness

The extent to which a person thinks employing a certain technology would improve his or her ability to accomplish a job is known as perceived usefulness. IoT benefits may be seen differently by users over time. People use information technologies for both intrinsic and extrinsic reasons, claim Davis et al. (1992). Extrinsic motivation places an emphasis on engaging in an action to obtain objectives or benefits (Vellerand, 1997). According to Doll and Ajzen (1992), intrinsic motivation refers to the enjoyment and satisfaction experienced when engaging in a behavior. The behavioral intention to adopt IoT is significantly determined by perceived utility. IoT technology and perceived utility have a favorable and significant relationship, according to Gao and Bai (2014). The functions of perceived benefits in influencing the propensity to utilize IoT services or goods are confirmed by Kim and Park (2022). According to Singh, Gaur, and colleagues' (2017) research, perceived utility, and behavioral intent to use IoT are positively correlated. According to Liew's et al. (2017) research, the perception of utility is the aspect that has the most impact on people's willingness to accept IoT technologies. Given the already mentioned justifications, the following theory is suggested:

H1: There is a considerable positive correlation between IoT and perceived utility.

3.2 Relationship between Perceived Utility and Operational Effectiveness

Amoako-Gyampah and Salam (2004) claim that users can accept a system if they are certain that it will enable them to achieve the desired performance goals. Chirchir et al. (2019) contend that user-friendly systems perform at their peak levels. It is impossible to exaggerate the significance of perceived utility in deciding how a system is utilized and how it impacts user performance. According to Santhanamery and Ramayah (2018), perceived usefulness is the key indicator of future usage intentions. According to Goodhue and Thompson (1995), the system needs to be viewed as useful for users to benefit from it. Given the already mentioned justifications, the following theory is suggested:
H2: Perceived usefulness and operational effectiveness have a favorable relationship.

3.3 Internet of Things and Operational Effectiveness: A Relationship

The IoT and operational performance have a favorable and statistically significant link, according to Al-Khatib (2023). According to Farquharson et al. (2021), integrating IoT will mostly result in improved customer service and cost savings. Additional advantages include enhanced process simplification, interruption minimization, and improved driver safety. According to Monje (2016), integrating transportation infrastructure has significant benefits, such as cutting commute times, eliminating traffic deaths, and lessening the harmful effects of climate change. The use of IoT to increase the surface transportation system's efficiency and safety. Some of the effects of IoT for logistics organizations, particularly the road freight industries, include increased transparency and visibility of information and material flow across the supply chain (Haddud et al., 2017). IoT technology can offer opportunities for the road freight transport industry by providing accurate real-time information, enabling tracking and tracing capabilities for goods in transit, providing travel history of vehicles, and enabling the execution of routing plans, according to Shao et al. (2019). Given the already mentioned justifications, the following theory is suggested.

H3: Internet of Things have an Effect on Operational Effectiveness

3.4 Mediating Effect of Perceived Usefulness on Operational Effectiveness

Previous studies posit that there is a positive relationship between perceived usefulness and the use of the new technologies (Zaremohzzabieh et al., 2015; Muhaimin et al., 2019). Gong et al. (2004) added that people were more likely to accept new technology when companies explain the benefits and advantages of new technologies with logical arguments, which increase the perception of usefulness. Koufaris (2002) found that the perceived usefulness is an important predictor of intended system. Tsourela and Nerantzaki (2020) demonstrated that perceived usefulness significantly influences the attitude of people and their behavioral intention towards IoT products and applications.

H3: The operational effectiveness of the Internet of Things is impacted.

3.5 Operational Success is Mediated by Perceived Usefulness

According to earlier research (Zaremohzzabieh et al., 2015; Muhaimin et al., 2019), there is a correlation between perceived utility and the application of new technologies. According to Gong et al. (2004), individuals are more inclined to adopt new technology when businesses provide logical justifications for its advantages and benefits, which heightens the technology's perceived usefulness. According to research by Koufaris (2002), the planned system is significantly predicted by the perceived usefulness. Perceived usefulness has been shown by Tsourela and Nerantzaki (2020) to have a considerable impact on people's attitudes and behavioral intentions toward IoT apps and devices. Martins et al. (2014) discovered that when individuals think new technologies are valuable, they want to use IoT services. The association between simplicity of use and propensity to utilize IOT technologies is mediated by perceived utility (DoyduK & Bayarçelik, 2019). Customers have a positive opinion of a service when they find it beneficial and are likely to use it again. Unfortunately, there has not yet been much research done on the role that perceived usefulness plays in mediating the link between operational performance and IoT. Therefore, it is assumed that:

H4: The relationship between the internet of things and operational effectiveness is mediated by perceived usefulness.
3.6 Conceptualized Model

The study investigates how IoT has affected the road freight industry while considering how effective Oman thinks mediation is. Figure 1.1 illustrates a research paradigm that was suggested based on earlier research. In this case, there are both direct relationships (such as those between the internet of things and perceived usefulness, between perceived usefulness and operational effectiveness, and between the internet of things and operational effectiveness) and indirect relationships (such as those between the internet of things and operational effectiveness being positively mediated by perceived usefulness). Internet of things, perceived usefulness, and operational effectiveness were the three constructs used in the study. The internet of things was used as the dependent variable while operational effectiveness served as the independent variable. The mediating factor was perceived utility. Four hypotheses are incorporated into the model.

H1: There is a considerable positive correlation between IoT and perceived utility.
H2: Perceived usefulness and operational effectiveness have a favorable relationship.
H3: Internet of things have an effect on operational effectiveness.
H4: The relationship between the internet of things and operational effectiveness is mediated by perceived usefulness.

A research hypothesis, which encompasses Internet of Things, perceived usefulness, and operational effectiveness are displayed in Figure 1.

![Figure 1. Conceptual Framework of Research Hypotheses H1 to H4](image)

The study included 15 measuring items in a structured questionnaire, among which 5 items pertained to Internet of Things, five items to the perceived usefulness, and four items to the operational performance. The items are measured using a five-point Likert scale with a different measurement scale for each section. The scale ranged from 1 to 5, where 1 = Strongly Disagree and 5 = Strongly Agree.
4. Research Methodology

A quantitative method was used within the positivist worldview. To gather primary data, a descriptive survey design was used. The unit of analysis was workers employed in road freight companies within Oman. A list of 126 road freight operators was obtained from the Ministry of Commerce, Industry, and Investment Promotion. This was used as an official database of the study. Only five companies were purposively selected for the study. Email and phone calls were made to these companies. A list of 398 employees was developed from the human resources (HR) databases of five companies. Workers were middle and senior managers for the five companies. To gather information from respondents, a structured questionnaire containing closed-ended questions was used. Questions were derived from literature on ToT, road freight industry and perceived usefulness. The goal was to assess the causal connections between the different latent constructs in the survey. The hypotheses came from a review of the literature. The questionnaire was organized around the sections: Section A, demographic information, section B, implementing ToT technologies, Section C, perceived usefulness; and Section D, operational effectiveness. The survey was administered using a five-point Likert-style scale, which made it simple for respondents to select their preferred response from strongly disagree (1) to strongly agree (5). The link between the variables was assessed, as well as the internal consistency of each latent construct, using structural equation modelling. Additionally, correlations between the various constructs were examined. The viability of the questionnaire was examined during pilot research, which ran from June 04 to August 24, 2022.

5. Demographic Results

The data collection period ran from November 16, 2022, through February 18, 2022. A self-administered questionnaire was used. The respondents completed 203 research questionnaires. This corresponds to 52 percent of the respondents who were being targeted. Findings suggest that 81 percent of respondents were males, while 19 percent were female. Results indicate that 51 percent were aged between 36 and 45, 21 percent between 46, and 55, 14 percent between 26 and 35, 6 percent were less than 26 years old; and lastly, 6 percent were more than 55 years old. Results found that most respondents were aged between 36 and 45 years. Most respondents had completed a diploma which meant that they could interpret the survey questions and provide relevant responses. The study found that 3 percent of the respondents had less than one year, 8 percent had between 1–5 years, 56 percent had between 6–10 years, 25 percent had between 11–15 years and, lastly, 8 percent had more than 15 years. This implies that most respondents had more than five years of experience in road freight industry in Oman. They could provide qualified opinions about the road freight industry in Oman. Findings suggest that 70 percent (n=201) of respondents were employed as full-time workers and 30 per cent (n=88) were part-time employees. They were likely to give an informed opinion would be given since most of the respondents were full-time employees.

5.1 Internet of Things Adopted in Oman

Respondents were asked to tick the Internet of Things technology used by their businesses. Results indicate that there were different IoT technologies available in the market. They thought that connected devices will make up the Internet of the future and further the boundaries of the world with physical and virtual elements. The IoT technologies used are shown in Figure 2. Most respondents pointed out that they were using fuel management sensors. Activity sensors together with smart load sensors were recognizable IoT technologies. In addition, RFID tags were used as revealed by the sample data. Half of the respondents mentioned that they were implementing navigation systems. Surprisingly, only a few respondents showed signs of employing smart route sensors and smart room controls. This was mostly due to the lack of incentives for implementing such IoT technologies.
5.2 Normality Tests

The Kolmogorov-Smirnov (K-S) test (Oztuna et al., 2006) and Shapiro-Wilk tests (Barton & Peat, 2014) were employed to check the normality of data. This was important to ensure that all variables (IoT, perceived usefulness, and operational effectiveness) were normally distributed.

The Shapiro-Wilk Test results in Table 1 were larger than 0.05, indicating that the data is normal. The data considerably deviates from a normal distribution if the values were less than 0.05. The null hypothesis, which proposed that the data from sampled variables were normally distributed, was used to conduct the test. For the Kolmogorov-Smirnov test, the statistic value and degrees of freedom are provided along with the significance level. All the measuring items have p-values greater than 0.05,
indicating that they are normally distributed. The study also used skewness and kurtosis scores to test normalcy. According to Collier (2020), for data to be considered normal, skewness values should fall between -2 and +2, whereas kurtosis values should fall between -10 and +10. The skewness and kurtosis values in Table 2 show that they were within acceptable range.

5.3 Sample Adequacy

The Kaiser-Meyer-Olkin (KMO) measure of sample adequacy and Bartlett's test of sphericity were assessed for each scale. In Table 2, given that the criterion of 0.6 (Pallant, 2020), the KMO values of 0.805, 0.730, and 0.863 for the constructs on IoT, perceived usefulness, and operational effectiveness, respectively, were acceptable. All of the measures showed statistical significance in Bartlett's test of sphericity, proving that they were appropriate for factor analysis.

Table 2. KOM and Bartlett’s Test

<table>
<thead>
<tr>
<th>Latent variable</th>
<th>Sample adequacy</th>
<th>KMO Measure</th>
<th>Bartlett’s test</th>
</tr>
</thead>
<tbody>
<tr>
<td>IoT</td>
<td>0.805</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>Perceived usefulness</td>
<td>0.730</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>Operational effectiveness</td>
<td>0.863</td>
<td>0.000</td>
<td></td>
</tr>
</tbody>
</table>

5.4 Scale Reliability

The mean and standard deviation of each measuring item was tested. Three constructs were considered for the study: IoT, perceived usefulness and operational performance. A total of 15 measuring items were considered for evaluation. The mean rating ranged between 2.586 (SD=1.444) and 3.802 (SD=1.140). Findings demonstrate that most responses strongly agreed with the measuring items. Cronbach's alpha was used to evaluate the consistency of each construct. According to Hair, Anderson, Tatham and Black (1998) and George and Mallery (2016), Cronbach's alphas of at least 0.7 indicate that the measuring items have acceptable reliability. For the IoT, perceived usefulness, and operational effectiveness, Cronbach's alpha values were 0.945, 0.895, and 0.855, respectively. The values were all more than the cutoff of 0.7, indicating strong internal consistency for each scale (Pallant, 2020). According to Netemeyer (2003), the study looks at composite dependability, which measures the internal consistency of scale items. The recommended cutoff point for the CR values is 0.7 (Fornell & Larcker, 1981). In Table 3, results show that the CR values were 0.941, 0.894 and 0.860 for ToT, perceived usefulness, and operational effectiveness, respectively. This indicates good reliability (Ketchen & Berg, 2006).

Table 3. Validity and Reliability Analysis
Construct validity was checked using the average variance extracted (AVE). According to dos Santos and Cirillo (2023), the EVE measures how much of the overall variance in the indicators is explained by the latent construct. Fornell and Larcker (1981) claimed that the EVE is accepted when a value for a construct is 0.50 or above. The AVE values range from 0.860 to 0.946, which shows that the constructs adequately account for measurement error-related variance. Results are shown in Table 3 as factor loadings, which show how strongly each item is related to its corresponding latent variable. All the factor loadings that were above 0.5 were considered for this study. This indicates that they are good measures of their corresponding construct.

### 5.5 Discriminant Validity

The study examined the discriminant validity of the measuring constructs. According to Smith (2005), discriminant validity means that two latent variables that represent different theoretical concepts are statistically different. Two validity tests were conducted, namely Heterotrait-Monotrait ratio (HTMT) and Fornell-Larcker criteria. The similarity between latent variables is measured by the HTMT of correlations. If the HTMT is unmistakably below one, discriminant validity is proven. The HTMT criterion suggests that all variables are uniquely different at the cut-off value of HTMT 0.90.

<table>
<thead>
<tr>
<th>Heterotrait-Monotrait ratio (HTMT)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>U&lt;-&gt;OE</td>
</tr>
<tr>
<td>IoT&lt;-&gt;OE</td>
</tr>
<tr>
<td>IoT&lt;-&gt;PU</td>
</tr>
</tbody>
</table>

In Table 4, HTMT values ranged from 0.228 to 0.659, showing that they were noticeably different at levels below HTMT 0.90, supporting the discriminant validity of the data. The Fornell-Larcker criterion (FL criterion) was developed by Fornell and Larcker in 1981 to assess discriminant validity. The correlation of latent constructs is compared with the square root of the average variance extracted (AVE). According to Hair et al. (2014), a latent construct should be able to account for the variance of its own indicator more effectively than the variance of other latent constructs. As a result, the correlations with other latent constructs should be smaller than the square root of each construct's AVE.

<table>
<thead>
<tr>
<th>Fornell-Larcker Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>OE</td>
</tr>
<tr>
<td>OE</td>
</tr>
<tr>
<td>vU</td>
</tr>
<tr>
<td>IoT</td>
</tr>
</tbody>
</table>

According to Fornell-Larcker, the square roots of AVE for the three latent constructs in Table 5 were higher than the correlation between the constructs.
5.6 Structural Equation Modelling

The structural links that the research model predicted were examined using structural equation modeling. They used a bootstrap approach to verify the importance of each path coefficient. The study applied the criterion of meaningfulness to establish a standardized path coefficient that is considered significant in the model and relevant to managerial decisions (Herse 1969; Kerlinger & Pedhauzard, 1973). All path coefficients with less than 0.10 were considered not meaningful and removed in the model (Land, 1969). The path coefficient is significant in SmartPLS 4.0 at the default 5 percent threshold of significance. The significance of the path coefficients connecting latent constructs was investigated to evaluate the hypotheses. The highest value suggests that the predictor (exogenous) latent variable has the largest influence on the dependent (endogenous) latent variable (Wong, 2013). The significance level of the value must be assessed using the t-value test. The non-parametric bootstrapping approach was used to conduct the test. Structural path results are presented in Table 5.

Table 6. Hypothesis, Path Coefficients, and Results

<table>
<thead>
<tr>
<th>Path</th>
<th>Path Coefficient (β value)</th>
<th>Confidence Interval</th>
<th>T-value</th>
<th>P-values</th>
<th>Significance Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>IoT→PU</td>
<td>.221</td>
<td>.096-.342</td>
<td>3.558</td>
<td>.000</td>
<td>Significant</td>
</tr>
<tr>
<td>PU→OE</td>
<td>.514</td>
<td>.413-.608</td>
<td>10.150</td>
<td>.000</td>
<td>Significant</td>
</tr>
<tr>
<td>IoT→OE</td>
<td>.300</td>
<td>.219-.382</td>
<td>7.095</td>
<td>.000</td>
<td>Significant</td>
</tr>
<tr>
<td>IoT→PU→OE</td>
<td>.114</td>
<td>.027-.112</td>
<td>3.119</td>
<td>.002</td>
<td>Significant</td>
</tr>
</tbody>
</table>

Table 6 presents the path coefficients, confidence intervals, t-values, p-values and significance levels for each hypothesized relationship in the model. The path shows a significant positive relationship between Internet of Things and perceived usefulness (β=0.221; t=3.558; p=0.000). Therefore, hypothesis H1 was accepted at a 95 percent confidence interval (t-value >1.96). The higher level of perceived usefulness is associated with high implementation levels of Internet of Things technologies. In Table 6, results indicate a significant positive relationship between perceived usefulness and operational effectiveness (β=0.514; t=10.150; p=0.000). Therefore, hypothesis H2 was accepted at 95 percent confidence interval (t-value >1.96). This means that a higher level of perceived usefulness is associated with a higher level of operational effectiveness. Findings show a significant positive relationship between Internet of Things and operational performance (β=0.300; t=7.095; p=0.000). Therefore, hypothesis H3 was accepted at a 95 percent confidence interval (t-value >1.96). This suggests that a higher level of Internet of Things is associated with a higher level of operational effectiveness.

For moderation, the study proposed in H4 that perceived usefulness mediates the relationship between Internet of Things and operational effectiveness. The main objective of mediation analysis is to identify an indirect influence and determine its statistical significance. Two key strategies were used to do this: the bootstrapping method (Preacher & Hayes, 2004) and the Sobel test (Sobel, 1982). It was stated that the mediator was the perceived usefulness. The research found that there is a positive significant relationship between Internet of Things, perceived usefulness, and operational performance (β=0.114; t=3.119; p=0.002). Therefore, hypothesis H4 was accepted at a 95 percent confidence interval (t-value >1.96). This implies the relationship between Internet of Things and operational performance is partially mediated by perceived usefulness. The path coefficients together with statistics provide evidence that the relationships between the latent constructs in the model were significant and supported the hypothesized model.
The resulting structural model of the connections between operational success, perceived usefulness, and the Internet of Things is shown in Figure 3. The breadth of the linkages between the constructs relevant to this study and the factor loadings for each item in the constructs are both illustrated by a detailed structural model. Internet of Things has a significant positive relationship with perceived usefulness. Perceived usefulness has a significant positive relationship with operational effectiveness. The Internet of Things have a significant positive relationship with operational effectiveness. There is a relationship between Internet of Things perceived usefulness and operational effectiveness. In summary, hypotheses H$_1$, H$_2$, H$_3$ and H$_4$ are accepted. The model coefficients and factor loadings of the fitted model are presented in Figure 3.

5.7 Goodness-of-fit Statistics for Final Model

According to Kline (2011), the absolute fit index, incremental fit index, and parsimony-adjusted index can all be used to measure the fitness of the model. The difference between the residuals of the sample covariance matrix and the proposed covariance model is known as the Standardized Root Mean Residual (SRMR), which is equal to the square root of this difference. The values of SRMR, which are standardized, ranged from 0 to 1 (Byrne, 1998; Hu & Bentler, 1999). In Table, SRMR value of 0.09 demonstrated that the research model fit the data well. The Normed Fit Index (NFI) result was more than the minimally acceptable level of 0.9. This implies it was a good fit (Hair et al. 2006). The difference between the observed and assumed covariance matrices is measured by the Chi-square. It is now more common to mention it mostly for historical reasons rather than for judgments regarding the quality of model fit.

Table 7. Goodness-of-fit Statistics for the Final Modified Model

<table>
<thead>
<tr>
<th>Index</th>
<th>Recommended value</th>
<th>Sources</th>
<th>Estimated model</th>
</tr>
</thead>
<tbody>
<tr>
<td>SRMR</td>
<td>0.08–0.10</td>
<td>Hair et al. (2010)</td>
<td>0.09</td>
</tr>
<tr>
<td>d_ULS</td>
<td>-</td>
<td>Hair et al. (2010)</td>
<td>1.725</td>
</tr>
<tr>
<td>d_G</td>
<td>-</td>
<td>Hair et al. (2010)</td>
<td>9.863</td>
</tr>
<tr>
<td>Chi-square</td>
<td>-</td>
<td>Hair et al. (2010)</td>
<td>5928.509</td>
</tr>
<tr>
<td>NFI</td>
<td>&gt; 0.90</td>
<td>Hair et al. (2010)</td>
<td>0.429</td>
</tr>
</tbody>
</table>
The measurement model was acceptable and nomologically valid.

6. Discussion

The goal of the study was to determine the most likely impact of IoT technologies on operational effectiveness in the context of road freight transportation in Oman. The study investigated the IoT technologies implemented in the road freight industry. Findings show that IoT technologies, including fuel management sensors and activity sensors, were employed. Fuel management sensors were used to remotely monitor and collect information from fuel storage tanks (Wang, Cao, Shen & Zheng, 2018). It takes information about the fuel level in tank in real-time through its sensor and live streaming of the site, then uploads it directly to the internet, where it can be read anytime and anywhere through web application (Ahmed et al., 2017). IoT technologies that were well-known included activity sensors and smart load sensors. The sample data also indicated the use of RFID tags. The findings supported earlier studies in road freight industry. IoT technologies employed in the transportation industry were categorized into tracking, information management, and navigation systems (Muuzuri et al., 2020).

According to Dlodlo (2015) and Taliaferro et al. (2021), IoT technologies assist managers in gathering sufficient data on the location of freight, environmental conditions, potential delays, and the detection of incidents and potential disruptions. Although smart route sensors and smart room controls were recognized as IoT technology, respondents did not frequently use them. Dong et al. (2021) found that smart sensors were utilized to monitor environmental variables, such as humidity, pressure, and temperature of cargoes, and send real-time reports to the control room for efficient decision-making. Golpira et al. (2021) classified IoT technologies based on a qualitative approach. In this study, IoT technologies were determined using quantitative technique.

The study explored the relationship between IoT and perceived usefulness. Findings, which are validated by prior research, show that there is a significant and positive relationship between IoT and perceived usefulness. A failure to clearly convey a benefit to potential users may be one of the primary causes of the sluggish adoption of IoT technology applications (Roger, 1995). Users will only accept innovations if they offer a distinct benefit over currently available alternatives. Users must feel improved performance when they use a particular technology (Venkatesh et al., 2003, 2012). Perceived usefulness is the most important driving factor in the intention to use IOT (Dong et al., 2017). Compatibility, result demonstrability and trialability are the main factors that affect perceived usefulness (Hong & Tam, 2006; Gumussoy & Calisir, 2009; Porter & Donthu, 2006; Zhou, 2013).

The study found that there is a significant positive relationship between perceived usefulness and operational effectiveness. This indicates that the variation in operational effectiveness was mostly explained by perceived usefulness. Perceived usefulness could be used to measure how far a user believes a specific application to increase work performance. Ghani et al. (2022) claimed that perceived usefulness significantly influenced digital banking effectiveness. When users find a service beneficial, they have a good attitude about it and are more likely to use it in the future (Davis, 1993). Perceived usefulness favourably impacts attitude and intention to use the service. Users are increasingly cherishing the benefits of digital services, such as time-saving.

The study found that IoT has a significant and positive impact on operational performance. Similarly, Al-Khatib, (2023) found that IoT enhances operational performance. Consistently, Gao and Bai (2014) established that IoT technologies can supply retail stores with faster processes, lead to less queuing time, and improve service quality perceived by users. According to Wang et al. (2013), IoT technologies enable railway maintenance employees to receive data from transponders through a mobile reader in their hand and determine whether they require maintenance, increasing efficiency. IoT keeps an inventory, and plans maintenance schedules based on accurate mileage for each part of the train. Michie, Andonovic et al. (2020) stated that IoT solutions reduce operational costs and minimize waste, whilst ensuring high standards. Anosike et al. (2021) suggest that IoT significantly improves the operational performance of manufacturing organisations, despite the early stage of the technology. Dahlqvist et al.
(2019) highlighted that IoT platforms improve financial performance across cost, revenue and operational efficiency.

The study found that perceived usefulness partially mediates the relationship between implementation of IoT and operational effectiveness. The results demonstrate that the implementation of IoT had a sizable indirect impact on operational effectiveness through the mediation of perceived usefulness. This implies that the perceived usefulness will enhance the combined effect of IoT and operational effectiveness. In summary, little is known about the mediation effects of perceived usefulness on the relationship between IoT and operational effectiveness. Therefore, this study sought to address this research gap in literature. However, perceived usefulness has been employed in several research as a mediating variable.

7. Conclusion

The study investigates the IoT technologies applied in the road freight sector in Oman. A survey was conducted to establish the existing IoT-based applications in the road freight industry. The main logistical activity in Oman for moving shipments from the origins to the destinations is road freight transportation. According to Oman’s Vision 2040, the Sultanate's efforts to diversify away from its reliance on oil should focus on five key areas, one of which is transportation and logistics. The efficiency and service quality of the road freight transport is impacted by mode of transport as well as strategic planning. Traffic congestion, poor roads, and weather conditions can negatively affect the cost of operations as well as delivery time. Such difficulties result from a lack of real-time information. According to this study, IoT-based applications are essential for securing the success of enterprises in the contemporary world. Today, more than ever before, it is now crucial that the road freight sector adopt cutting-edge technologies like IoT. IoT technologies can enhance business operations and processes.

IoT technologies, according to Golpira et al. (2021), had not yet been properly defined or identified. Therefore, it was challenging to include all IoT technologies. However, the study only listed those used within the road freight industry. These include, among other things, activity trackers, RFID tags, and smart route sensors. Farquharson et al. (2021) argue that IoT technologies are constantly being improved. As a result, it is anticipated that the list will continue to grow.

The adoption of IoT technologies can enhance customer service, job satisfaction, operational and supply chain performance, and driver safety in the road freight sector. The installation of IoT-based applications and operational effectiveness are amplified by perceived usefulness. An indirect relationship was found between IoT technologies, perceived usefulness, and operational effectiveness. Practitioners Managers will be advised about the IoT technologies that can be used and their potential advantages for businesses. However, the application of these technologies requires a significant investment in capital and skill capability. According to this study, benefits are greater because adopters are probably extremely competitive. Managers need a thorough understanding of the behaviors of drivers as well as the visibility of products in transit. Managers can lower transportation costs, miles driven, and vehicle wear and tear by implementing IoT solutions. Real-time knowledge of the location of the asset and its condition is key to logistics management. IoT technologies can also be used to monitor operations, enhancing visibility and transparency. They can help create sustainable and effective operations by avoiding traffic jams by adopting alternative routes. IoT gives managers an opportunity to use the internet and smart devices together to gather information and make smarter decisions.

The study offers a fresh perspective on the field of logistics management. A few limitations were identified. The information used in this study was gathered in the province of Muscat. Data gathered from all of Oman’s provinces could provide a more complete view of how IoT technologies are being used. The study only covered the road freight sector. It is possible to expand the scope of the study in the future by incorporating additional industries, such as public transportation, aviation, and maritime transportation. The study employed a quantitative approach, but future studies may employ a mixed
research method to learn about the subject. The study looked at how perceived usefulness affected the relationship between IoT-based applications and operational effectiveness. Other mediating factors, such as competitiveness, compatibility, and security, may be used in future investigations.

References


Lack of Real Talent in The Supply Chain Industry

Manuj R. Nair Ramachandran\textsuperscript{a} & Nur Nadirah Mohamad Ishak\textsuperscript{b}
\textsuperscript{a}School of Business, Malaysia University of Science and Technology, Malaysia
\textsuperscript{b}School of Business, Malaysia University of Science and Technology, Malaysia
\textsuperscript{*}manujnair@gmail.com

Abstract The discipline of supply chain management is essential to smoothly transferring goods, services, and information across different organizations. Growing worries about a talent gap in the supply chain management industry have emerged recently. Companies face substantial obstacles due to scarcity, making it harder to meet consumer needs, optimize supply chain operations, and maintain competitiveness in today's global market. An overview of the skill shortage in supply chain management is given in this abstract, along with a discussion of its origins and effects. It also addresses several tactics businesses and academic institutions might use to deal with this problem and guarantee a long-term talent pipeline for the supply chain. There are some reasons for the talent gap in supply chain management. First, the supply chain's environment has changed dramatically due to quick technological improvements, including automation, big data analytics, and artificial intelligence, necessitating hiring experts in these fields. On the other hand, traditional educational systems have found it difficult to keep up with these changing needs, resulting in a skills gap in the workforce. Second, there is a shortage of knowledge about the possibilities and potential of a career in supply chain management among students and young professionals. Selected 10 supply chain management organizations in Malaysia to represent our target population a sample size of roughly 378 respondents would be appropriate for a population. Malaysia was selected as the site to draw samples from since it is home to a disproportionately high number of organizations and their respective workers. There is a shortage of skill in the field since it is frequently ignored or misunderstood. The lack of diversity among supply chain management employees also worsens the talent deficit, notably in gender and ethnicity. The talent gap in supply chain management affects organizations significantly. It may lead to higher prices, ineffective business practices, sluggish deliveries, and diminished consumer satisfaction. The talent gap is further widened by the requirement for individuals with cross-cultural capabilities and the ability to negotiate intricate international networks due to the global nature of supply chains.

Keywords: supply chain management, talent shortage, skills gap, diversity and inclusion

1. Introduction

The planning, sourcing, production, and distribution activities involved in providing goods and services to clients are all covered by the important discipline of supply chain management. It is essential for increasing customer happiness, cost savings, and operational efficiency. But there has been rising worry in recent years about a skill gap in the supply chain management industry, which makes it difficult for organizations to satisfy the needs of a globalized and increasingly complicated market. There are many reasons for the talent shortage in supply chain management. One important aspect is the quick development of technology, particularly big data analytics, automation, and artificial intelligence. These technological developments have altered the supply chain landscape, necessitating personnel with specialized knowledge to use these tools efficiently. Unfortunately, traditional educational systems have found it difficult to keep up with these changing needs, which has resulted in a substantial skills gap in the labour market. In addition, there is a lack of understanding of the possibilities and potential of a career in supply chain management among students and young professionals. Many people are unaware of supply chain specialists' critical role in maintaining the smooth flow of goods and services and driving corporate success. Because of this, the subject has a shortage of skill and is frequently disregarded or misunderstood.
The lack of diversity among supply chain management employees also worsens the talent deficit. There has historically been little representation of women, racial minorities, and other underrepresented groups in the sector, which particular demographics have historically dominated. Organizations miss out on the distinctive views, insights, and problem-solving techniques that a varied workforce may bring by neglecting to access the broad talent pool. The supply chain management industry must encourage inclusion and diversity to address this issue. The lack of qualified talent in supply chain management greatly impacts businesses. The supply chain may experience increased costs and inefficiencies as a result, first and foremost. Organizations may have delays, disruptions, and quality problems that may affect the prompt supply of goods and services to clients without trained individuals who can optimize operations. This can ultimately harm the bottom line by eroding consumer happiness and loyalty. The talent deficit is further complicated because supply networks are global. Cross-cultural competence and knowledge of global trade, legislation, and business practices are essential for supply chain specialists. However, lacking individuals with essential global savvy worsens the skills gap and makes it difficult for organizations to successfully navigate worldwide networks and markets. Multiple strategies must be used to address the talent gap in supply chain management. Developing a pertinent curriculum incorporating cutting-edge technologies and real-world industry experience depends heavily on collaboration between industry and academics. Educational institutions can better prepare students with the skills and knowledge they need to succeed in supply chain management careers by aligning educational programs with the industry's changing demands.

Organizations can also actively participate in attracting and nurturing talent. Providing students and young professionals with internships, apprenticeships, and mentorship programs can give them practical learning experiences and exposure to supply chain operations in the real world. These programs help organizations find and develop talented individuals by bridging the gap between theory and practice and acting as effective recruitment channels. Another essential component of overcoming the talent deficit is promoting diversity and inclusion within the supply chain management industry.

Within the scope of this research project, our primary purpose is to examine the factors that contribute to the skill gap in supply chain management and to propose potential solutions. Thus, the objectives of this research study are given below:

a. To determine the impact of employee education on the skill gap in supply chain management industry.
b. To determine the impact of training employees on the skill gap in the supply chain management industry.
c. To determine the impact of employee compensation on the skill gap in the supply chain management industry.
d. To determine the impact of HRM practices on the shortage of qualified talent in the supply chain management industry.

2. Literature Review

2.1 Supply Chain Management

Over the past few years, there has been a rising understanding of the importance of talent management in supply chain management (SCM). The process of systematically and methodically attracting, recognizing, developing, engaging, and retaining talented individuals who may contribute to an organization's success is called "talent management". In this review of related literature, we examine the relationships among talent management, employee development, and compensation and the effects these relationships have on the supply chain management industry.
2.2 Talent Management

Operations Management Regarding the Management of Talent in Supply Chains Businesses that are involved in the supply chain operations industry is required, without exception, to have successful organizational talent management practices in place. According to the results of several studies, companies that invest in people management techniques have improved levels of supply chain performance, larger levels of operational efficiency, and enhanced levels of customer satisfaction. Implementing talent management efforts inside an organization, such as stringent hiring processes, training and development programs, performance management systems, and career planning, may help an organization increase its capacity to attract and keep the best employees. This helps to guarantee that the staff members are skilled and competent.

2.3 The Influence of Employee Education on Supply Chain Management

There is a one-to-one relationship between the amount of education employees hold in the supply chain management industry and the level of performance their respective businesses attain. This relationship is a direct connection. According to the findings of a number of studies, there is a positive correlation between staff members' education and the supply chain's performance metrics.

2.4 The Influence of Employee Compensation on Supply Chain Management

In the supply chain management industry, salary is a significant component that plays a significant role in recruiting, motivating, and retaining competent personnel. It has been shown that providing workers with competitive compensation packages, including salaries, benefits, and incentives based on their performance, may positively impact employee job satisfaction and engagement. As the findings of various studies have shown, businesses that provide attractive pay structures have a stronger ability to attract and retain high-performing personnel, leading to improved supply chain performance and operational outcomes. In addition, pay practices that connect employee rewards with performance metrics of the supply chain may serve as an incentive for employees to contribute to the company's overall goals.

2.5 How Employee Education, Compensation, and Supply Chain Management Interact

It is important to note that employee education, remuneration, and supply chain management all have intricate and interconnected relationships. The higher the education level of employees, the more the supply chain knowledge and experience they give, which may lead to superior performance and expanded prospects for reward. On the other hand, businesses that invest in employee education and development programs may be more inclined to provide competitive wage packages to keep competent workers and reward them for their contributions. Education and remuneration methods can be combined in such a way as to generate a positive cycle, which will attract and keep exceptional employees who are the driving force behind supply chain excellence. The research that has been done on the topic emphasizes how crucial talent management is in the field of supply chain management. Positive effects on supply chain performance, operational efficiency, and customer satisfaction may be attributed to effective personnel management practices. These practices include staff education and competitive remuneration. Companies that prioritize personnel management strategies are better able to traverse the complicated and ever-changing terrain of the supply chain, resulting in a lasting competitive advantage. In a further study, there should be a continued investigation of the mechanisms via which talent management efforts affect supply chain results and the identification of best practices for recruiting, developing, and keeping top talent in the business.

2.6 Hypothesis and Research Framework

H1: There is a significant relationship between employee education and the shortage of the right talent in the supply chain management industry.
H2: There is a significant relationship between employee training and development and shortage of right talent in the supply chain management industry.

H3: There is a significant relationship between employee compensation and the shortage of the right talent in the supply chain management industry.

H4: There is a significant relationship between HRM Practices and the shortage of the right talent in the supply chain management industry.

![Conceptual Framework](image)

**Figure 1. Conceptual Framework**

3. Methodology

3.1 Data Collection Methods

Research surveys collect information by questioning a sample and tallying the responses. To collect data from respondents, researchers always resort to surveys. Data for surveys are gathered by sending out questionnaires and then collating the completed responses. Researchers select a methodology for this survey study depending on several factors, such as the number of available participants or respondents, the average level of education, and the nature of the study's focus.

3.2 Data Analysis

Pearson's correlation and multivariate regressions were used for inferential analysis. The degree of association between the variables was analyzed using Pearson's correlation. Pearson's correlation coefficient (r), used in correlation analysis, has a value between -1.00 and +1.00, which describes the strength of the association between the analyzed variables. The effects of potential independent factors on the dependent variable were examined using multiple regressions. Regression analysis considers several potential factors to find the causes of variation in a dependent variable. The trustworthiness of
the variables was determined with the help of a Cronbach’s Alpha reliability test. Higher levels of internal consistency dependability are indicated by Cronbach’s Alpha values closer to 1.0. After all the information has been gathered, SPSS was used to evaluate and analyze it.

3.3 Data Reliability Analysis

Cronbach’s alpha is a statistic that measures how internally consistent a collection of objects is or how closely related they are to one another as a whole. It does this by comparing the items in the collection to themselves.

<table>
<thead>
<tr>
<th>No.</th>
<th>Factor</th>
<th>Cronbach’s Alpha</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Employee’s Education</td>
<td>.736</td>
<td>Reliability Acceptable</td>
</tr>
<tr>
<td>2</td>
<td>Employee Training &amp; Development</td>
<td>.863</td>
<td>Reliability Acceptable</td>
</tr>
<tr>
<td>3</td>
<td>Employee’s Compensation</td>
<td>.864</td>
<td>Reliability Acceptable</td>
</tr>
<tr>
<td>4</td>
<td>HRM Practice</td>
<td>.781</td>
<td>Reliability Acceptable</td>
</tr>
</tbody>
</table>

As a measurement, this component is taken into consideration as part of the process of assessing the reliability of the scale. Even though it has a "high" value for alpha, this does not indicate that the measure must be unidimensional to be considered legitimate. This is true even if the value of alpha is rather high. If, in addition to determining the extent to which a scale is consistent internally, your goal is to demonstrate that the scale in question is unidimensional, then you may decide to conduct additional research to support your position. If this is the case, however, you should remember that this will take more time and effort.

4. Results

Table 2. Results of Multiple Regression

Model Summary

<table>
<thead>
<tr>
<th>Model R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. The error in the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.591</td>
<td>.349</td>
<td>.340</td>
</tr>
</tbody>
</table>

Predictors: (Constant), HRM practice, Employee's Training & Development, Employee's Education, Employee's Compensation

ANOVA

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Regression</td>
<td>79.170</td>
<td>4</td>
<td>19.793</td>
<td>39.586</td>
</tr>
<tr>
<td></td>
<td>Residual</td>
<td>147.497</td>
<td>295</td>
<td>.500</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>226.667</td>
<td>299</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Dependent variable: Shortage of talent in supply chain management
Predictors: (Constant), HRM practice, Employee's Training & Development, Employee's Education, Employee's Compensation

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Constant)</td>
<td>.909</td>
<td>.267</td>
</tr>
<tr>
<td>Employee's Education</td>
<td>.103</td>
<td>.048</td>
</tr>
<tr>
<td></td>
<td>.116</td>
<td></td>
</tr>
<tr>
<td>Employee Training</td>
<td>.074</td>
<td>.049</td>
</tr>
<tr>
<td>&amp; Development</td>
<td>.083</td>
<td></td>
</tr>
<tr>
<td>Employee's Compensation</td>
<td>.165</td>
<td>.059</td>
</tr>
<tr>
<td></td>
<td>.154</td>
<td></td>
</tr>
<tr>
<td>HRM practice</td>
<td>.425</td>
<td>.055</td>
</tr>
<tr>
<td></td>
<td>.417</td>
<td></td>
</tr>
</tbody>
</table>

The impact of all independent variables is significant, as the values are less than 0.5, so all the null hypotheses are accepted.

Constant: The constant coefficient represents the expected value of the dependent variable when all independent variables are zero. In this case, the constant is 0.909, which means that even when all other variables are zero, the dependent variable is expected to have a value of 0.909.

Employee's Education: The coefficient for employee's education is 0.103. This indicates that for a one-unit increase in employee's education level (holding all other variables constant), the dependent variable is expected to increase by 0.103 units. The p-value of 0.032 suggests that this relationship is statistically significant at a significance level of 0.05.

Employee Training & Development: The coefficient for employee training and development is 0.074. This suggests that for a one-unit increase in employee training and development (keeping other variables constant), the dependent variable is expected to increase by 0.074 units. However, the p-value of 0.137 indicates that this relationship is not statistically significant at a significance level of 0.05.

Employee's Compensation: The coefficient for employee's compensation is 0.165. This implies that for a one-unit increase in employee's compensation (holding other variables constant), the dependent variable is expected to increase by 0.165 units. The p-value of 0.006 suggests that this relationship is statistically significant.

HRM Practice: The coefficient for HRM practice is 0.425. This indicates that for a one-unit increase in HRM practice (while keeping other variables constant), the dependent variable is expected to increase by 0.425 units. The p-value of 0.000 suggests that this relationship is statistically significant.

5. Conclusion

5.1 Shortage of Right Talent in Supply Chain

The global economy is in flux, and organizations struggle to keep pace with the ever-changing business landscape. The war for talent has never been fiercer, and the skills gap is only widening. This is particularly true in supply chain management, where the demand for qualified professionals far outstrips the supply. The talent shortage in supply chain management is a real and pressing issue. In a recent survey, 58% of respondents said that lacking skilled workers was their organization’s biggest
challenge. With the rapid expansion of the e-commerce sector and the growth of global supply chains, the demand for qualified supply chain professionals is only going to increase (Auino & Draper 2008).

Several factors have contributed to the talent shortage in supply chain management. Firstly, the field is relatively new, and formal education and training programs are lacking. Secondly, the supply of qualified professionals is not meeting the demand. And finally, the Baby Boomer generation is retiring in droves, taking a wealth of experience and knowledge with them.

Organizations must invest in formal education and training programs to develop the next generation of supply chain professionals. Secondly, they must look outside the traditional supply chain talent pool to attract qualified professionals from other industries. And finally, they need to invest in retention programs to keep experienced workers from leaving the profession. The talent shortage in supply chain management is a real and pressing issue. However, by investing in formal education and training programs, looking outside the traditional supply chain talent pool, and investing in retention programs, organizations can address the issue and ensure they have the skilled workers they need to compete in the global marketplace (Bradley, 1999).

The global war for talent is raging, and nowhere is the battle fiercer than in the field of supply chain management. A recent Institute for Supply Chain Management study found that nearly two-thirds of organizations face a talent shortage in their supply chain operations. There are some factors at play. First, the supply chain management profession is still relatively young and is only now starting to gain the recognition it deserves. This means that there’s a smaller pool of talent to draw from. Second, the skills required for successful supply chain management are in high demand across several industries. This means that organizations are competing for the same talent.

Reference


Port Facilities Threats and Preventive Security Measures: A Case Study on Port Klang, Malaysia

Balachandar V Rajoo\textsuperscript{a}, Murali Raj Deva Raja\textsuperscript{b}, Neerushah Subarimaniam\textsuperscript{c}, Sundary N. Rajagopal\textsuperscript{d} & Vincent Paul Jr Aloysious Anthony\textsuperscript{e}

\textsuperscript{a,b}School of Transportation and Logistics, Malaysia University of Science and Technology, Malaysia
\textsuperscript{c}Institute of Postgraduate Studies, Malaysia University of Science and Technology, Malaysia
\textsuperscript{d}School of Business, Malaysia University of Science and Technology, Malaysia
\textsuperscript{e}balachandar@must.edu.my

Abstract: Compliance with the ISPS Code is monitored through the Maritime Transport Security Area Security Plan, Marine Facility Security Plan, and periodical audit carryout by the administration as well as the operator of the concerned. Unfortunately, there is a deficiency in the precise identification of current and future threats; and this warrants effective preventive security measures. In this paper, threats to port facilities to determine current and potential future threats are identified. The secondary aim is to identify effective preventive security measures. A case study interview method was employed, and the interview involved seven participants from seven different port facilities at Port Klang, Malaysia. The findings indicated that smuggling and terrorism are the major current threats to port facilities. Unauthorized access to port facilities leads to additional threats. On the contrary, digitization and automation of ports triggered cyber-attacks and they are becoming the most potential future threats. These results suggest that it is not possible to entirely eliminate threats through existing countermeasures, but they can be mitigated. To mitigate this, preventive security measures are proposed and the need for continuous awareness is emphasized in this study.

Keywords: threats, security, preventive measures, container port, port facilities

1. Introduction

Maritime transportation is significant for the worldwide economy as it is the dominant mode of transportation in international trade (Hoffman & Kumar, 2010 similar to this, 80 percent of world trade is conducted by sea. Additionally, the world economy's intensity rose by up to 4% in 2017, totalling up to 10.7 billion tonnes (UNCTAD, 2018). Subsequently, the maritime trade expanded globally in 2017.

Seaports are a crucial part of global trade because they link global supply chains between the ocean and land. In terms of volume, seaports handle more than 80% of all worldwide trade in products. Additionally, foreign trade and economic changes are the main determinants of seaport output (UNCTAD, 2018). Since the trading growth ratio to GDP growth was generally 1.5 in 2017, the quickest rate of growth in six years, goods volumes have increased (WTO, 2018). However, the success of the seaports cannot solely be attributed to changes in global trade and the economy. Adding on, the compliance with port security regulations will also aid in the expansion of trade.

There are port security regulations in place to guard against risks that could be brought on by terrorists or other criminal activity. To protect against risks that could be caused by terrorism or other criminal behaviour, port security regulations are in place. However, the effectiveness of the security measures was questioned following the terrorist attacks on September 11, 2001. Due to the incident, the US government, and the International Maritime Organisation (IMO) have been searching for more effective defensive measures to stop traffickers and terrorists from exploiting seaport weaknesses (McNicholas, 2016). The International Ship and Port Security (ISPS) Code has been approved by contracting countries.
as a result of the critical need for reform and the requirement for more suitable security systems for port facilities and ships. Since its implementation on July 1st, 2014, the code has served as the main authentication code for ships and port facilities. The Maritime Transport Security Area Security Plan (MTSP), the Marine Facility Security Plan (MFSP), and recurring audits conducted by the administration and the operator of the facility are used to track compliance with the ISPS Code. Unfortunately, there is a lack of accurate threat detection, which necessitates strong preventive security measures. In this study, a boundary was drawn to distinguish between perceived risks and preventive security measures based on how the ISPS Code was implemented. The following are the main goals of this investigation:

a. To identify the current and future types of threats that concern the facilities to determine which of those are the most potential; and

b. To identify the preventive security measures with regard to countering the identified threats.

2. Literature Review

Various strategies and a natural obligation to detect and monitor flows between providers and customers meet all hazards in the modern world. Hazards in the modern world are met by a variety of methods as well as a natural responsibility to identify and keep track of flows between service providers and clients. The dangers to the ports and preventative security measures are identified and explained in this review. First, the literature's critical examination clarified what port is and why it is necessary. Second, it defines and explains the dangers to ports, their impact on ports, and why it is crucial for ports to take precautions against them. Other researchers and institutions have used pertinent notions to further explain this. Thirdly, the ISPS Code requirements are used to describe and clarify preventive security methods. Ideas from other researchers and approaches used by other ports to deal with particular risks were also highlighted. Additionally, security measures taken by several researchers and organizations are explained in order to explain why they were not adopted by many ports and the reasons for their failure to effectively resist attacks. The study's final goal is to define future port security measures based on the industry's recent technological revolution and improvements.

2.1 Port Security

In a certain Member State or the designated authority, the port is referred to as a "geographical" area. On the other side, the port facility, where maritime operations and other activities take place, is secured by the International Ship and Port Facility Security (ISPS) Code (IMO, 2003). Security was deemed "a prerequisite for acceptable risk level" by the IMO (IMO, 2003). Counterterrorism operations, law enforcement, and treaties are just a few examples of port security measures. By lowering their exposure to potential dangers and hazards, ports are being protected. Port security involves crime fighting, such as drug trafficking, human trafficking, and smuggling. Additionally, passenger and crew security is necessary for port security (Gujar et al., 2018). Threats to secure ports must be taken seriously since they are a focal point in all intermodal logistic supply networks (Robinson, 2002).

2.2 Current and Future Threats

Threats are actions that have the potential to harm or negatively impact a nation, an organization, a person, or a facility. As a result, the primary component of a threat is an action or the potential for action (Edgerton, 2013). The following are some potential risks to ports across the world:

2.2.1 Terrorism

As a result of the increased security following the terrorist events of September 11, 2001, the SOLAS Convention was revised, and the ISPS Code was subsequently introduced (Glaser & Vitello, 2015). This is according to the Organization for Economic Cooperation and Development (OECD, 2002). Buildings
and other resources may sustain severe damage as a result of terrorist attacks, needing costly repairs and increasing the cost of making them more vulnerable. The term "terrorism" has become widely recognized as of 2013. According to Edgerton (2013), the majority of definitions point to a few universal traits, including (a) the use of violence or threats of violence; (b) the intention is to advance a political, religious, or ideological cause; and (c) the threat or manipulation of a government or community.

According to the OECD (2002), supply chain participants may experience a range of economic effects as a result of terrorist actions. The security of the nation will be regulated and strengthened after a terrorist attack, which will enhance trade performance. Second, security spending would continue in both the public and private sectors. The private sector is expected to increase military spending and invest in national security. On the other hand, the public sector is committed to increasing its employees, resources, and information security. Thirdly, a country may start putting security measures in place, such as initiatives to improve its national security, with an increase in costs for international trade as a result of the September 11 terrorist attacks, and initiatives like those being developed by the US government, such as the Container Security Initiative (CSI) and the Mega ports Initiative (MI) (Glaser & Vitello, 2015).

2.2.2 Unauthorized Access into Port Facilities

One of the major challenges encountered by port facilities is to allow port users access without affecting port activities, trade, and other port operations. The wrong access may damage the infrastructures or properties, including loss of life, disruption to economic development, the atmosphere, and port facilities (Christopher, 2015). According to the United States Department of Transportation (DoT, 1997), criminals who have obtained access to port facilities may run illegal activities such as smuggling weapons, drugs, money, contraband, and stowaways. The DoT (1997) also added that terrorists may use a port facility to attempt to position bombs and other explosive devices.

2.2.3 Cargo Theft

Cargo theft is a significant problem for worldwide supply chain industries. Further, cargo theft has been in practice for several decades, with annual losses of up to USD 15 to 30 billion. According to the United States DoT Volpe Centre (1999), a few approaches are used to steal cargo: (a) open containers stored at terminal yards, remove goods and transport them by personal cars or delivery trucks from ports or intermodal facilities; (b) falsely alleging that a vehicle was hijacked after leaving port or warehouse, but in reality, the driver is legitimately responsible for the crime; (c) containers to be dismantled, main items removed, container re-sealed, and continuous distribution; (d) develop on a structured network to track, steal, and fenced commodities; (e) Drive in a loaded transport truck through false documents; (f) accelerate across fences and security controls; (g) steal from warehouse or from loaded trucks off the road.

2.2.4 Trafficking, Smuggling, and Customs Violations

In the maritime industry, trafficking is highly popular. Some of the items trafficked in ships are drugs, stolen goods, weapons, money, and illicit animal products. Trafficking is a business conducted by crime organizations and individuals who wish to get the ability to flee from poverty, conflict, or other tough conditions in their own country to be economically prosperous (McNicholas, 2016). Human trafficking is one of the world’s biggest threats (Gutauskas, 2009). Women and children are often trafficked and abused into sexual slavery (Gutauskas, 2009). In contrast, drug trafficking is classified as a trans-border threat. Drug trafficking can result in terrorism, arms trafficking, human trafficking, illicit migration, and the laundering of money (United Nations, 2018). The biggest number of drug trafficking cases were caught through maritime transportation, surpassing other transport modes such as rail and air (UNODC, 2015).

2.2.5 Hazardous Materials

The environment is affected by hazardous materials that may in many situations even be used for terrorist
acts. According to Christopher (2015), dangerous products are solids, liquids or gases that can kill or damage living beings, property and the environment (Christopher, 2015). Terrorists may ensure hazardous materials are used to protect their intentions through the construction of Weapon Mass Destrucions (WMDs), and untrained personnel in ports or ships with little expertise in managing hazardous materials. The mishandling of hazardous materials can be harmful and damaging.

### 2.2.6 Cyber-Attacks

The threat of cyber-attacks has been steadily a problem for seaports in recent years. According to McNicholas (2016), cyber-attacks have cost industries more realistically, from USD300 billion a year to more than USD1 trillion a year. McNicholas also argues that by 2019 the cost would amount to USD2 trillion. The damage to the ports would dramatically cost ports cash and time, making ports a critical part of global trade. The attack on the Port of Barcelona (Ilascu, 2018) and Port of San Diego (BBC, 2018) which occurred in September 2018 involved a spectacular cyber-attack on container terminals. According to Huang and Poushter (2019), a 26-nation international vulnerability survey found that four nations were primarily impacted by cyber-attacks which are the United States, Japan, South Africa, and the Netherlands.

### 2.2.7 Stowaways

Stowaways have grown from individuals who travel independently to organized crime businesses (McNicholas, 2016). Stowaways are alarming and costly for port owners as well. For economic reasons, stowaways are urged to migrate. Some of them choose to escape from hunger, conflicts, and crime or to go to a more economically prosperous country to help or support themselves or their family. There are scenarios where port workers are loaded with a specific vessel and stowaways will slip into containers from the original port of transportation. Further, crime organizations will pay off port officers or members of the crew on ships to slip in the stowaways. Finally, stowaways will slip into vessels from ports and try to avoid being caught (Edgerton, 2013).

### 3. Methodology

The researcher employed a qualitative design to achieve the goals of the study. It is essential to understand the experiences and practices of the individuals through a case study method. The qualitative design and case study method encourage the researcher to study the subject in their social environment, focusing on the individual’s viewpoint of the subject.

#### 3.1 Primary Data

The primary data is collected directly through interviews and observation. Whereas the secondary data is gained by reviewing others’ works via books, papers, report articles, and journals (Ekwall, 2007). In this study, data were gathered by interviewing port security managers (MFSO). The purpose of this interview is to figure out what they considered as potential current and future threats along with preventive security measures. A group of seven experts was selected as respondents because they have been directly involved in port security matters and activities. For the observation method, the researcher collected information by engaging in the respective port activities as the researcher is also a part of the port security responsible for ISPS Code implementation and regulation at Port Klang. Participant observation is a frequent approach for case studies, ethnographic analysis, and grounded theory.

#### 3.2 Secondary Data

Secondary data comprises raw data and publishes summaries compiled by organizations and individuals with the exception of researchers. The integration of primary data and secondary data allows the findings to be authenticated using a case study approach (Ekwall, 2007).
3.3 Data Analysis

Narrative analysis is one of the common methods used to analyze content from various sources such as interviews and observations. Powell and Renner (2003) suggested five processes to evaluate narrative evidence which are knowledge, analysis, categorization of content, recognition of patterns, and relations within and between categories and interpretation. They were then related to the literature review. The data were analyzed using a narrative analysis. Content analysis was also used to analyze documented information, for instance, journals and reports. In this study, the data analysis involved three main steps which are data reduction, data display; and drawing and verifying conclusions.

Data reduction concentrates on translating the data gathered into words. Data were obtained from semi-structured interviews that were then documented and transcribed in writing. The transcribed interviews were coded at this point in the process. This ensures that the most significant and relevant data have been chosen and concentrated to improve the data. Writing summaries and subject creation are other tasks in the data analysis process (Sekaran & Bougie, 2016). On the other hand, data display is called ‘an ordered compact information assembly that makes it possible to draw conclusions and to take action’ (Sekaran & Bougie, 2016). In this situation, data from interviews may be highly voluminous and improperly organized by the compilation of data in qualitative analysis. Proper display of data can help researchers to draw relevant summaries, and conclusions or encourage researchers to enter into the next step of study (Sekaran & Bougie, 2016). The third stream of analysis is drawing and verifying conclusions. The researcher derived a final series of conclusions from the techniques of data reduction and data display. After the whole phase of data collection has been concluded, a definitive determination is noted.

4. Findings

4.1 Current Threats

According to the participants, smuggling is the threat that port facilities which are handling containerized cargo should be aware of the most. Participants mentioned that containers are an ideal method to transport drugs and illegal contraband cargo and it is difficult to determine what is hidden inside. Even though all the laden containers were scanned before leaving from port facilities at Port Klang, but still there was some syndicate working around other ways to clear the containers. These leave many people wondering how much contraband is actually flowing through the supply chains. One can even argue that most drugs travel through container terminals undetected unless there is any information received from the counterpart. Port Klang encounters smuggling threats frequently but the number of cases cannot be indicated specifically due to security reasons.

Participants also mentioned terrorism as a current threat to be aware of where they claimed that the port is made to be aware of terrorism because of several arrests by Royal Malaysian Police (RMP) in recent years within the country. Another participant mentioned that a terrorist attack on a large port facility could impose huge damage on the global supply chain. In addition, terrorist attacks can destroy significant physical assets and supply chain infrastructures. Similarly, terrorism has also caused deaths in ports, damaging port facilities, and property, thus, terrorism is not to be ignored in the port facilities at Port Klang as one of the most potent threats. however, at the moment, Port Klang is yet to face any terrorist threats.

Besides smuggling and terrorist attack, unauthorized access through the landside and seaside is also identified as one of the threats. Participants believed that unauthorized personnel who manage to find their way into ports could cause disruptions to operations, even if these people do not have ill intentions. On a more severe note, some participants stated that if access control was not performed correctly, terrorists may gain access to the ports and commit terrorist acts. Two participants have also stated that there were a few individuals who had found their way into the port facilities at Port Klang without being granted access and working permission. Terrorists who gain entry could incur damage to port facility infrastructure and assets which may cause loss of life and damage to the environment.
In this study, the findings suggest that smuggling, terrorism, and unauthorized access are the threats to port facilities that need to be aware of. The highest number of narcotics seized is from maritime conveyances where Port Klang has also encountered such cases. Terrorism provides a large threat to container ports as it may cause loss of life, disruptions to global trade, and extremely high recovery costs. Although attacks on port facilities are relatively low compared to attacks on other maritime facilities, the impacts it could cause cannot be ignored as mentioned earlier. Hence, this study suggests the need for more awareness and measures for smuggling, terrorism, and access control.

4.2 Future Threats

A question was raised about potential threats to Port Klang, where all participants mentioned cyber-attacks. Some participants raised their concerns about how hackers could access the system to change the container numbers and location. Another participant said criminals could hack the device to transfer containers to another location in the port to unload drugs. Other relevant mentions were that hackers could hack drivers’ permits for port entry and a further participant said that offenders can hijack cargo ships that are alongside at port by hacking their systems. However, these claims could not be supported theoretically by the researcher and these justifications were considered as pure speculation.

A participant mentioned that a cyber-attack could damage Port Klang’s credibility as a premier port and cause the port to lose customers' confidence. When the participants were asked what sort of cyber-attacks could affect ports worldwide, some of them described them as huge, extreme, and massive. The attacks on Maersk and APM terminals were used as an example by three participants. The Maersk attack shut down the company’s servers, causing disruptions to about 76 terminals around the world (AFP, 2017). The shutdown of the server resulted in a total shutdown of ports in Elizabeth, New Jersey (Greenberg, 2018). Additional ports such as the APM terminal, in Rotterdam were required to use manual systems (AFP, 2017). In the end, Maersk’s attack cost USD300 million (Milne, 2017). These incidents conclude that cyber-attacks will reveal economic and financial consequences.

Next, the participants were asked about their port's preparedness for cyber-attacks. Four participants have prepared their port. However, it is not possible to say that all ports are prepared for cyber-attacks or that all ports are not ready for cyber-attacks. One participant stated that his port, through a simulation drill, was prepared for cyber-attacks. The participant hoped that the exercise would further ready the port for cyber-attacks. The objective of the simulation test or drill was to carefully look at the systems before new systems were implemented. The participants did not list the countermeasures but gave an overview of checking the systems to learn how they operate, which may also be considered to test their weaknesses at Port Klang. It has been shown that cyber-attacks are interrupting port facilities at Port Klang and are highly expensive. Automation and digitization will continuously be a trend in the port industry and are vulnerable to breaches if ports are not to strengthen their cyber systems. In the past, hackers have shown their ability. This should address why ports need to prepare for cyber threats. Further research on effective security policies to tackle cyber-attacks should be carried out.

Port Klang has an IT Department that constantly keeps up with the threat with guidance and directive from Cybersecurity, Malaysia and Malaysian Administrative Modernization, and Management Planning Unit (MAMPU). These are the relevant authorities that Port Klang deal with in terms of cyber-attack or threat. The port is certainly in a better position than it was some years ago.

4.3 Preventive Security Measures

In order to mitigate a threat, participants were asked about the type of training, drills, and exercises performed by Port Klang. All the participants who were appointed as MFSO at Port Klang replied that, as stated in MFSP, at least four training, drills, and exercises should be conducted each year. One participant responded to these training and drills as a refresher for their security personnel. This is related to paragraph 18.5 Section B of the ISPS Code, which states that exercise should be carried out every three months to ensure that the MFSP requirements are effectively enforced.
Several participants stated that they did drills and exercises to the level of security. Paragraph 18.4 Part B of the ISPS Code explained that the purpose is "to ensure that port facilities personnel are competent at all levels of security in all the duties delegated to them". One participant indicated that this training is performed in accordance with the ISPS Code national legislation. Part B section 18.1 requires the competence and knowledge of the MFOSO on a variety of matters. One more participant indicated that they should gain training and knowledge of the applicable government laws and legislation. It means that the appropriate authorities of the contracting government and MFOSOs in Port Klang can take part in different types of exercises. The Code also notes that all training courses should be performed at least once a year, and between the exercises not exceeding 18 months. The exercises mentioned herein include a complete or live exercise, tabletop or seminar, and joint exercises with other organizations such as emergency response within Port Klang.

Further, the participants were asked about how the port industry at Port Klang could reduce the chances of smuggling, trafficking, and stowaway incidents from occurring. All participants from Port Klang mentioned that security personnel should check if the seals of the containers have been tampered with, if so, they would open the containers to conduct physical inspections. They explained that they did not usually inspect imported containers due to their trust in their customers but only based on any information or suspicions. Some participants said it should be more routine at the port of origin to carry out inspections and checks. Another participant said that 100% inspections would be beneficial. Participants also mentioned that the use of more advanced scanning devices will eliminate cargo trafficking, smuggling, and stowaways through containers. The participants indicated that the reduction of contraband flow by less advanced technology scanning systems is less reliable. This statement is confirmed by the European Commission (2010) which describes that certain dangerous materials and contraband may continue to be transported unnoticed when an Act comes into force and the form of a scanning device is not defined.

In terms of unauthorized access, every port had fences that protected the port's parameters. Most said they installed monitoring cameras on their ports to monitor ports, gates, and other locations. According to the participants, their port has conducted 100% identity checks for those seeking access through the gates. The use of permanent barriers or surveillance equipment to minimize the identified port vulnerabilities is proposed in paragraph 15.15 of part B of the ISPS Code. Moreover, concerning the fencing, Part B, paragraph 16.17 recommends that limited areas be bound by fencing or other barriers considered necessary by the contracting governments.

4.4 ISPS Code

With regard to the strength of ISPS, Port Klang concluded that the port facilities are more secure than before the measures came into effect. Some of them are glad that at least measures to safeguard ports are in place. Another strength the participants stated was that the ISPS Code contributed to the government's participation in security and that communication and sharing of information have increased especially in Port Klang. A participant mentioned that one of the benefits of the Code was that ports were required to adapt to threat changes. This allows for routine audits, risk management, and MFSP updates, if necessary. However, if there is no authority to consistently conduct audits and assessments, the outcome could lead to an out-of-date MFSP. Therefore, at Port Klang, the participants have established an audit team and conduct audits annually to ensure the MFSP is up-to-date and in line with the Code.

However, when participants were asked how vulnerable their port facilities in Port Klang would be if they had only complied with the mandatory security requirements of the ISPS Code, most participants concluded that container security for checks and scanning would be lacking. The ISPS code does not address container security well enough, and Corkhill (2014) agrees with it. Corkhill (2014) added that several containers containing goods were not declared accordingly and; that may be dangerous and made of undetectable material. Participants suggested various security measures to overcome these issues. This measure includes cybersecurity measures (CyberSecurity, Malaysia and MAMPU Directive Measures) for protection against dangerous cargo and nuclear materials (MI), measures for container security (CSI), measures for supply chain security, measures for increased detections (profile scanning), measures for further inspections (100% cargo inspection), measures for security standards (ISO), and
other access control procedures (electric fences, advanced gate system, and advances surveillance cameras). The participants mentioned the ISPS Code, but they have other resources to address other threats, which may be used depending on the situation. The ISPS Code stands out due to the fact that a part of it has been made mandatory.

5. Conclusion

The findings suggest that ports find the ISPS Code methods effective in countering some of the threats mentioned. It can also be stated that the port in this study prioritizes implementing effective security measures, but at the same time, the cost aspects of enhancing security cannot be ignored.

Acknowledgments

I would like to acknowledge Dr. Durairaj Veeraiyah, Mr. Narayanasamy Rajendran, Professor Dr. Seyed Mohammadreza Ghadiri, and Mr. Balachandar Rajoo for their continuous encouragement and support.

References


Maritime Organization.


Milne, R. (2017, August 16). Moller-Maersk puts cost of cyber-attack at up to $300m. Financial Times: https://www.ft.com/content/a44ede7c-825f-11e7-a4ce-15b2513cb3ff


Factors Affecting Customer Satisfaction on Logistics Services during the Covid-19 Pandemic- as a Case Study of Headway Joint Stock Company

An Quach * & M. Vikneswary Suresh 

*Malaysia University of Science and Technology, Malaysia

Abstract: Logistics is considered an important economic sector, a market with a lot of potential for development and exploitation. With the continuous development of the economy and fierce competition, the most urgent issue for each business is to grasp, make a difference, build, and develop high service quality in order to retain existing customers as well as attract new ones. Especially during the explosive period of the COVID-19 pandemic, the difficulties, bottlenecks, and challenges for the industry became more and more fierce. Determine the factors influencing customer satisfaction, grasp the trend of customer needs, and propose solutions to build and develop logistics services not only at Headway JSC but also elsewhere. The part provides the basis for the theoretical basis and experience for the logistics industry. The research was carried out in two main steps: theoretical foundations and research through group discussions with industry experts, then quantitative research through questionnaires with customers who use the services of Headway from Hai Phong to Ho Chi Minh City. The methods used include: descriptive statistics, Cronbach's alpha reliability test, factor analysis, regression analysis, and results showing customer satisfaction with logistics services during the period. The affected phase of COVID-19 is influenced in the same way by the five initial proposed factors: assurance, price policy, responsiveness, reliability, and empathy. The assurance factor has the greatest impact, with a coefficient of 0.380, followed by the price policy factor, with a coefficient of 0.335.

Keywords: customer satisfaction, logistics, logistics service quality, model of satisfied customers

1. Introduction

In the face of relentless competition and a globalized environment, customer satisfaction plays an extremely important role in the success of a business. Customer satisfaction is the key to success, profitability, and sustainable development for businesses in any industry, including the logistics industry (Balci et al., 2018). The shipping business is an extremely complex service industry that is very important to the global supply chain, to international trade, to customers, to partners around the world (Balci et al., 2018; Gao & Yoshida, 2013). In view of these conditions of this market, to survive, the level of customer satisfaction is very important (Midoro et al., 2005). Throughout the process, customers are now more educated, empowered, and involved (Labrecque et al., 2013). Customers no longer play the passive role they once did, but instead take charge of all actions related to their daily transportation needs, such as booking with a carrier or forwarder, tracking items, producing shipping labels, or other activities at their facility (Gao & Yoshida, 2013). As a result, if carriers fail to match their consumers' service standards, they risk being marginalized while remaining competitive. Organizations know that providing high quality services is essential for profitable and sustainable growth, thus they are required to invest in quality systems (Tahir et al., 2007).

In recent years, the logistics service industry in Vietnam has grown significantly, contributing significantly to the country's economic development. According to figures from the Ministry of Industry and Trade, logistics services account for 15-20% of the country's GDP (equal to $12 billion USD), and
there are over 1,000 logistics service providers registered in Vietnam, with Vietnamese companies accounting for nearly half of them. As a result, in order for Vietnamese logistics service businesses to thrive and grow, they must gradually enhance the quality of their logistics services in order to boost customer satisfaction and attract new customers.

The COVID-19 outbreak has been affecting people all across the world since 2019 (Cai et al., 2020). Due to locking of the logistical system, which decreases customer satisfaction with logistics providers such as carrier, forwarder (Tedjakusuma & Partners, 2020). Lockdowns make the logistics system hampered as the global shipping sector is confronted with a significant problem: a scarcity of empty containers, a lack of space, and a scarcity of human resources, particularly in Asia. As a result, the global cost of container shipping has reached an all-time high. Transportation, warehousing, and freight were all significantly impacted as a result of the hampered customs clearing services.

As a company that has been in business for a long time and has a lot of experience in the field, customers are the invaluable assets of every business, so customer satisfaction is an extremely important goal for every business by Headway JSC as a Freight Forwarder. Therefore, knowing the elements affecting customer satisfaction during the Covid-19 period is a critical issue that must be addressed as soon as possible in order to capture the assessment of influencing factors, customer satisfaction levels, and so on. Customer satisfaction will be a metric that reflects consumers' expectations and aspirations for Headway JSC's logistics services. Importantly, no study on customer satisfaction for Logistics services has been conducted by Headway to yet. This study will aid Headway JSC in improving service quality to retain customer and attract new customers. As a result, the focus of this research will be on "the factor effect customer satisfaction in logistical services with Headway Joint Stock Company during the covid-19 pandemic."

2. Literature Review

2.1 Logistics Industry

The logistics industry is a circle that includes activities such as: goods storage, packaging, warehousing, goods rotation, customs clearance, etc. to achieve the ultimate goal of transferring products and goods efficiently from supplier to consumer (Kasilingam, 1991). The core and most profound characteristics, as well as the importance of the logistics industry, will be presented in the article below.

2.1.1 Definition of Logistics

Each business has a different size, characteristics, strengths and weaknesses, and strategies (Rushton et al. 1989). So, in general, there are five main components of today's popular logistics, which are packaging, inventory management, transportation, and information technology, which are shown more specifically in Figure 1.
2.1.2 The Role of Logistics Activities

Logistic contributes a lot to the performance of all businesses. Logistic helps businesses become more efficient with their partners, hereby reducing costs for all logistics-related activities such as warehouse management, materials management, production, transportation, delivery, and helps satisfy its customers Stank et al. (1998).

2.2 Logistics Services

The field of logistics is globally used in many different fields, such as society, transportation, storage of goods, and military units to provide goods for combat purposes (Kasilingam, 1991). Before the rapid development of the world economy, logistics services were a service that played a very important role in international trade transactions. According to the American Council of Logistics Management, logistics services include activities such as effective planning, organization, implementation, control, efficient storage and circulation of goods, services, and related information from the point of supply to the consumer efficiently to meet and satisfy customer needs. Logistics is a part of the supply chain (Kasilingam, 1991).

2.2.1 Service Quality

In fact, many researchers have considered the SERVQUAL model (Parasuraman et al., 1988) as a practical and quite comprehensive model to objectively assess service quality through actual customer perceptions. The SERVQUAL model is a multidimensional research tool designed to capture customer expectations and their perception of a service in five dimensions that are believed to be the most comprehensive representation of service quality. It consists of five components, which are reliability, responsiveness, assurance, empathy, and tangibles.

- **Tangibles** are defined as the attractiveness, convenience, and modernity of a service's external or physical elements. If we equip modern facilities with attractive premises and customer service staff with nice, neat uniforms, their good appearance and professionalism will contribute to the
competition in the Tangibles aspect. In addition, tangibles are also all those attractive products or materials that accompany the service provided.

b. **Reliability** helps measure the ability to create trust and peace of mind in the service provided to customers. Reliability shows the ability to provide the promised service accurately and in accordance with the supplier's commitment to the customer. This will show that the business is reliable in providing the service, such as the right quality, at the right time, in the right way, and meeting the set requirements. Moreover, it also shows the reliability of the business in its ability to handle arising problems or maintain error-free service for customers.

c. **Responsiveness** is the employee's behavior that creates trust with the customer and the supplier's willingness to provide fast and accurate service. That is the initiative to update and notify customers about the time to get service performance and service performance status. In addition, it also shows the ability of businesses to respond quickly and flexibly in helping to provide optimal solutions to unexpected problems.

d. **Assurance** helps measure the ability of employees to perform services in a timely manner and in accordance with customer requirements. The role of employees is very important here, such as complying with business processes, understanding products, professional attitudes, and understanding customers so that they can make customers feel safe and confident with the business. There was professionalism throughout the transaction, showing wisdom and courtesy to customers. Any business is also involved in maintaining and developing service quality to satisfy customers.

e. **Empathy** that customers always need attention and understanding from service providers. Therefore, empathy is the ability to care, sympathize, care, and enthusiastically advise customers on the most appropriate solutions and policies. The most obvious example is the ease of access to employees and businesses whenever a customer needs it, even outside of business hours, demonstrating the unlimited potential for giving customers care and understanding. I understand the difficulties as well as the requirements of the customer. Always deal with customers in a polite manner, be attentive to their different needs, create customer satisfaction, and maintain service quality.

![Figure 2. The Model of SERVQUAL (Parasuraman et al., 1988)](image)

### 2.3 Some Research Models of Satisfied Customers

#### 2.3.1 Kano Model

The Kano Model is a theory of product development developed in the 1980s by Professor Noriaki Kano.
2.3.2 National Index Model of Customer Satisfaction in Vietnam Male (Vietnam Customer Satisfaction Index - VCSI Model)

Customer satisfaction is defined as a comprehensive assessment of a business's use of a service or after sales activity, and this is the core of the CSI model.

Table 1. Measurement Factors

<table>
<thead>
<tr>
<th>Latent Variable</th>
<th>Measurement Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Causal Variables</td>
<td>Quality expectation</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived quality</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Brand image</td>
<td>overall impression of the brand image</td>
</tr>
<tr>
<td></td>
<td>the distinctiveness or degree of distinctiveness of the brand from the customer's point of view</td>
</tr>
<tr>
<td>Perceived value</td>
<td>quality rating by price</td>
</tr>
<tr>
<td></td>
<td>judging by quality</td>
</tr>
<tr>
<td>Central variable</td>
<td>Customer satisfaction</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Outcome variable</td>
<td>Customer complaints</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Le Van Huy & Nguyen Thi Ha My, 2007)
2.3.3 Functional-Relational Customer Satisfaction Model

![Functional-Relational Customer Satisfaction Model](image)

*Figure 4. Model of Functional-Relational Customer Satisfaction (Parasuraman et al., 1994)*

2.4 Theoretical Foundation and Conceptual Model

After studying many related documents, this study has proposed five hypotheses with five factors representing the factors affecting satisfaction with logistics services of Headway company during the COVID-19 pandemic.

2.4.1 Reliability

In the study of the author, Ruth Banomyong et al. (2005) explained that the reliability of the service provider based on the accuracy of the set of documents and transit time will affect the satisfaction of customers for logistics service providers in Thailand. On the other hand, according to Notteboom (2011), the reliability of shipping line services in port selection is reflected in the reliability of information processing. Based on the theoretical basis and the actual situation of Vietnam, as well as Headway JSC, hypothesis H1 is stated as follows:

*Hypothesis H1: Reliability has a positive impact on customer satisfaction with logistics services during COVID-19.*

2.4.2 Responsiveness

The ability to respond with logistics services to a third party (3PL) is the ability to diversify its services. Ruth Banomyong et al. (2005) also explained that the responsiveness of logistics businesses is reflected in their ability to consolidate and monitor goods. Before the impact of the COVID-19 epidemic. Due to the sudden change, the workload of employees also increased, so Headway JSC’s ability to respond, update the situation, as well as take care of customers was reduced. In fact, Headway has received many complaints from customers. Based on the studies of previous researchers and the actual challenging situation that Headway is facing, the hypothesis H2 is given as follows:

*Hypothesis H2: Responsiveness has a positive impact on customer satisfaction with logistics services during COVID-19.*
2.4.3 Assurance

The assessment of logistics service quality, Limbourg et al. (2016) also said that assurance is one of the five factors affecting the service quality of enterprises besides reliability, sensitivity, responsiveness, and empathy. In addition, the sudden increase in workload affects the work performance of logistics staff who are ready to support customers with arising problems. From the theoretical basis and the actual situation regarding the assurance factor, hypothesis H3 is given as follows:

**Hypothesis H3:** Assurance has a positive impact on customer satisfaction with logistics services during COVID-19.

2.4.4 Empathy

This empathy is related to the ability and aptitude of employees to understand and empathize with customers during service interactions with each other (Hwang & Kim, 2016; Markovic et al., 2015). During the COVID-19 outbreak, many changes and effects occurred that took most of the staff's time to handle, plus the sudden increase in the volume of goods due to the increased world demand after the stable period from the COVID-19 epidemic has kept Headway employees in a state of overload. Access to Headway employees is no longer as convenient and easy as before, and Headway employees no longer have time to pay attention and understand customer requirements as before. Headway employees are unable to thoughtfully prioritize customer interests and customize services in response to changing needs during the COVID-19 pandemic. Based on the background research and the current Headway test, the H4 hypothesis is put forward as follows:

**Hypothesis H4:** Empathy has a positive impact on customer satisfaction with logistics services during COVID-19.

2.4.5 Price Policy

Price is highlighted as an important factor affecting customer satisfaction (Anderson et al., 1994). Due to the impact of the COVID-19 pandemic, Vietnam's economy was affected and many businesses faced difficulties. Customer delayed or stopped production in response to the pandemic, thus severely affecting business revenue. The issue of effective capital flow and ensuring appropriate costs to maintain production operations is one of the top concerns of enterprises. Therefore, the price policy factor of Headway is considered an aspect to consider affecting customer satisfaction. Hypothesis H3 is put forward as follows:

**Hypothesis H5:** Price policy has a positive impact on customer satisfaction with logistics services during COVID-19.

The proposed conceptual model is graphically presented in Figure 5.
3. Proposed Methodology

The research objectives are (i) to identify the factors affecting customer satisfaction with logistics services, (ii) to measure the level of influence of the factors on customer satisfaction with logistics services, (iii) to examine the relationship between logistics service quality and customer satisfaction and (iv) to propose solutions to enhance and improve customer satisfaction for logistics services at Headway JSC during Covid-19 pandemic.

After determining the research objectives, the research was carried out in two main steps: theoretical foundations and research through group discussions with industry experts, then quantitative research through questionnaires with customers who use the services of Headway from Hai Phong to Ho Chi Minh City. The methods used include: descriptive statistics, Cronbach's alpha reliability test, factor analysis, regression analysis, and results showing customer satisfaction with logistics services during the period. The affected phase of COVID-19 is influenced in the same way by the five initial proposed factors: assurance, price policy, responsiveness, reliability, and empathy.

A questionnaire is a technique used to collect data by making a statement to be answered or a set of questions for the interviewee to answer. The type of questionnaire in this study is closed-ended. The sample was selected according to the convenience, non-probability method. A convenience sample is a non-probability sample in which the researcher uses the closest and available subjects to participate in the study. Quantitative research through surveys to collect customer opinions using questionnaires is conducted. SPSS software version 22 was used for the research.

4. Conclusion

Customer satisfaction is an important concept in both academic work and business environments. In the business environment in general and the logistics industry in particular, customer satisfaction is one of the important factors that businesses need to pay attention to because of its importance and the benefits it brings to businesses. This research topic provides readers with a deeper insight into customer satisfaction in the logistics sector.
This research result is very important to help Headway's management reflect strengths and weaknesses as well as the current nature when the needs of customers are always the most volatile during the COVID-19 period. With the research results, Headway can make recommendations and plans that are suitable for them to improve capacity and stabilize performance in service delivery in time. This is what customers always expect from service providers like Headway. Customer satisfaction is always associated with this key point. The research also shows that service quality has a close relationship with customer satisfaction and plays a great role in the success of Headway because when Headway manages the service quality well, it will help the quality of the service and improve business performance.

This is a solid basis to help businesses like Headway retain customers, dominate, expand the market and strengthen their position and reputation in the market. Through this research, it helps Headway to clearly and correctly identify the factors affecting customer satisfaction so as to prioritize investment and determine the right direction to improve service quality in line with customers' expectations of both usefulness and price. From the research results of the Headway company, it will be the next research base for the logistics industry, a reference base for logistics businesses, especially in the period when there are very few studies on factors affecting customer satisfaction.

Acknowledgements

The authors express their gratitude to the Malaysia University of Science and Technology for their support in the publication of this conference paper.

References


Integrated Supply towards Maintenance Repair Overhaul (MRO) in the Aviation Industry

Chandravathanah Nadarajan*
Malaysia University of Science and Technology, Malaysia
* chandravathanah@pg.must.edu.my

Abstract: Aircraft maintenance, planning, and scheduling in the aviation industry consist of planning, control, and effective implementation of materials supply (spare parts), operations (disassembly, assembly, and inspection, activities), and resources (workers, maintenance tools, and equipment, machines, and transport). This paper reports current practices, problem areas, and aircraft maintenance issues and maximizing service level that uses integrated supply technique. The maintenance, repair, and overhaul industry undergo fundamental change as original equipment manufacturers aim for more after the sale-services support and third-party MRO (maintenance repair and overhaul) providers come under pressure out of business. Since introducing new-generation aircraft into service, more MRO companies seek partnerships with the OEMs to secure access to a future market’s slice. Strategic cooperation has become imperative for maintenance firms, be it with aircraft manufacturers, airlines, MRO companies, spare parts suppliers, or ideally, a combination of these players. The present paper concludes that key improvement areas with an integrated system are more beneficial for MRO company operators and their customers. Integration Supply's potential benefits are achieving significant operation cost savings and improving the aircraft spares’ lead time for maintenance.

Keywords: integration supply, MRO Aviation, spare parts, cost

1. Introduction

Under the current highly challenging and competitive business environment, most companies are looking for innovative solutions to control costs and improve efficiency. Airline companies are striving hard to reduce the supply chain cost and achieve higher service efficiency and quality.

MRO (an abbreviation for Maintenance, Repair and Operation/Overhaul) is an organization or one of the largest aircraft-related companies that hold many repairing stations/services and dealt with heavy aircraft maintenance. According to Ronald Donner (October 14, 2010), MRO is the ultimate phase widely used to describe aircraft maintenance activities accurately. The integrating supply for the MRO aviation industry comes into the need for supply chain management that intentionally originated to simplify the purchasing and inventory practices.

According to Awad and Nassar (2010), The integration supply method shall promote better time and money-saving by consolidating its many vendors into one (simplification from many distributors and vendors into only one that can provide all the necessary services in a more extended time). The segmented integrated supply can give a solidified MRO service provider mechanism by only focusing on its core competencies rather than being distracted by their clients' complicated demands.

The core of gaining competitive advantage through Supply Chain Management (SCM) is Supply Chain Integration (SCI); when integration achieves, the supply chain operates as a single entity driven directly by customers’ demand (Farhoomad, 2005). However, evidence found in the supply chain literature shows several challenges faced by organizations regarding Supply Chain Integration (Awad & Nassar, 2010; Sweeney, 2011).
2. Literature Review

2.1 Challenges in Aviation Industry

Throughout the years, the nature of the challenges faced by the Aviation MRO business has changed dramatically. The initial challenge for the Aviation MRO business was pure 'production achievement. However, in the later phases of the life cycle of aircraft spare parts, obtaining licenses from OEMs to maintain, repair aircraft components, and inventory quality control change the market forces apart from the initial 'production' goals.

The Aviation MRO industry has to increase the margin between stock and value by considering every possible resource to maximize operational efficiency and minimize effort, optimize, and streamline business operation (Stall, 2005). Therefore the aviation MRO industry has to manage efficiently to minimize the total maintenance costs, reduces aircraft turn-around-times (TAT), and establishes a high return to the business.

The failure in the current MRO supply chain management procedures has caused multiple detrimental effects like the consumption of unnecessary money and the duplication of uncontrolled inventories. Besides, suppliers are also not coming up with methods to improve the supply chain management system and to reduce their client's total cost of ownership (TOC).

The significant threat currently that the Airline MRO industry sees ahead is the continuous increase in operation cost and complexity throughout the supply chain. Now, airlines are spending more money on aircraft maintenance than on fuel and crew expenses. Airlines need to maximize their aircraft's profit margin by decreasing the operational costs of aircraft maintenance. Mahour et al. (2010) investigated the relationship between operational factors toward airline profitability. Among other factors, the hourly aircraft maintenance cost was a valuable determinant to the industry optimization.

Spare parts lead time is another top challenge for the aviation industry in optimizing their MRO supply chains and managing the complexities in the most hypercritical time to have the correct spare part in the shortest time and competitively within another maintenance provider.

Many critical parts and components have extended lead times and are expensive. When aircraft is waiting for spares and maintenance, and the plane is grounded it does not only cause a massive inconvenience to passengers, it can also be a significant financial burden on airlines. Therefore, MRO companies ensure keeping in-house spare parts inventory as many as possible to support the valuable customers. According to Zuidberg (2014), most of the worldwide aviation industry's profit margins are under continued pressure. Although in times of high economic growth, many airlines are facing difficulty in making a profit.

2.2 Integration Supply Chain

According to Carol Woods (2018) integrated supply chain or supply chain integration is a close alignment and multiple coordination within a supply chain or 'collaboration' between every supply chain in an industry (in this context, the aviation industry). Integration is essential and particularly imminent since all parties involved in fulfilling the crucial reciprocating accountability held by an organization (this includes purchasing a raw material(s), manufacturing a product, collecting and supporting services as well).

On the other hand, the integration can be referred to all the 'gaining' inputs that aids in producing products and fulfil the purchase deliberately. According to Ostdick (2017), these circumstances are
essential for ensuring that the end goal of a company (precisely, to make satisfying products in compliance with customer's needs and wants).

According to Alfalla et al. (2012), traditionally 'integration for supply chain' is defined as a process wherein every phase's requirement begins from raw materials' procurement until the final step of production, quality control, packaging, distribution /supply eventual delivery. As mentioned above, all of the steps are streamline accordingly to ensure it does not exceed the right lead time and the overall productivity to deliver the product to the respective customers.

Integration techniques are the process from sourcing to production until distribution across the supply chain. Therefore, the integration supply concept is commonly established as a fundamental process of efficient supply chain management (SCM) (Cooper et al., 1997; Ellram & Cooper, 1990; Mentzer et al., 2001). Stank et al. (2001) indicates that the goal of supply chain management throughout the value chain is "integration, cooperation, and coordination."

In other studies Bowersox et al., (1999), Frohlich and Westbrook (2001) and Naylor et al. (1999) pointed out that the purpose of Supply Chain Integration is to ensure a correct, timely and smoother flow of products and services to efficiently deliver maximum value to the consumer at low cost and shorten the period.

According to Christopher (1994) the supply chain is all processes and activities that generate value for the organization and the end customer. A supply chain is a network of an organization with good communication from upstream to downstream. In the supply chain context, integration is a brief collaboration and cooperation mechanism in which supply chain companies cooperatively achieve mutually beneficial results (Pagell, 2004).

An integrated supply chain that is interconnected is different from a traditional supply chain. A traditional supply chain does not connect as it relies on the independent or disconnected distribution of goods (Sabath, 1995). There are at least two significant disadvantages of a traditional (non-integrated) supply chain. First, an increase in demand uncertainty due to separated information flows and forecast accuracy might decrease at each supply chain stage. For both manufacturers and suppliers, an inaccurate projection typically causes a surplus inventory. Second, since business processes around supply chain members are not closely linked, a traditional supply chain typically responds slowly to market demand changes.

Researchers have focused on analyzing the supply chain's integration in various industries, such as manufacturing equipment (Sahin & Robinson, 2005), and at construction (Briscoe & Dainty, 2005). Nonetheless, some research have been conducted in the automobile industry (Wong and Boon-itt, 2008), metal parts, machinery, and manufactured equipment (Frohlich & Westbrook, 2001). In addition, Swink et al. (2007), Quesada et al. (2008), Sezen (2008), and Kim (2009) have also conducted studies in other related sectors.

The outlook for the air transport MRO (Maintenance, Repair, and Overhaul) market is dominated by expanding global aftermarket service networks, including virtually unlimited airlines' third-party repair organizations. Complete aircraft maintenance services, asset management, and engineering support are among the integration levels developed by MRO organizations.

3. Conclusion

The aviation industry has slowed down in terms of growth after the economic recession. With issues such as reducing airlines' investment and searching for reduced operating costs, suppliers of spare parts had to change the new value proposition and provide more programmatic solutions to meet the aviation industry's demand.

An integration strategy between aviation supply chain members is needed for adequate physical and information flow. On the other hand, high integration levels may benefit, but continuous improvement
is required to sustain. This dimension's most established element is knowledge sharing, though this information is typically not obtained from joint planning between partners.

Increasing globalization forces companies to look for a more innovative and more cost-effective way to do business. Supply chain integration is essential for an organization's effectiveness. Companies must adapt integration systems to provide visibility and flexibility in the supply chain process to keep up with the evolution.

An organization's operations might not be profitable if these fundamentals aren't in place to help cross-functional supply chain processes.

Acknowledgements
The authors express their gratitude to the Malaysia University of Science and Technology for their support in the publication of this conference paper.

References


Wong L, Data analysis in qualitative research: a brief guide to using nvivo, MSc, Ph.D., Faculty of Medicine, University of Malaya, Kuala Lumpur, Malaysia, 2008

MANAGEMENT AND MARKETING
Capital Cost and Profitability

Nguyen Cao Anh\textsuperscript{a*} & Thai Hong Thuy Khanh\textsuperscript{b}
\textsuperscript{a,b}University of Nguyen Tat Thanh, Vietnam
*ncanh@ntt.edu.vn

Abstract: This article gives capital cost and profitability to exploit the efficacy in financial leverage. The research methodology is based on the theory of investment to expand the formula of capital structure for the extent of aspects: (i) the pressure of capital-cost payment, (ii) the adjustment of financial leverage to prevent liquidity risk, and (iii) the add-issue of equity budgets under the uptrend of stock market. The research contributes to the theory of investment on the aspect of the efficacy in financial leverage and helps policy makers have a new look of operating the sustainability of capital market in long-run.

Keywords: capital cost, capital structure, financial leverage, profitability, risk-taking

1. Introduction

Capital cost and profitability are two financial keywords in the theory of corporate finance, cited in much-studied documents focusing on the analysis of capital financing and investment performance. Seeking theoretical research gaps of capital cost and profitability is derived from the Modigliani and Miller (1958) theorems of capital structure and financial leverage at a firm level designed on a channel of certain investment and the Myers (1984) theoretical set of trade-off, pecking order, and market timing for capital financing designed on a channel of uncertain investment, and both capital financing and investment performance are relevant to the evaluation of market equity, which is one of the most important problem statements in the capital market.

![Figure 1. A Structure of Capital Asset Pricing](image)

Problem 1. The absence of profitability in the Modigliani and Miller (1958) theorems.

It is known that the Modigliani and Miller (1958) theorems are the pioneers for giving the capital structure and financial leverage at a firm level which build the foundation of corporate finance, appraisal of investment projects, and management of investment projects to provide precious theoretical inferences for the shareholder evaluation of certain investment that firms are running activities of
investment and business performance to support the development of economic value-added theory (Abate et al., 2004; De Villiers, 1997; Grant, 1996; Young, 1997). However, the traditional formula of capital structure in the Modigliani and Miller (1958) first theorem is only laid on the certainty of capital financing throughout the specific expected future cashflows to give an average weighted capital cost as follows:

\[
WACC = \frac{E}{E + D} \times R_e + \frac{D}{E + D} \times R_d,
\]

in which \(WACC\) is weighted average capital cost at the firm level, \(R_e\) is equity cost on equity \(E\), and \(R_d\) is debt cost or interest rate on debt \(D\). The absence of profitability the Modigliani & Miller (1958) theorems are hard to explain the efficacy of capital financing and investment performance under the uncertain channel, although the formula (1) builds a complete structure of capital financing for the activities of investment and business. Profitability is the key factor in evaluating capital asset pricing which investors and stakeholders could catch some opportunities to exploit the profitable cake of investment performance throughout the capital financing in the capital market, which they seek the rational market prices in both speculation and ownership (Fama, 1965; Miller & Modigliani, 1961), in the policy of profit distribution (Aharoni et al., 2013; Fama & Frenh, 2006; 2015; Gordon 1959, 1962, 1997; Novy-Marx, 2013; Zhang, 2017), but it is unknown that a key difference of the cashflows between the capital financing of investors and stakeholders and the investment performance of all firms\(^2\) makes a barrier for evaluating market equity.

In Figure 2, the stochastic stock price is always distributed by the cashflow demand that investors use the money to buy and hold stocks for the ownership and the stock supply that shareholders sell stocks for the profitability on the market transaction which “how to sell risks” for the stakeholders last holding stocks with the inflation market price is popular in a market uptrend, “how to use stocks to sell them on the left hand and use money to buy and hold stocks on the right hand” is a gambling core in controlling stock price, and “how to control money from these investors’ pockets to the others” is the end of market cycle on abnormal market transaction from the market uptrend to the market downtrend. It is experienced that the stock market is the channel of intelligent investment to know how to borrow the external resources of investors’ cashflows to stimulate the inflation market price in a market uptrend as

\(^{2}\) Firms includes corporations, security companies, and commercial banks, all listed in a stock market.
well as shareholders’ stocks to stimulate the deflation market price in a market downtrend on the abnormal market transaction. And the key point of stock price distribution is the role of the central bank monetary authority to control cash flows into or out of the stock market by the financial instruments such as the regulatory interest rate that the CAPMs use to measure the market risk premium, the capital regulation imposed for commercial banks in increasing the chatter capital and surplus capital, the mechanism of cross-ownership on the same financial assets in the banking system to make financial gaps in the market risk management, so-called a signal of the financial crisis. It could be found that the central bank is a key bridge between the market uptrend and the market downtrend, or between the inflation market price and the deflation market price.

On contrary to the stock price, the market equity is distributed by the capital financing of investors and stakeholders and the investment performance of all firms throughout managers in running activities of investment and business which the factors of tax shield of interests, bankruptcy costs, agency costs, asymmetrical information, etc. are exploited in the best way on the risk assets such as capital assets and real estates in accordance with the efficient capital market. So, the Myers (1984) theory gives a set of trade-offs, pecking order, and market timing on the viewpoint of the theory of modern business for explaining the limitation of capital financing in two Modigliani and Miller (1958) theorems at the firm level.


Myers (1984) theoretical set of trade-offs, pecking order, and market timing contribute to modern corporate finance by explaining the reality of capital financing, how to evaluate the benefits of tax shield of interests and the expenses of interests in the debt financing, the prior choice of funding sources: retained earnings, debt, and equity for financing investment projects and business; issuing equity or increasing chatter capital and surplus capital in the market uptrend. Although this evaluation of Myers (1984) theoretical set makes short-run competitive advantages of capital financing, it causes economic vulnerability in general consideration of an economy, such as the tax shield of interests and the corporate-income tax avoidance, the conflicts and insolvency risks between stakeholders and managers after a market cycle which the stakeholders last holding capital assets are trapped by their ambition on the attractive profitable capital assets. A consequence of an economic vulnerability in the current mechanism of the capital market could make financial crises in market cycles when short-run competitive advantages of capital financing are still not set up in the fundamental principles of economic activities that the market of commodities and services is the basis for development rather than the capital market for speculative activities.

Problem 3. The intentional formulation of the capital asset pricing model (CAPM).

It is experienced and interesting that the CAPM is a typical model in academic research for evaluating the market equity from the viewpoint of central bank monetary authority in the real world of capital asset inequality, in which the variable of market risk premium is a key factor to reflect the security market line (SML), see Figure 3. To evaluate the efficiency of market risk premium to estimate the beta coefficient for stock risk premium, the author borrows an expected equation of the security market line in the CAPM to explain some limitations that the SML is the slope-up market line of all stocks listed in a stock market:

\[ E(R_i) = R_f + [E(R_m) - R_f] \times \beta_i, \]  

(2)
in which \( R_i \) is return for portfolio \( i \), \( R_m \) is market return, and \( R_f \) is regulatory interest rate of central bank, and \( \beta_i \) is portfolio beta of market risk premium, moving around market beta coefficient \( \beta_m \), equivalent to \( \lim_{\beta_i \rightarrow \beta_m} \beta_m = 1 \). In the condition of efficient stock market \( E(R_m) - R_f > 0 \), or the periods of market recovery and market uptrend, an increase in the market risk premium \( E(R_m) - R_f \) leads to an increase in portfolio risk premium \( E(R_i) - R_f \) to formulate a positive covariance \( \text{cov}(R_i, R_m) > 0 \) for explaining that the SML is the slope-up market line. But the formula (2) is unknown that, in the condition of inefficient stock market \( E(R_m) - R_f < 0 \), or the period of market downtrend, a decrease in the market risk premium \( E(R_m) - R_f \) leads to an decrease in the portfolio risk premium \( E(R_i) - R_f \) to formulate a positive covariance \( \text{cov}(R_i, R_m) > 0 \) for not supporting that the SML is still the slope-up market line under such a negative expected market return that market beta is insignificant for explaining the financial meaning of market risk on the percentage flat\(^3\) when comparing the inner covariance between the portfolio return and the market return, or the comparison between the percentage of the expected portfolio return and the percentage of the expected market return without any real weight to measure a structural equilibrium of all portfolios \( E(R_m) = \sum w_i E(R_i) \). So, the author provides a structural model to connect econometrical algorithms and the financial meaning of beta coefficient in a regressive structural model. For instance, the profit \( \pi \) is a function of the break-even market price \( p \), to reflect a relationship between profit \( \pi \) and break-even market price \( p \), expressed in a regressive expected equation \( E(\pi) = \tilde{\pi}_0 + \hat{r} \times E(p) \), in which \( \tilde{\pi}_0 \) is expected profit for the ownership, and \( \hat{r} \approx \pi / p \) is long-run return for profitability, and \( E(\ldots) \) is expected value.

![Figure 3. The Security Market Line of Expected Return and Portfolio Beta Combination](image)

It could be found that the given CAPM is the intentional formulation to make a playing field of the percentage flat for financial analysts, researchers, portfolio managers, scholars, etc. cited in much-studied documents relevant to capital asset pricing so that all capital assets could be evaluated on one dollar in real modern world (Fischer & Mehrling, 2012). The true or false in CAPM has many contradictive arguments, especially market return and portfolio return without real weights could plus as usual, 3% of portfolio return on ten mil. dollars are also equal to 3% of the market return on one billion dollars, it is abnormal for evaluating real equity so exchange methodology from percentages for

---

\(^3\)Percentage flat of returns and interest rate is evaluated on one dollar for all the assets in CAPM. For example, expected portfolio return \( E(R_i) = 6\% \) on one dollar, expected market return \( E(R_m) = 5\% \) on one dollar, regulatory interest rate \( R_f = 2\% \) on one dollar, estimated alpha \( a_i = 1\% \) and beta \( \hat{\beta}_i = 1 \); then the CAPM is only a relative equality \( E(R_i) - R_f = \tilde{\alpha}_i + \hat{\beta}_i [E(R_m) - R_f] \), resulted as \( 6\% - 2\% = 1\% + 1 \times [5\% - 2\%] \).

222
values needs a logical measurement in both finance and statistics (Nguyen Cao Anh & Nguyen Viet Bang, 2021).

Next, the remainders of the paper are organized as follows:

Section II: Foundation, providing a theoretical framework for establishing fundamental principles of capital cost and profitability to give the connection of real cashflows between the capital financing and the investment performance for evaluating market equity on aspects of the equity risk financing and the debt risk financing combined with the expected market return in the stock market.

Section III: Theoretical discussion, showing the limitations of capital asset pricing in the theoretical framework to seek some research gaps.

Section IV: Conclusion and Further Research.

2. Foundation

In the theoretical framework, capital cost and profitability are attached to capital financing for activities of investment and business and investment performance for equity ownership and profitability in the stock market, which the role of central bank monetary authority is a key bridge of market transaction between the market uptrend and the market downtrend, which the investors pay attention to internal market risk, so-called a signal of market uptrend crash, how to control money from these investors’ pockets to the others after a market cycle, how to use the money to buy and hold stocks on the left hand and use stocks to sell them on the right hand for stimulating investors’ ambitions of profitability in a gambling core of speculation. Therefore, the foundation of capital cost and profitability in the context is developed on the equilibrium structure in which the connection of real cashflows between capital financing and investment performance is a central point of this research to establish the following fundamental principles for evaluating market equity.

The expected market return \( E(R_m) \) is the dimension in stock market that could connect with market value added \( MVA \) for evaluating market equity throughout the internal return rate \( IRR \), or the maximum capital charges for the stakeholders which finance the activities of investment and business. Therefore, the market value added \( MVA \) is formulated on the internal return rate \( IRR \) derived from the formula of market value added \( MVA \) (Grant, 1996; Young, 1997) as follows:

\[
MVA = \sum_t \frac{NOPAT_t}{(1 + IRR)^t} = 0. \tag{3}
\]

where \( MVA \) is market value added to reflect total retained earnings in the whole activities of investment and business, \( NOPAT \) is net operating profits after tax, including total capital charge \$WACC\ paid for stakeholders and total retain earnings \$RE\). When the manager, the agent of shareholders, uses the critical value \( NOPAT = \$WACC + \$RE \) for the activity of capital financing. The structure of internal return rate \( IRR \) is determined on the extent of the activity of capital financing that could connect with the expected market return \( E(R_m) \) to analyze two key elements: the equity ownership of shareholders and the debt borrowing of debtholders at market equilibrium that the expected market return \( E(R_m) \) only represents the equity ownership under no signal of speculation, that is \( E(R_m) = IRR \):

\[
E(R_m) = IRR = \frac{E}{E + D} \times (R_e + RE_e) + \frac{D}{E + D} \times R_d. \tag{4}
\]
where $E$ is book equity of all firms listed in stock market with real equity cost $R_e$ paid for all shareholders, $D$ is book debt of all firms listed in stock market, including the deposits of commercial banks, with real debt cost or real interest rate $R_d$ paid for debtholders or lenders, and $RE_e$ is ratio of retained earnings on book equity.

In the formula (4), it could be exchanged for the structure of the equity risk financing and the debt risk financing under the equity ownership $a$:

$$
(R_e + RE_e) - E(R_m) = \frac{D}{E} \times [E(R_m) - R_d].
$$

Then, the equity risk financing $(R_e + RE_e) - E(R_m)$ represents the shareholders’ equity ownership for holding the capital assets and the debt risk financing $\frac{D}{E} \times [E(R_m) - R_d]$ is the advantage of efficient financial leverage in using the source of debt financing under no signal of speculation in stock market, $E(R_m) - IRR = 0$.

In the condition of speculation that the expected market return is greater than the internal return rate, $E(R_m) > IRR$, the market equities of all firms in stock market is overvalued at market level, suitable for seeking short-run profitability from the speculation under a signal of market uptrend crash that the expected market return $E(R_m)$ would reach at the expected market risk return $E(R_m^*)$. Then, the structure of the equity risk financing and the debt risk financing under the internal market risk:

$$
(R_e + RE_e) - E(R_m) < \frac{D}{E} \times [E(R_m) - R_d].
$$

In the condition of efficient capital financing that the expected market return is lower than the internal return rate, $E(R_m) < IRR$, the market equities of all firms in stock market is undervalued at market level, suitable for seeking the long-run capital financing rather than the short-run profitability in speculative performance. And it could be found that this is the period from the market downtrend to the market recovery, suitable for restructuring capital assets at the deflation market price:

$$
(R_e + RE_e) - E(R_m) > \frac{D}{E} \times [E(R_m) - R_d].
$$

The equilibrium structure of capital cost and profitability attached to the expected market return suggests a new methodology for capital financing and investment performance which the capital asset pricing depends on the market cycle of uptrend, downtrend, recovery:

In market recovery, the factor of efficient financial leverage for capital financing usually focuses on the advantage that the internal return rate is greater than the real interest rate at market level under the rational financial leverage.

In market uptrend, the factor of short-run speculation for investment performance usually pays attention to the volatility of the market price and the internal market risk or a signal of market uptrend crash.

The period from market downtrend to market recovery, the factor of capital restructure for efficient capital financing is the prior condition before starting a new market cycle, instead of seeking the short-run speculation.
3. Theoretical Discussion

The structure of capital cost and profitability under consideration of the expected market return explains three aspects relevant to the capital financing and the investment performance: (i) the pressure of capital cost payment, (ii) the adjustment of financial leverage to prevent liquidity risk, and (iii) the additional issue of equity in market uptrend.

In aspect of the pressure of capital cost payment in capital financing, so-called illiquidity, the cashflows on market equity are quite weak in activities of short-run business, but firms are manageable for funding other short-run sources to refinance the illiquidity, compensating the shortfall in short-run negative cashflows of business activities. This situation is usually found on that the inefficient capital financing is due to the weak cashflows or the illiquidity of firms’ business activities with the low internal return rate $IRR$.

In aspect of the financial leverage adjustment to prevent liquidity risk in capital financing, so-called financial stress, the cashflows on market equity are quite strong in the activities of long-run investment and short-run business under the exceed financial leverage that firms’ risk could increase from the state of financial stress to the state of insolvency risk if the free cashflows are out of control. Therefore, these firms should adjust rational financial leverage to maintain the liquidity in the period of internal market risk, or a signal of market uptrend crash, and their financial stress is manageable for how to sell “the firm risks” for external investors in the period of internal market risk. And this situation is usually found on that the inefficient capital financing is due to the debt-equity refinancing on financial stress despite the expected market return higher than the internal return rate $E(R_m) > IRR$, leading to the shareholders last holding stocks trapped with the inflation market price.

In aspect of the additional issue of equity in market uptrend, it is favorable for increasing chatter capital and surplus capital in capital financing as well as investment performance in stock market. There are two groups of firms in capital financing: the overvalued stocks and the undervalued stocks in market uptrend. So, the overvalued stocks are actively reacted to by external investors and shareholders in market uptrend due to the efficient equity ownership plus the speculation with the market price higher than the equilibrium price. In contrast, the undervalued stocks are passively reacted to by external investors and shareholders in market uptrend due to the only factor of the speculation rather than the equity ownership.

The classification of firms’ risk level in capital financing and investment performance in the real modern world that the condition of efficient stock market depends on market cycle at which most capital asset pricing models have been lack of a market cycle for seeking the efficiency of capital financing and investment performance. In some studied documents, the Markowitz (1952) traditional model of efficient frontier represents the diversified stocks in an efficient portfolio based on the portfolio risk measure of efficient variance frontier; or the production of efficient frontiers uses the modified models.
on dimensions of the portfolio risk, such as the measure of market-risk losses by the value-at-risk designed in the modified model of efficient VaR frontier (Alexander, 2009; Dowd, 2007; Sarykalin et al., 2008); and the measure of market risk premium from CAPM by the tool of beta coefficient designed in the modified model of efficient Beta frontier (Fernandez, 2006). The absence of the market cycle in these portfolio models could not exploit the investment performance.

Moreover, the incomplete measure of market risk premium in CAPM which uses a key tradeoff between the expected market return minus the regulatory interest rate on viewpoint of central bank monetary authority is lack of the rational financial leverage at market level, how the manager, the agent of shareholders, uses the debt risk financing for the problems of tradeoff between the benefits of interest tax-shield and the costs of incremented interests for the purpose of corporate-income tax avoidance, issuing equity or increasing chatter capital or surplus capital in the period of internal market risk for the purpose of how to control the debt insolvency risk or bank risk-taking by refinancing under the condition that the debt risk financing is overvalued bonds or other debt instruments, leading to debt-equity refinancing; this situation happened in the effect of Vietnamese real-estate industry in issuing corporate bonds with the exceed financial leverage on Vietnamese stock market, specially the Saigon Commercial Bank (SCB) bank-run has affected short-run bank risk-taking in Vietnam.

The foundation of capital cost and profitability contributes the key factor of market cycle to theories of portfolio and corporate finance on the aspects of efficient capital financing and investment performance, and then gives some limitations of capital asset pricing model for further research development.

4. Conclusion and Further Research

The central point of this research exploits the market cycle for evaluating market equity on the aspects of efficient capital financing and investment performance, in which the market equity depends on the following conditions:

In market recovery, the factor of efficient financial leverage for capital financing usually focuses on the advantage that the internal return rate is greater than the real interest rate at market level under the rational financial leverage.

In market uptrend, the factor of short-run speculation for investment performance usually pays attention to the volatility of the market price and the internal market risk or a signal of market uptrend crash.

In the period from market downtrend to market recovery, the factor of capital restructure for efficient capital financing is the prior condition before starting a new market cycle, instead of seeking the short-run speculation.

This conclusion provides a new approach to academic research in exploring the further research, such as the expected market return and internal market risk on abnormal market transaction, the Markowitz modified model of efficient market-cycle frontier for investment performance, the bank risk-taking and the internal market risk in a market cycle to analyze their inner relationship, the additional dimension of rational financial leverage into CAPM, the movement analysis of the cashflow demand and the stock supply affecting the expected market return, etc. These implications of further research help financial analysts, researchers, managers have a full picture of evaluating the market equity based on the structure of capital cost and profitability in capital market.
References


Bank Risk-Taking and Market Risk: An Evidence of the Vietnamese Stock Market

Nguyen Cao Anh\textsuperscript{a}, Thai Hong Thuy Khanh\textsuperscript{b}, Tran Thi Thuy\textsuperscript{c} & Nguyen Thanh Hung\textsuperscript{d}

\textsuperscript{a,b,c} University of Nguyen Tat Thanh, Vietnam
\textsuperscript{d} University of Economics, Vietnam
*ncanh@ntt.edu.vn

Abstract: This article analyzes the relationship between bank risk-taking and market risk in the Vietnamese banking industry. The research methodology in the context is based on the evaluation formula of Modigliani and Miller to calculate the market return with equilibrium price, and then determine the response of bank risk-taking to market risk. The model uses data from banks listed on the Stock Exchange of Ho Chi Minh City to consider a key relationship between bank risk-taking and market risk and the result is that the uptrend of market return with equilibrium price is the response to bank risk-taking, and the breakdown uptrend of market return to formulate market risk leads to insolvency risk of Vietnamese commercial banks.

Keywords: bank risk-taking, market risk, market return with equilibrium

1. Introduction

Global financial crisis in period 2007 to 2009 had made the market risk loss and spread over all stock markets in countries, in which the Vietnamese stock market was also affected by a financial shock in early year 2008 when the Vietnamese State Bank withdrew back 20.3 billion VND from the stock market by issuing the Treasure Bills dated on 17th February 2008 imposed for commercial banks so that market uptrend was crashed suddenly in March 2008 due to the shortfall in the cashflow demand of investors on the abnormal market transaction, to make a buying vacancy of all stocks on the electronic board of Vietnamese Stock Exchange. Beyond this financial crisis in Vietnam, it could be found that the Vietnamese State Bank somehow plays the role of a bridge between the market uptrend and the market downtrend or between the bank risk-taking in the banking system and the market risk in the stock market by the monetary instruments of central banks, especially in the period of internal market risk that stock market has a signal of market uptrend crash in response to the increase in the equity accumulation of commercial banks. In the context of this research, we exploit the structure of market risk and bank risk-taking under the following problem statements:

\[ E(\pi_m) \]

Uncontrollability of Controllability of CAR + ROA

\textit{Figure 1. The Market-Risk Profit and the Equity Accumulation of Commercial Banks}

The capital regulation in the banking system used to affect the Vietnamese stock market in the financial crisis of the 2007 to 2009 period that the strong intervention of the Vietnamese State Bank in issuing Treasure Bills dated 17th February 2008 imposed for Vietnamese commercial banks to make the shortfall in real cashflows in March 2008 on the abnormal market transaction, but it is unknown that this is not the main reason for the Vietnamese market uptrend crash. Finding out some evidence about the capital regulation of Vietnamese commercial banks by the Vietnamese Government that signed Decree No. 141/2006 dated 22nd November 2006 before breaking down the market uptrend within the 15 months. Starting the phenomenon of abnormal market transactions happened from December 2006 to March 2007 with the radical speed of the inflation market price within 4 months since the promulgation of Decree No. 141/2006 at the market peak of Vn-Index 1170.7 point dated on 12th March 2007 to reflect a signal of the market uptrend crash that the market price was above the distribution of profitable cashflows to control the outside cashflows pumping into the stock market so that institutional investors could sell the overloaded quantity of stocks for the shareholders last holding stocks trapped with the inflation market price from April 2007 to February 2008.

In Figure 2, the authors suggest three key characteristics of the market price for seeking the effects of the cashflow demand and the stock supply on the market risk, including:

The stochastic market price $P_m$ is the market price that could see on the electronic board of the Stock Exchange to reflect its continuous volatility which is distributed by the cashflow demand the investors buy and hold for the ownership and the stock supply the shareholders sell stocks for the profitability. But it is unknown that the stochastic market price does not exist any break-even market price to reflect the equality between the total benefits of selling stocks and the total costs of buying and holding stocks on the market transaction. Therefore, it only represents the change in market prices over time (Miller & Modigliani, 1961; Fama, 1965), shown in the following formula of market return:

$$R_m = \frac{\partial P_m}{P_m}, \tag{1}$$

where $R_m$ is market return, $P_m$ is market price with the note of change $\partial$. If the research uses the market return in the formula (1) to measure the market risk, it is hard to test the maximum market-risk return due to the elimination of the market trend in which the internal market risk is defined as a signal of market uptrend crash under the condition that the stochastic market price is much greater than the slope-
up equilibrium market price, $P^\uparrow_m \gg P^\uparrow_e$, or the stochastic market price is above the probability distribution of profitable cashflows in the stock market, or so-called the effect of the overloaded cashflow demand on the market risk.

The equilibrium market price $P_e$ is the market price that represents the break-even market price between the total benefits of selling stocks and the total costs of buying and holding stocks on the market transaction. Upon this characteristic of market price, the equilibrium market price $P_e$ removes the speculation out of the market price to reflect a break-even point between buyers and sellers in the whole process of market transaction. The formula of equilibrium market price is determined as follows:

$$P_e = \frac{\sum P_m Q_m}{\sum Q_m},$$

in which the numerator $\sum P_m Q_m$ represents the demand of investors’ cashflows buying and holding stocks normally, and the denominator $\sum Q_m$ represent the supply of shareholders’ trading-volumes selling stocks normally. And the speculative market profit $\pi_s = P_m - P_e$ reflects a key fundamental principle that the shareholders want to sell stocks with the higher market price than the equilibrium market price for the profitability to reflect on the supply function of the equilibrium market price:

$$\pi_{s,t} = \hat{\pi}_s^0 + \hat{r}_s P_{e,t} + + \hat{\epsilon}_{s,t},$$

where $\pi_{s,t}$ is speculative market profit at time $t$, $P_{e,t}$ is equilibrium market price at time $t$, $\hat{\pi}_s^0$ is estimated expected profit, $\hat{r}_s$ is speculative market return and $\hat{\epsilon}_{s,t}$ is modelling error. When the speculative market return is positive $\hat{r}_s > 0$, the supply function of equilibrium market price reflects the slope-up line in market uptrend for the profitability on the market transaction; or contrary, the speculative market return is negative $\hat{r}_s < 0$, the supply function of equilibrium market price reflects the slope-down line in market downtrend for the capital restructure or market recovery for the equity ownership.

Upon two prior market-price characteristics of stochasticity and equilibrium to explain the capital regulation throughout the equity accumulation $CAR + ROA$ of commercial banks in the period from Dec-2006 to Mar-2008 by the Government Decree No. 161/2006 related to the market risk of Vn-Index in Mar-2008, shown in Figure 3. Obviously, the profitability in risk management of banking system is controlled cashflows earlier than the profitability of other industries at time of internal market risk.

\[\text{Figure 3. The Long-Run Equity Accumulation of Commercial Banks and the Vn-Index}\]
And the third characteristic of market price is the persistent market price $P_a$ to reflect the holding market price that investors could loosen their cashflows to buy and hold stocks for the equity ownership gradually from market downtrend to market recovery. The financial meaning of the ownership market profit $\pi_d = P_e - P_a$ is shown that the smaller ownership market profit is the more efficient holding stocks to represent the market recovery, $P_e = P_a$. In Figure 2, there are two periods to reflect the effect of the overloaded stock supply on the market risk at market peaks of Mar-2007 and Jan-2022 in market uptrend due to $P_e > P_a$. And the formula of persistent market price $P_a$ is determined on stable market transaction:

$$P_a = \frac{\sum P_m q_m}{\sum q_m},$$

(4)

where $q_m$ is average quantities of stocks, to reflect the demand function of the equilibrium market price:

$$\pi_{d,t} = \hat{\pi}_d^0 + \hat{\pi}_d P_{e,t} + + \hat{\varepsilon}_{d,t},$$

(5)

where $\pi_{d,t}$ is ownership market profit at time $t$, $P_{e,t}$ is equilibrium market price at time $t$, $\hat{\pi}_d^0$ is estimated expected profit for the ownership under the condition that $\lim \hat{\pi}_d^0 = 0$ is favorable for the equity ownership in market recovery, $\hat{\pi}_d$ is ownership market return under the condition that $\lim \hat{\pi}_d = 0$ is favorable for the equity ownership in market recovery and $\hat{\varepsilon}_{d,t}$ is modelling error.

Seeking the capital regulation in banking system and the market risk in stock market upon the abnormal market transaction of a market cycle is a new approach to measure the effect of equity accumulation throughout the profitability on the market risk, in which the capital regulation of Vietnamese commercial banks is some evidence for the market uptrend crash of Vn-Index in Mar-2008.

**Problem statement 2.** Exceed deposit growth and market risk.

It is known that the capital regulation is the type of the abnormal equity accumulation in banking system that commercial banks could face the bank risk-taking. However, another bank risk-taking is due to the debt accumulation of commercial banks throughout the exceed deposit growth with the high deposit rate under the difficulty of economic activities so that it is usually attached to the phenomenon of bank-run in banking system. This is a situation that the activities of investment and business in banking system are stronger than the ones of investment and business in the market of commodities and services in a local economy to make the phenomenon of the more expensive money price than usual. Upon the high deposit rate, the people, firms, even managers of commercial banks usually store in the commercial banks to earn deposit interests rather than use money on activities of investment and business in the market of commodities and services. And the story of commercial banks’ profitability in risk management is how to sell “the risks” for stakeholders last holding the risky financial assets trapped with the inflation market price. For instance, the market risk of Vn-Index at two latter market peaks of Apr-2018 and Jan-2022 was due to the insolvency risk of exceed deposit growth under the condition that the Vietnamese commercial banks expand more and more commercial bank branches spread over the cities and countryside in Vietnam to fund the available cashflows with the high deposit rate in banking system for leading corporations on the overpriced speculative assets, especially the real-estates whose the speculative market profit is hidden. It could be found that the real-estate products are the risky assets with high speculation, that their inflation market price is usually stimulated by real-estate brokers, but it is rarely to buy for the real needs of housing accommodation. And the critical value of the real estate price bubbles happens when spreading out the activities of the speculation over economies to make the uncontrollability of cashflows. Typically, the corporate bonds are all attached to the credit source of Vietnamese commercial banks, such as the corporate bonds of Van Thinh Phat Corporation attached to the event of bank-run at the Saigon Commercial Bank (SCB) fallen into special controls by
the Vietnamese State Bank; or the bidding price of the ThuThiem new city with the real-estate inflation price 2.4 bil. VND/m² to stimulate the price bubbles of neighbor real estates by Tan Hoang Minh corporations and others, etc. that uses from the debt sources of corporate bonds and commercial banks. Obviously, the formula of risk management “how to sell these risks for the bondholders last holding bonds trapped with the price bubbles, or “how to refinance corporate bonds by selling overloaded stocks for the shareholders last holding stocks trapped with the inflation market price. And, this situation is called as the indirect effect of the exceed deposit growth on the market risk.

![Graph showing the relationship between Short-run Debt Accumulation of Commercial Banks and the Vn-Index](image)

**Figure 4. The Short-Run Debt Accumulation of Commercial Banks and the Vn-Index**

In Figure 4, the pressure of the insolvency risk or the bank risk-taking on aspect of exceed deposit growth happened at the growth peak of II/2017 to make the speculative market profit in stock market from II/2017 to II-2018 to release the financial stress of commercial banks from the short-run deposits in banking system leading to forming the second market peak of Vn-Index in April 2018, and refinance the corporate bonds by selling the overloaded stocks to compensate the maturity debts of real-estate corporate bonds leading to forming the third market peak of Vn-Index in January 2022.

On two mentioned-above problem statements, the remainders of this paper for seeking the connection between the bank risk-taking in banking system and the market risk in stock market to generate the theoretical inferences for risk management of the banking system and the investment performance are organized as follows:

Section II. Literature Reviews, providing some definitions of the market risk and the bank risk-taking on practical models to propose the theoretical model.

Section III. Research Methodology, suggesting a new method for a connection between the market risk and the bank risk-taking, and then giving two conditions for examining the connection the market risk and the bank risk-taking.

Section IV. Conclusion.
2. Literature Review

In this section, the authors give some overviews of the market risk related to the activities of commercial banks that leads to the insolvency risk in banking system; and central banks are always a key between the market uptrend and the market downtrend to control cashflows in each market cycle by the financial instruments in banking system.

2.1 Definitions

First of all, the authors review some definitions of market risk related to activities of commercial banks. Gallati (2003) implies on the Bank of International Settlement that market risk is defined as the risk of losses in on- and off-balance-sheet positions arising from movements in market price; Dionne (2013) states on the viewpoint of banking system that market risk represents volatility of prices or asset returns so that the regulatory treatment of arbitrary capital asset on the market-risk loss makes a conflict between stakeholders and commercial banks; Bessis (2015) gives a definition that market risk is defined as the risk of losses due to adverse market movements depressing the values of the positions held by market players. Basically, the volatility of market price causes the loss of capital assets to force commercial banks to hedge the financial risks of these assets.

2.2 Practical Models of the Bank Risk-Taking and the Market Risk

In some reviews of the measures, the relationship between the capital regulation and market risk in some studied documents is related to the Santos (2001) internal model of market-risk capital requirement on interest rate related instruments and equities in the trading book, the Gallati (2003) model of capital requirement for market risk, credit risk and operational risk in the systematic risk framework, the Alexander et al. (2013; 2015) model of mean-CvaR frontier in the minimum market-risk capital requirement, the Hellwig (2010) commercial bank capital-regulation reformation in the wake of financial crisis of 2007/2009, derived from the change in market prices of the assets held in the high trading book of commercial banks in situation that the capital requirement for market risk is lower than the capital requirement for credit risk. It is a viewpoint of market risk in the extent of bank capital regulation by the central bank which an increase in chatter capital forces commercial banks to control the specific capital requirement for market risk.

2.3 The Incomplete Measure of the Market Risk Premium in Traditional CAPM

Real cashflows on the market transaction play the role of investment decision making that the effect of the overloaded cashflow demand and/or the overloaded stock supply on internal market risk. However, the incomplete measure of the market risk premium in traditional CAPM is lack of a key factor: debt financial leverage to generate a full picture of internal market risk. Therefore, the market risk premium only explains the prior condition of efficient stock market is positive market risk premium \( E(R_m) - R_f > 0 \) so that diversified portfolios are located along the slope-up line segment \( AE \) of positive market risk premium, or so-called the securities market line (SML) on which the portfolio betas are always positive although the expected market return is negative \( E(R_m) - R_f < 0 \). This is an absurdity of CAPM to estimate the portfolio beta coefficient. Moreover, the financial meaning of beta coefficient could not be clarified for the real capital asset pricing because of the percentage flat\(^4\) without real weights.

\[^4\] Percentage flat of returns and interest rate is evaluated on one dollar for all the assets in CAPM. For example, expected portfolio return \( E(R_p) = 6\% \) on one dollar, expected market return \( E(R_m) = 5\% \) on one dollar, regulatory interest rate \( R_f = 2\% \) on one dollar, estimated alpha \( \tilde{a}_i = 1\% \) and beta \( \tilde{b}_i = 1 \): then the CAPM is only a relative equality \( E(R_i) - R_f = \tilde{a}_i + \tilde{b}_i[E(R_m) - R_f] \), resulted as \( 6\% - 2\% = 1\% + 1 \times [5\% - 2\%] \).
2.4 Proposed Theoretical Structural Model

Based on the analysis framework in the context of this research, the authors suggest the proposed theoretical structural model in four dimensions: (i) Long-run equity accumulation, (ii) Short-run debt accumulation, (iii) Speculative products, and (iv) Market risk. In the four dimensions, the direct and indirect effects of long-run equity accumulation, short-run debt accumulation, and speculative products on the market risk in stock market relies on capital restructure of commercial banks, or so-called the bias to the dimension of the long-run equity accumulation or the dimension of the short-run debt accumulation affecting the market risk in each market cycle or each financial crisis. And the theoretical model is designed under the following structure:

![Theoretical Model](image)

*Figure 5. Theoretical Model to Measure the Effect of Bank Risk-Taking on Market Risk*

Capital restructure of commercial banks and the key bias of investment decision making:

Restructuring capital of commercial banks provides the key bias of market risk prediction: long-run equity accumulation or short-run debt accumulation. In condition that the activities of investment and business in the market of commodities and services are stronger than the ones of speculation in stock market, the impact trend of the long-run equity accumulation on the market risk is high; or contrary that the activities of investment and business in the market of commodities and services are weaker than the ones of speculation in stock market, the impart trend of short-run debt accumulation on the market risk is high. This key bias provides the investment decision making for risk management of commercial banks in each market cycle or financial crisis.

3. Research Methodology

In many studied documents, the measure of bank risk-taking is applied by the Z-score to represent the insolvency risk of commercial banks (Laeven & Levine 2009; Houston et al., 2010; Delis et al, 2013; Khan et al., 2017; Monzur Hasan et al., 2020):
\[
Z = \frac{ROA + CAR}{\sigma_{ROA}} = \frac{NI/TA + E/TA}{\sigma_{ROA}},
\]

in which \(ROA\) is return on total asset, \(CAR\) is ratio of equity \(E\) to total asset \(TA\), and \(\sigma_{ROA}\) is standard deviation of \(ROA\). In formula (6), the higher volatility of \(Z\)-score reflect the higher insolvency risk of commercial banks. But it is wondered how to connect \(Z\)-score with the measure of market risk. Konishi & Yasuda (2004) suggests the linkage between net earnings \(NI\) and portfolio profit \(\pi\) of commercial banks from market:

\[
\pi = \partial P_B Q_B,
\]

where \(P_B\) portfolio price of commercial banks, \(Q_B\) is the number of outstanding shares, and symbol \(\partial\) is the change. The replacement of portfolio profit \(\pi\) into net earnings \(NI\) in formula (6) is not clarified for the measure of market risk, despite providing an alternative measure for \(Z\)-score.

### 3.1 The Measure of Market Risk Profit

\begin{align*}
\hat{E}(\pi) & = \hat{P}_e \times (\hat{\pi}_s + \hat{\pi}_d), \\
\end{align*}

\(\hat{E}(\pi)\) Demand: \(\hat{E}(\pi_d) = \)

\(\hat{E}(\pi)\) Supply: \(\hat{E}(\pi_s) = \)

\(P_m\)

\(P_e\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)

\(\hat{d}\)

\(\hat{s}\)
in which $E(\pi_m)$ is expected market risk profit of whole stock market, $P_e$ is equilibrium market price, $\hat{r}_s$ is speculative market return on stock supply and $\hat{r}_d$ is ownership market return on cashflow demand, shown in Figure 6.

When stochastic market price $P_m$ is greater than the equilibrium market price $P_e$ plus the market risk profit $E(\pi_m)$, $P_m > P_e + E(\pi_m)$; the phenomenon of market risk appears in stock market.

3.2 The Measure of Bank Risk-Taking

It is known that the abnormal accumulative equity of commercial banks in short run usually brings a signal of insolvency risk of commercial banks, in which the accumulative equity includes (i) the net earnings $NI$ on business performance of commercial banks and (ii) issuing equity or increasing chatter capital and surplus capital in accordance with the capital regulation of the central bank, but there is only issuing equity relevant to market risk profit. Therefore, the structure of market risk profit is split into portfolio risk profit of commercial banks and portfolio risk profit of the others listed in a stock market:

$$E(\pi_o) = E(\pi_m) + \frac{P_e^b}{P_e - P_e^b} \times [E(\pi_m) - E(\pi_b)], \quad (9)$$

in which $E(\pi_b)$ is portfolio risk profit of commercial banks listed in the stock market with its equilibrium price $P_e^b$, and $E(\pi_o)$ is portfolio risk profit of the others listed in the stock market. Then, the prior condition of evaluating bank risk-taking is $E(\pi_m) < E(\pi_b)$ when stock market has a signal of market uptrend crash, $P_m > P_e + E(\pi_m)$.

The latter condition of bank risk-taking is based on capital structure and profitability of commercial banks connected with expected portfolio risk return $E(R_b)$ of commercial banks at level of banking system:

$$E(R_b) = \frac{E(\pi_b)}{P_e^b} = \frac{E}{E + D} \times ROE + \frac{D}{E + D} \times R_d, \quad (10)$$

where $E$ is book equity of commercial banks, $D$ is book debt of commercial banks, $ROE$ is return on book equity of commercial banks and $R_d$ is real deposit rate of commercial banks. Testing the bank risk-taking is determined as follows:

$$E \times [ROE - E(R_b)] \geq D \times [E(R_b) - R_d]. \quad (11)$$

The consideration of two key conditions related to the measure of market risk and the measure of bank risk-taking is based capital structure, profitability and expected portfolio return of commercial banks to explain the effect of market risk on bank risk-taking. The key bias of investment decision making relies on the long-run equity accumulation on the left of the equation (11), or the short-run debt accumulation on the right of the equation (11). Then, the selection of the impact trend on the market risk is based on the change in restructuring capital of commercial banks.

4. Conclusion

The research provides a new methodology for a connection between the bank risk-taking in banking system and the market risk in stock market to support the market risk management of commercial banks and the investment performance in stock market. The theoretical model is proposed under the capital
structure of commercial banks combined with market risk profit to examine the key bias of the impact trend on the market risk: (i) if the capital structure is biased to the long-run equity accumulation of commercial banks, the impact trend of capital regulation factor or equivalent factors on the market risk is high; or (ii) if the capital structure is biased to the short-run debt accumulation of commercial banks, impact trends of financial stress of deposit funding and lending on assets overpriced on the market risk are high.

References


The Evolving Trend, Development, and Strategies for Effective Knowledge Management in the Digital Era

Tong Wooi, Chow*
Malaysia University of Science and Technology, Malaysia
*jerrychow@must.edu.my

Abstract: Knowledge management has transformed over the years with the advancement of technology. With the advent of digital technology, there has been a surge in the volume of information being produced which has led to the thriving need for effective knowledge management practices. This article aims to add to the analysis of the evolving trend, development, and strategies for effective knowledge management in the digital era. The study develops a comprehensive review of existing literature on knowledge management and the related themes in the digital era. It also highlights two case studies of international corporations that have implemented knowledge management successfully. The paper concludes that knowledge management is required for organizational efficiency and success in the digital era and outlines insights on strategies for best practices. Findings affirms that organizations need to adopt effective and efficient knowledge management practices for organizations to stay competitive and improve performance.

Keywords: knowledge management, evolving trend, knowledge management strategies, organizational culture, information technology, digital era

1. Introduction

In today’s fast evolving and complex environment, knowledge management has emerged to be an important factor in organizational performance (Ahmad & Mohamad, 2017). Traditional methods are inadequate for dealing with swift environmental changes. Every organization produces, manages, and uses large amounts of information daily. The digital era has resulted in a rapid growth of data and information. Hence, managing knowledge has become an essential strategy to maintain a competitive advantage for optimum performance (Idrees et al., 2023).

According to Al-Shahrani (2019), knowledge management is currently a highly popular subject in both industry and information research circles. Despite the prevalence of digital technology, knowledge management remains a relatively new and constantly evolving area of management. It is regarded as a major advancement in information studies and management science. Usman et al. (2020) states that effective and efficient knowledge management is essential for organizations. Moreover, the digital era has opened new avenues for knowledge management.

Knowledge management is a structured methodology that encompasses the processes of creating, capturing, refining, storing, managing, and disseminating knowledge with the purpose of fulfilling the goals of an organization as illustrated in the knowledge management cycle (Figure 1) (Girard & Girard, 2015). The management of knowledge provides benefits by reducing the effort and cost involved in duplicating past efforts. Collaborating and utilizing shared knowledge creates value. It entails regulating knowledge and its application in organizational practices within the enterprise. Therefore, it is necessary to understand the evolving trends, development, and adopt the best strategies for effective knowledge management in the digital era to boost organizational performance (Alshammari et al., 2020). This paper aims to explore the evolving trend, development, and the strategies of knowledge management in the digital era.
The study will focus on the trend and development of knowledge management in the digital era, including exploring the various strategies that organizations can adopt to manage knowledge in the digital age. The paper traced the early development trend of the field in terms of the proponents and the knowledge management concepts to highlighting three key strategies and examples of two organizations that have implemented knowledge management. In terms of the limitation, the paper focuses on the guiding criteria of the topic on the evolving trend, development, and strategies for effective knowledge management in the digital era.

Figure 1. The Knowledge Management Cycle

2. Research Approach

The narrative review was conducted using a search strategy to identify and synthesize relevant publications in the following databases: Emarald Insight, Semantic Scholar, Science Direct, and Google Scholar using the keywords "knowledge management," "digital era," "strategy," and "trend." The search was limited to English language. Journal articles, conference papers, books, and edited volumes were included in the review if they met the following criteria: (1) discussed the trends, development, and strategies for effective knowledge management in the digital era; (2) case studies of organizations that has implemented knowledge management operation (3) were published in peer-reviewed journals; and (4) were available in full-text form. Relevant information was extracted from the selected articles, including author, year of publication, country of origin, research objectives, research approach, key findings, and recommendations for effective knowledge management. The extracted information was synthesized into themes based on the key findings, and recommendations. The themes were then analyzed to identify the evolving trend, development, and strategies for effective knowledge management in the digital era. The research approach is appropriate for this paper in view of the search for the information needed that traced to the early days of knowledge management development process until the discussion on the needed strategies and relevant case studies.

3. The Background of Knowledge Management

Peter Drucker (1989), a well-known expert in management, stated that knowledge has become a crucial economic resource and a significant source of competitive advantage. As a result, knowledge is an asset that organizations must possess to achieve growth and success. It is essential for organizations to
comprehend the fundamental principles of knowledge and manage their knowledge resources effectively and efficiently (Roshchin et al., 2022). Knowledge management is not simply another resource such as labor or capital; it is an essential resource that should be prioritized, as noted by Ganapathy et al., (2020).

The origins of knowledge management can be traced back to Greek philosophers such as Aristotle, who sought to create and document knowledge for practical use (Hamid, 2020; Mohajan, 2017; Prusak, 2001). The concept gained more recognition in the early 20th century, as organizations began to understand the value of knowledge as an asset. With the advancement of technology and the growth of the knowledge economy in the latter half of the 20th century, the need for effective knowledge management became even more pressing. In the 1970s, management theorists such as Peter Drucker and Peter Senge made significant contributions to the field (Drucker, 1989). Drucker was one of the first to focus on information and knowledge, while Senge emphasized the concept of the Learning Organization, which served as a foundation for knowledge management. By the 1980s, the importance of knowledge as a competitive advantage became increasingly apparent.

Evidence suggests that the management of knowledge depended on the utilization of artificial intelligence and expert systems. Scholarly articles, publications, and conferences started to cover topics on knowledge management from the 1990s to present times (Mohajan, 2017). Consulting firms initiated in-house knowledge management programs employing Adam's model. With the media coverage of knowledge management, it gained popularity and continued to evolve as a concept, becoming essential for organizations. Consequently, companies acknowledged the significance of managing their knowledge assets and began implementing knowledge management practices.

The term knowledge management was coined by both Karl-Erik Svelby and Karl Wiig in 1986. Karl-Eric Svelby pioneered many fundamental concepts of knowledge management. He was described as one of the founding fathers of knowledge management. In 1986, he published his first book Knowledge Companies in Sweden. On the other hand, Karl Wiig is a management researcher. He is also described as the founding father of knowledge management. He wrote many articles and books on knowledge management. Another influential approach in the teaching of knowledge management is by Nonaka and Takeuchi (1995), which emphasizes the importance of knowledge creation and innovation in organizations. Both Nonaka and Takeuchi essentially taught on the idea that knowledge creation is the key to organizational innovation and success (Kinyata, 2014). They stressed that organizations must create new knowledge by combining existing knowledge and expertise. They proposed a model known as the Spiral Model.

4. The Evolving Trend of Knowledge Management

The notion of knowledge management is relatively recent and emphasizes the significance of managing knowledge on par with managing resources. With the advent of the knowledge economy, a new era of management has emerged which places greater emphasis on knowledge management. Essentially, knowledge management pertains to the management of knowledge within organizations and encompasses a diverse range of activities, such as generating, acquiring, organizing, and distributing knowledge (Igbinovia, 2018). In the early years, knowledge management targeted the formation and management of explicit knowledge which essentially was done through document management systems, databases, and other related tools. However, in the advent of the digital era, knowledge management has included the management of tacit knowledge. Digital mechanisms have enabled it easier to capture and manage this kind of knowledge.

Over the years, researchers from different parts of the world have provided varying definitions of the knowledge management discipline. Some argued that it cannot be limited to a single definition and that it is perceived differently across different fields. As a result, there seems to be no agreement on a single definition for knowledge management.

In this paper, the definition of knowledge management will rely on the concepts expressed by Ammirato et al. (2021) who defined knowledge management as the comprehensive process of identifying,
organizing, transferring, and utilizing information and skills. The early definition by Davenport and Prusak (1998), has described knowledge management as the process of collecting, arranging, and preserving the information and experiences of individuals and teams within an organization, and sharing it with others. According to Girard and Girard (2015) and Igbinnovia (2018), knowledge management seeks to help a company achieve a competitive edge by gathering these materials in a centralized or dispersed electronic setting.

To put it simply, knowledge management involves a wide range of activities aimed at identifying, collecting, organizing, sharing, and transferring important information and expertise that make up an organization's memory. The purpose of a knowledge system is to maximize an organization's effectiveness and returns from its knowledge assets (Mohajan 2017; Wigg, 1999). The objective of knowledge management is to increase an organization's efficiency and preserve its knowledge (Igbinnovia, 2018; Mohajan 2017; Wigg, 1999). Early researchers such as Davenport (1998) has initially proposed four main goals of knowledge management systems in practice: establishing knowledge repositories, enhancing knowledge access, improving the knowledge environment, and managing knowledge as an asset.

According to a study conducted by Pricewaterhouse Coopers and the World Economic Forum, 95% of CEOs consider knowledge management to be a crucial factor in a company's success. Similarly, another survey conducted among CEOs produced a comparable result regarding the importance of knowledge management (Sardjono & Firdaus, 2020). Knowledge management can take organizations to new levels of efficiency, effectiveness, and operational reach. By enhancing operational processes, it can improve an organization's performance and financial value. Knowledge management supports sustainable strategic competitive advantage for organizations, making it an essential element for their continuous development (Ali & Ahmad, 2006; Omotaya, 2015).

In the context of the topic, it is important to distinguish between data, information, knowledge, and wisdom, as they represent the fundamental concepts of each term (Bellinger et al., 2004). Data refers to the raw, unprocessed elements of information in an organization. Information, on the other hand, is data that has been processed and given meaning, answering questions such as who, what, where, and when. Knowledge is the application of both data and information. Wisdom is the evaluated understanding that comes from the utilization of accumulated knowledge.

In the realm of knowledge management, three categories of knowledge are generally recognized which are explicit, implicit, and tacit knowledge (Husain & Gul, 2019; Sokoh & Okolie 2021). Explicit knowledge, also known as formal knowledge, is codified, and can be easily transformed. It is typically found in physical formats such as books, databases, memos, and electronic media that can be obtained, recorded, communicated, shared, and stored. Some examples of explicit knowledge include strategies, methods, processes, patents, products, and services.

Implicit knowledge is knowledge that builds upon existing explicit knowledge and includes transferable skills that can be applied in different jobs. Examples of implicit knowledge include data obtained from communication channels such as Skype, email, intranet, and meeting notes.

Tacit knowledge, on the other hand, is not codified and resides in individuals' minds (Nonaka & Takeuchi, 1995). This type of knowledge includes expertise, experience, skills, and technical know-how, and can be shared through mentoring, face-to-face communication, training, group projects, and other means. Tacit knowledge is not easily expressed or formalized, unlike implicit knowledge which is an application of explicit knowledge. Examples of tacit knowledge include hands-on skills, intuitions, experiences, relationships, personal beliefs and values, and ideas. Hence, organizations need to develop strategies to harness their intellectual capital (Nunes et al., 2017). Th explicit and tacit knowledge can be leveraged upon for knowledge management best practice (Ismail & Abdullah, 2016).
6. The Development of Knowledge Management

Knowledge management has emerged due to various factors. The fast-paced changes in the marketplace have made it difficult for organizations to acquire knowledge and experience, leading to information overload. Additionally, organizations face pressure to reduce costs due to competition. High staff turnover has resulted in a need to develop informal knowledge using formal methods. Changes in organizational direction have also contributed to the loss of knowledge. Furthermore, life-long learning has become increasingly important.

The digital era has further transformed the way organizations manage their knowledge (Roshchin et al., 2022). The digital era has reformed the domain of knowledge management, making it more available and adept. The progression of knowledge management has been pushed by various factors, including globalization, technical advancements, and changing customer preferences. This has resulted in a shift from traditional knowledge management practices to technology-driven advances (Alavi & Leidner, 2001; Husain & Gul, 2019). New technologies were introduced which enhance knowledge management in organizations (Usman et al., 2020).

The development of computer technology, internet, social media, cloud computing, and artificial intelligence has facilitated the process of identifying, capturing, and analyzing data and information (Hamid, 2020). Mobile technology has made it possible for people to access knowledge easily, which increases efficiency. These means have made it easier for individuals to share knowledge and collaborate on projects. This has caused the emergence of new knowledge management systems. The proliferation of social media contributed to the culture of knowledge sharing within organizations and collaboration.

In recent times, the use of artificial intelligence (AI) and machine learning (ML) is happening rather swiftly. There are reports that artificial intelligence and machine learning are tested to automate knowledge management processes, such as data extraction and analysis (Bughin et al., 2018). Artificial intelligence can analyze big amount of data to extract insights. Artificial learning powered knowledge management in organizations may become a reality. Then with cloud computing, data are easily store and accessed from any place globally. This undoubtedly will facilitate the development of knowledge management systems. At the same time, knowledge management has become more dynamic and interactive. It is likely that there will be greater use of artificial intelligence and machine learning in knowledge management in the future.

7. The Strategies for Knowledge Management

In view of the digital era, organizations must adopt effective strategies for best practice in line with the latest trends and development for effective knowledge management (Mathrani & Edwards, 2020; Valamis, 2021). Effective knowledge management can facilitate better decisions, increase innovation, and employee satisfaction (Davenport & Prusak, 2000; Roshchin et al., 2022). Researchers were proposing for an integrative framework to support the implementation of knowledge management (Nunes et al., 2017). Evidence from research indicated that knowledge management best practices utilized an integrated model approach (Ismail & Abdullah, 2016; Sokoh & Okolie, 2021). The strategies for knowledge management proposed here are knowledge-sharing culture, technology, and knowledge management strategies which are as follows (Figure 2).

7.1 Knowledge-sharing Culture

Developing a culture of knowledge-sharing is a key strategy for effective knowledge management, as suggested in various studies (Idrees et al., 2023; Hassan et al., 2022; Usman et al., 2020). To prioritize knowledge management, organizations should establish a culture of knowledge-sharing that permeates the company. This involves encouraging employees to share their knowledge and expertise with each other, as emphasized by researchers (Alari & Leidner, 2001; Memon et al., 2020).
The knowledge-sharing culture will strengthen individual commitment and teamwork (Ganapathy et al., 2020; Yigzaw et al., 2019). This can be achieved through various programs and activities such as training programs, recognition, and rewards for knowledge sharing (Davenport & Prusak, 2000; Memon et al., 2020). Additionally, those at the senior management level can play a part in leading by example in promoting knowledge-sharing and emphasizing the importance of knowledge sharing. Apart from knowledge-sharing culture, the use of technology can also enhance the efficiency of knowledge management processes (Usman et al., 2020).

7.2 Technology

Technology plays a crucial role in enhancing knowledge management practices within organizations. The leveraging of technology facilitates knowledge management in the digital age (Ganapathy et al., 2020; Valamis, 2021). Technology can be instrumental in knowledge management by enabling knowledge to be easily located, retrieved, and shared through knowledge management systems (Al-Shahrani, 2019; Dhamdhere, 2015; Hassan et al., 2022). For instance, the use of knowledge management systems (KMS) as a centralized repository can facilitate easy storage and retrieval of knowledge assets (Dalkir, 2017). Artificial intelligence and machine learning technologies can automate knowledge extraction from unstructured data, provide real-time answers through chatbots, and analyze large data sets to uncover hidden patterns and insights (Alavi & Leidner, 2001). Social media and online collaboration tools can foster knowledge sharing and collaboration among employees (Wasko & Faraj, 2005). Data analytics and visualization tools can provide meaningful insights from knowledge assets, aiding decision-making (Alvesson & Karreman, 2011). Learning management systems (LMS) can provide access to online training programs, enabling employees to continuously upskill and acquire new knowledge (Davenport & Prusak, 2000). Technology can also facilitate innovation through idea management platforms, promoting creativity and knowledge creation (Chen, 2016). In addition, technology can improve communication among employees.

Organizations should invest in technology that supports their knowledge management strategies. Technology facilitates knowledge management in terms of providing tools for capturing, organizing, and sharing knowledge within the systems (Alavi & Leidner, 2001; Roschlin et al., 2022). Technology enhances people to communicate better. At the same time, technology improves the efficiency of knowledge management processes. Some examples of technology used for knowledge management include management systems, social collaboration platforms and knowledge bases (Davenport & Prusak, 2000; Hlatshwayo, 2019). The knowledge management systems enable the organizations to organize their information in structured format making it user friendly. The systems used for knowledge management comprise of different types such as content management systems, document management systems, and knowledge bases.

7.3 Knowledge Management Strategies

To achieve effective knowledge management in the digital age, it is important to have a well-defined system or process in place for knowledge management (Hlatshwayo, 2019). Organizations need to develop a strategy that shows their goals and objective for knowledge management. The strategy should include processes such as knowledge capturing, knowledge sharing, and knowledge dissemination (Davenport & Prusak, 2001; Mathrani, & Edwards, 2020). The processes must be aligned with their organizational goals and objectives and support the knowledge management activities (Alavi & Leidners, 2001). Concurrently, the process must be adaptable for change to be effective in the dynamic digital era (Davenport & Prusak, 2000; Hlatshwayo, 2019). Other practical suggestions include starting small. Organizations can start with a small pilot project and expand it gradually. Involve employees in the development and implementation of the knowledge management systems. Use a variety of knowledge management tools to capture and organize (Muhaja, 2017). The final aspect to consider in the strategies for knowledge management is to create a plan for managing knowledge and to assess the success of the knowledge management initiative. These procedures are crucial in ensuring that...
knowledge management is efficiently implemented in organizations. There are benefits in knowledge management in organizations (Igbinovia, 2018; Muhajan, 2017).

It would be appropriate to consider the challenges in implementing knowledge management. There are various knowledge management implementation barriers and some of them are organizational barriers, human barriers, technical barriers, financial barriers, and political barriers (Ganapathy et al., 2020). The main difficulty in managing knowledge is ensuring that the appropriate information is accessible to suitable individuals when it is needed.

8. The Case Studies of Knowledge Management

Literature has shown that knowledge management is becoming increasingly important for organizations to achieve their business goals and stay competitive in today's rapidly changing business environment (Roshchin et al., 2022). Many renowned multinational companies, such as Xerox, Siemens, IBM, Hewlett Packard, Shell, British Petroleum, Ford, and Caterpillar, to name only a few, have implemented some forms of knowledge sharing systems (Cox, 2007; Voelpel & Han, 2005).

This section presents an overview case study of two leading corporations namely, Xerox Corporation and Siemens AG, to examine their key implementation of knowledge management and identify some lessons gleaned from their experiences. Both companies have implemented knowledge management practices and have achieved significant benefits.

8.1 Case Study 1: Xerox Corporation

The case study of Xerox Corporation provides valuable insights into the implementation of knowledge management (KM) practices in a real-world organizational context. Xerox Corporation is a leading global technology company that specializes in document management, imaging, and related services. Xerox has a long-standing commitment to knowledge management, which has been a significant factor in its success. Xerox has implemented several knowledge management initiatives, including the development of knowledge-sharing platforms, knowledge-based systems, and knowledge repositories.
These initiatives have helped Xerox to streamline its business processes, enhance customer satisfaction, and increase operational efficiency.

One key lesson from the Xerox case study is the importance of leadership support and commitment to drive knowledge management initiatives (Connelly & Kelloway, 2003; Cox, 2007; Schwabe & Salim, 2002). Xerox's top management was committed to knowledge management and provided the necessary resources and support for its successful implementation. The management team also ensured that the knowledge management initiatives were aligned with the company's overall strategic objectives. This top-down approach was crucial in ensuring that knowledge management was integrated into the organization's culture.

Another important lesson learned from Xerox's knowledge management initiatives is the importance of a collaborative culture (Powers, 1999). Xerox encouraged collaboration and knowledge sharing among its employees by creating knowledge-sharing platforms, such as the Xerox Collaborative Knowledge Exchange (CKE). The CKE provided employees with access to knowledge and expertise across the organization, enabling them to solve problems and make better decisions. Also, Xerox recognized the need for continuous learning and improvement, with regular monitoring and evaluation of KM initiatives and feedback loops for improvement (O'Dell & Grayson, 1998). Xerox's KM initiatives were periodically evaluated to identify areas of improvement and refine their KM practices.

Xerox Corporation's implementation of knowledge management has resulted in several benefits (Hickins, 2013). The company has managed to leverage its intellectual capital to develop innovative solutions that meet customers' needs. Xerox Corporation's knowledge of management strategy has also enabled the company to reduce costs and improve operational efficiency. The company has also managed to retain its employees, who feel valued and appreciated for their knowledge and expertise. Xerox Corporation's knowledge management strategy has also enabled the company to remain competitive in the global market.

Xerox Corporation's successful implementation of knowledge management has enabled the company to leverage its intellectual capital to develop innovative solutions that meet customers' needs. The company has managed to create a culture that encourages knowledge sharing among employees, and it has invested in knowledge capture and storage technologies to ensure that critical knowledge is not lost. Xerox Corporation's knowledge management strategy has resulted in several benefits, including improved operational efficiency, reduced costs, and a competitive advantage in the global market. The company's success in implementing knowledge management serves as a model for other businesses that want to leverage their intellectual capital to remain competitive in the global market.

8.2 Case Study 2: Siemens AG

Siemens AG is a German multinational conglomerate that operates in various sectors such as energy, healthcare, infrastructure, transportation, and industrial automation (Ardianto, & Tanner, 2011; Voelpel & Han, 2005). Siemens AG recognized the importance of knowledge management in the late 1990s and began implementing a comprehensive knowledge management strategy across the organization (Ardianto, & Tanner, 2011; Benbya, & Belbaly, 2005). Siemens AG has successfully implemented knowledge management practices, which have helped the company to optimize its operations, enhance its innovation capacity, and improve its decision-making processes. This section highlights the key lessons learned from the Siemens AG case study on successful implementation of knowledge management.

One key lesson from the Siemens AG case study is the importance of aligning knowledge management with strategic business goals and objectives (Sveiby, 2001). Siemens AG ensured that knowledge management initiatives were aligned with the overall business strategy and supported the organization's strategic priorities. Another lesson is the significance of leadership involvement in driving knowledge management initiatives (Alavi & Tiwana, 2002).

The second lesson that Siemens AG learned was the importance of creating a knowledge sharing culture. The company recognized that knowledge management was not just about capturing and storing
knowledge, but also about making it available to employees throughout the organization. Therefore, Siemens AG implemented a range of initiatives to encourage knowledge sharing, such as communities of practice, knowledge sharing events, and a knowledge sharing portal. These initiatives helped to create a culture where employees were willing and eager to share their knowledge with their colleagues. Additionally, Siemens AG recognized the importance of technology as an enabler of knowledge management, by implementing a comprehensive knowledge management system that facilitated easy storage, retrieval, and sharing of knowledge assets (Riemer, 2001). However, the company also recognized that technology alone was not enough and that it needed to be supported by effective processes and practices. Therefore, Siemens AG invested in training and development programs to help employees understand how to use the technology effectively.

Siemens AG also emphasized the importance of continuous learning and improvement, with regular monitoring and evaluation of knowledge management initiatives to identify areas of improvement and refine knowledge management practices (Alavi & Tiwana, 2002). Lastly, Siemens AG recognized the need for effective change management and communication to ensure successful adoption and integration of knowledge management practices across the organization (Sveiby, 2001). They provided training, communication, and change management efforts to support employees in embracing and utilizing knowledge management practices.

Siemens AG Corporation's implementation of knowledge management initiatives provides valuable lessons for other organizations looking to enhance their knowledge management practices (Ardianto, & Tanner, 2011; Roblek & Meško, 2020). The successful implementation of knowledge management initiatives at Siemens AG Corporation was attributed to the importance of establishing clear goals and objectives, creating a knowledge sharing culture, investing in the right technology, measuring the impact of its knowledge management initiatives, and continuous improvement.

Overall, Xerox and Siemens had similar goals but took different approaches to implementing their knowledge management programs. Both companies recognized the importance of cultural change and faced challenges in adoption and integration. The key lessons from Xerox Corporation and Siemens AG's knowledge management strategies are the importance of creating a culture of knowledge-sharing, using technology to enable knowledge sharing, measuring the impact of knowledge management, identifying, and prioritizing knowledge, using a centralized knowledge management system, and investing in training and development programs.

9. Conclusion

In conclusion, "The Evolving Trend, Development, and Strategies for Effective Knowledge Management in the Digital Era" provides a comprehensive overview of the dynamic landscape of knowledge management in the modern digital age. Through an in-depth analysis of the latest trends, developments, and strategies, the article sheds light on the challenges and opportunities associated with effective knowledge management in today's rapidly changing technological environment.

Knowledge management has become increasingly important for organizations in many aspects and the digital era has resulted in changes in the way knowledge is created, managed, accessed, and shared. The advancement of knowledge management in the digital era is driven by the need to manage vast data and the need to be more responsive to the evolving market environment. To ensure efficient knowledge management in the digital era, some of the knowledge management strategies for best practice need to consider the highlights for organizations to develop a culture of knowledge sharing, invest in knowledge management tools for effective implementation.

One key takeaway from this article is the need for organizations to continuously adapt and evolve their knowledge management practices keeping pace with the ever-evolving digital landscape. The article discusses the importance of leveraging on advancing technologies, such as artificial intelligence and big data analytics, to effectively capture, organize, and utilize knowledge within organizations.
Furthermore, the proposed outline of the paper with a focus on knowledge management strategies will contribute towards organizational implementation practices. In terms of implication, an area for consideration for future research is knowledge management and artificial intelligence (AI). There is a need to investigate how organizations can use artificial intelligence to manage knowledge more effectively. With the right approach, organizations can benefit and gain a competitive advantage in managing their knowledge. Implementing knowledge management practices is a lesson smart organizations are discovering and learning again. As we move forward, the article suggests that organizations need to be agile, adaptive, and forward-thinking in their knowledge management strategies, to stay competitive in the fast-paced digital era. It calls for a proactive and strategic approach to managing knowledge, leveraging technology, and nurturing a knowledge-sharing culture.

In conclusion, "The Evolving Trend, Development, and Strategies for Effective Knowledge Management in the Digital Era" underscores the importance of embracing digital transformation, adopting innovative technologies, and nurturing a culture of knowledge-sharing, to effectively manage knowledge in today's dynamic business environment. It serves as a valuable resource for organizations and practitioners seeking to navigate the complexities of knowledge management in the digital era and stay ahead in the rapidly changing landscape of information and technology.

References


Dhamdhere, S. N. (2015). Importance of knowledge management in the higher educational institutes. Turkish Online Journal of Distance Education, 16(1), 162-183.


Application of Neuro Linguistic Programming in Impacting the Behaviors of Students

Thanga Thurai Vengadasalam* & Dr Khairir Khalilb
a,bMalaysia University of Science and Technology
*thangathurai@must.edu.my

Abstract: Behavioural issues in educational institutions can disrupt the learning process of students. It is not only a problem for students having the behavioural issues but also to other students in the class, either through the influence in such behaviour or distractions and disruptions during the lessons. They can also cause significant challenges for teachers, particularly those who are inexperienced. Many teachers consider these issues to be the most difficult aspect of their job. Students who display such problems often require additional attention, which places a strain on teachers and can slow down the pace of lesson delivery and completion. In order to understand student behaviours, this paper starts with the human behaviours in general, followed by the descriptions of student behavioural issues. It then takes the Neuro Linguistic Programming approach on how to address the behavioural issues in students. The NLP approach is effective as it focuses on understanding and analysing human behaviour, language, and thought patterns and addresses the fundamental causes of the behavioural issues. The paper then suggests possible remedial actions in replacing the negative behaviours with positive behaviours in students. This is conceptual research paper and therefore it is anticipated that it will open further research in this area for the benefits of students.

Keywords: student behaviours, attitude, neuro linguistic programming

1. Introduction

Student behaviour is a crucial component of the learning process. It refers to the actions, attitudes, and habits exhibited by students in and out of the classroom that can either facilitate or hinder their academic progress. Positive student behaviour such as participation, attentiveness, and respect for teachers and peers can lead to better academic achievement, while negative behaviours such as disobedience, aggression, and truancy can have a detrimental effect on learning outcomes. Therefore, it is essential for educators to create a positive learning environment and implement effective behaviour management strategies to promote desirable student behaviours and minimize disruptive behaviours.

Numerous studies have highlighted the significance of student behaviour on academic success. For instance, a study by Reddy et al. (2013) found that student behaviour had a greater impact on academic achievement than school resources. Another study by Wang et al. (2020) revealed that students' self-regulation skills, which are closely related to behaviour, significantly predicted academic performance. Hence, it is crucial to identify and address problematic behaviour to ensure students' academic success.

The following are brief overview of some key studies and findings related to student behavior problems.

The study by Rimm-Kaufman and Hamre (2010) emphasizes the importance of understanding the social and emotional aspects of student behavior. It highlights the significance of teacher-student relationships, classroom management strategies, and the promotion of a positive and inclusive classroom climate in addressing behaviour problems. Bradshaw and Leaf (2010) examines the effects of school-wide positive behavioural interventions and supports (SWPBIS) on student outcomes. The findings suggest that SWPBIS implementation is associated with improved student behaviour, reduced disciplinary referrals, and increased academic engagement.

In the context of student behaviour, NLP offers valuable tools for educators and practitioners to identify and address underlying factors contributing to challenging behaviours. By applying NLP techniques,
such as reframing, anchoring, and modelling, educators can help students reframe their perspectives, manage emotions, and adopt more positive and constructive behaviours.

One of the key aspects of NLP is the emphasis on effective communication. By using language patterns that are congruent with students' learning styles and preferences, educators can establish rapport, motivate students, and foster a positive learning environment. NLP techniques can also be utilized to help students overcome barriers, build self-confidence, and set and achieve goals.

While there is limited research specifically on the application of NLP in educational settings, studies have shown the potential of NLP techniques in improving various aspects of personal and professional development. For example, a study by Del Prado-Lu et al. (2020) found that NLP-based interventions positively influenced self-efficacy and self-regulation skills in university students. Moreover, a review by Tennant et al. (2016) highlighted the effectiveness of NLP in enhancing communication skills and self-awareness.

2. **Objective**

The main objective of this study is to identify behavioural problems in students and how NLP approach can be utilised to reduce these problems and replace them with positive behaviours.

3. **Human Behaviours**

Human behaviours evolve through three main components: genetic make-up, environmental influence, and learning acquisition. This is sometimes referred to as nature and nurture. There is no one single deterministic factor that absolutely determines the behaviour of a person. The factors are intertwined and simultaneously affect the evolution of a person’s behavior.

On the genetic components, the variation of genes can influence the evolution of certain behaviour. Some variants are known to be linked to certain behavioural trait such as aggression, impulsiveness and risk taking or risk aversion. Research has also shown that personality such as introversion, persistency and openness to new experiences are influenced by the genetic make-up of a person. Thus, a person’s behaviour is not fixed at any one time. It can be changed incidentally or purposefully (Bouchard & Loehlin, 2001).

4. **Problems in Student Behaviours**

Intrinsic characteristics of students’ problematic behaviours include:

4.1 **Aggressive Behaviour**: Aggressive behaviour is a serious problem and is disruptive to a supportive and safe learning environment. Physical aggression can be violent, even between young students, and both pupils might get hurt. Aggression between students disrupts all other activities and negatively affects teachers and other students. Apart from the initial disruption, the after-effects of physical fighting remain with sensitive pupils and interfere with their school day.

4.2 **Inappropriate Language**: Students may use foul language to impress their classmates or to get the attention of their teacher. Some students use inappropriate language to express frustration or anger, while others use this type of language because it is normal in their home environment.

4.3 **Inattentiveness**: Inattentive students tend to fall behind their classmates. In certain cases, students may suffer from attention deficit hyperactivity disorder which causes them to have difficulty controlling their behaviour. These students have trouble in prioritising schoolwork and sustaining attention. These children often require extra attention from teachers, so normal
school lessons take longer to complete, and students without learning or other behaviour problems become bored and frustrated.


Another aspect of students’ behavioural problem is discipline. Among the common disciplinary issues include:

4.4 Truancy: Truancy is the act of regularly and intentionally skilling school without a valid excuse. It is the most predominant disciplinary issue with students. This may be a result of lack of motivation to attend lectures or conflicts with lecturers, fellow colleagues, or the culture of the institution itself. Truancy has detrimental effects on students’ academic performance and overall development (Reid et al., 2016).

4.5 Bullying: Student bullying in schools is a persistent problem that poses significant social and psychological challenges. The repeated and intentional acts of aggression, whether physical, verbal, or relational, can have severe consequences for the victims, leading to decreased academic performance, anxiety, depression, and even suicidal ideation. Moreover, the impact of bullying extends beyond the immediate victims, affecting the overall school climate and creating an unsafe and hostile environment for all students. According to a study bullying prevalence rates range from 18% to 31% in primary and secondary schools, emphasizing the urgent need for effective intervention strategies and comprehensive anti-bullying programs to address this pervasive issue (Espelage et al., 2014).

5. Causes of Problems in Student Behaviours

Identifying the underlying causes of these behavioural problems can help in identifying potential solutions. Some of the contributing factors include:

5.1 Family problem: This is the main common factor affecting students’ behaviour. Students who are experiencing family problems tend to behave differently at school. They may release their anger by fighting with their classmates or they may have difficulties concentrating on their subjects.

5.2 Poor parental guidance: In modern times, it has become increasingly common for both parents to work, leaving little or no time to spend with their children. This can lead to juvenile delinquency as students may lack proper parental supervision and guidance. Without parental oversight, children may not receive appropriate feedback about the acceptability of their behaviour. Parents may also struggle to observe their children’s behavior and correct them when necessary. Consequently, children may develop the perception that they are free to do as they please, without regard for the consequences of their actions.

5.3 Peer pressure: When students enter school, it is important for them to make friends to avoid feeling lonely or left out. Creating a sense of belonging is essential. However, the circle of friends that students choose is not always beneficial. It is common for teenagers to seek membership in particular groups, and this is where problems can arise. Some students may desire to join popular groups, leading to conflict or bullying. Even if students don't want to fight, they may feel forced or encouraged to do so by the group's leader to maintain their position within the group.

6. **Neuro Linguistic Programming**

NLP is a psychological approach that aims to help individuals achieve their goals by changing the way they think, feel, and behave. NLP can be a powerful tool for improving student behaviour in the classroom, helping to create a positive and supportive learning environment. One of the main principles of NLP is that behaviour is shaped by our thoughts and beliefs. By identifying and challenging negative thoughts and beliefs, teachers can help students develop a more positive outlook and improve their behaviour in the classroom.

The fundamentals of NLP involve how the brain is wired to think one way or another. The wiring is based on how it has been programmed. At the micro level, the programming is done by making connections of the neurons in the brain. Since a child is born these connections are being made continuously which shape the mental development of the child as the child grows into teenager, adulthood and finally the old age. As the name suggests, the programming is done mainly through language. And the language can be in the form of words used, expressed emotions and body gestures. (Bandler & Grinder, 1979).

There are fourteen Presuppositions (also known as Convenient Assumptions) commonly used in NLP:

6.1 **Respect**: Everyone is unique. NLP recognizes that everyone has their own way of experiencing the world, and that there is no one-size-fits-all solution to any problem. NLP techniques are designed to be flexible and adaptable to the individual needs and preferences of each person.

6.2 **Ecology**: Our behavior must be based on its impact to the environment. In NLP, each of us need to behave in the way that gives positive impact to those around us. On the minimal, the impact should not be detrimental. With this presupposition, we will always be conscious on how we behave, and this will result in positive behaviours.

6.3 **Sign of lack of rapport is resistance**: NLP suggests that if there is a resistance towards us, it will result in our relationship with others being not up to our expectations. It simply means that we have not communicated to our stakeholders in the way that they fully understand our intention. We therefore need to be flexible in the way we communicate and be ever willing to change the words we use or the way we deliver the message.

6.4 **People are not their behavior**. This preposition suggests that we accept people for what they are. It is their behavior that may need to be changed. Before we can change their behaviour, we need to understand the underlying factors behind those behaviours.

6.5 **Everyone is doing their best with the resources they have**. When we are seeing weaknesses in people, we need to look at the resources that they need (people, time, money, materials, and knowledge). To help them improve their performance, we need to support them with the resources that they need.

6.6 **Calibrate our reaction to others based on their behaviours**. This will eliminate unnecessary conflicts while attempting to change the behaviors of others. NLP suggests that to change the behaviors of others, we need to make changes to our own behaviours.

6.7 **Territory is larger than the map we are looking at**. The map is not the territory. NLP suggests that our perception of reality is not the same as reality itself. In other words, the way we interpret and understand the world is based on our own subjective experiences and beliefs, and not on objective reality.

6.8 **You are in charge of your mind and therefore your results**. Mind and body are connected. NLP suggests that our thoughts and emotions are closely linked to our physical sensations and behaviors. By changing the way, we think and feel, we can also change our physical sensations and behaviours. To achieve a different result, you need to change the way you think.
6.9 Resources are abundant for people to achieve their desired results. When we are not able to achieve the results that we want to achieve, examine what additional resources that we need. And we need to know that those resources are available. We just need to look for them.

6.10 Wholeness is increased by all procedures. We should not limit ourselves to a single action to achieve the desired results. We need to explore the possible options and execute them based on necessity and priorities.

6.11 Only feedback – no failures. If we do not achieve the desired results, we need to look at it as feedback to our actions and the need to change on how we do things. Thinking of something as a failure is negative thinking, whereas thinking of ways to improve how we do things is positive thinking.

6.12 Response you get is the results of your communication. NLP emphasizes the importance of effective communication in achieving our goals. Effective communication involves not just the words we use, but also our body language, tone of voice, and other nonverbal cues. To change the results, we need to change the way we communicate.

6.13 Law of Requisite Variety: The one who is most flexible will eventually win. NLP suggests that we cannot stay rigid with our own way of thinking. This, however, does not suggest that we compromise on principles. We need to be flexible when the situation requires it and there are avenues to be flexible.

6.14 Design all procedures to increase choices. Change is possible. NLP suggests that we have the power to change our thoughts, emotions, and behaviors, and achieve our goals. It also means we can similarly help others change. By identifying and challenging negative thought patterns and beliefs, and developing more positive and adaptive behaviors, we can create positive change in our life and in others’ life too. We need to look at all possibilities to institute the desired changes.

These presuppositions form the fundamental way of thinking in understanding human behaviors and how to manage them (Bandler & Grinder, 1979).

With the right strategies and techniques, the behaviours can be changed and developed into the desired behaviours. These strategies include:

6.15 Positive and negative reinforcement: Positive and negative reinforcement are widely recognized techniques used in behavior modification. Positive reinforcement involves providing a favorable stimulus or consequence to strengthen desired behaviors, while negative reinforcement aims to increase desired behaviors by removing or avoiding aversive stimuli or consequences. These approaches have been extensively studied and applied in fields such as psychology and education (Malott & Shane, 2021).

6.16 Modeling: This involves observing and imitating the behaviors of others who exhibit desired qualities or skills. It is based on the social learning theory, which suggests that individuals can acquire new behaviors through observation and imitation of role models. Modeling can be an effective approach to promote positive behavioral changes as it provides individuals with real-life examples of desired behaviors, increases self-efficacy, and offers a sense of achievable goals. By witnessing others successfully engage in the desired behavior, individuals can gain confidence and motivation to adopt similar behaviors themselves. Modeling has been applied in various fields, including education, therapy, and public health, and has shown promising results in promoting behavior change and skill acquisition (Bandura, 1977).

6.17 Coaching and Counselling: Coaching and counseling are both effective behavioral change methods that offer guidance, support, and strategies for individuals seeking personal growth and development. Coaching focuses on assisting individuals in achieving specific goals, exploring their strengths, and unlocking their potential. It involves a collaborative partnership between the coach and the client, with a focus on action-oriented steps and accountability.
Counseling, on the other hand, delves deeper into addressing emotional and psychological challenges, providing a safe space for individuals to explore their thoughts, feelings, and experiences. It aims to help individuals gain insight, develop coping strategies, and overcome obstacles that hinder personal growth. Both coaching and counseling can be instrumental in facilitating behavioral change by providing individuals with the tools, support, and guidance needed to make positive and sustainable changes in their lives (Grant, 2003).

6.18 Cognitive Behavioural Therapy (CBT): This is a widely recognized and empirically supported psychotherapeutic approach that focuses on the interplay between thoughts, emotions, and behaviours. It aims to identify and modify negative or distorted thinking patterns and beliefs that contribute to emotional distress and maladaptive behaviors. By targeting these cognitive processes and promoting adaptive coping strategies, CBT helps individuals develop more positive and realistic perspectives, ultimately leading to improved mental health and well-being. CBT has been successfully applied to a wide range of mental health conditions, including anxiety disorders, depression, and substance abuse (Beck, 2011).

6.19 Neuro Linguistic Programming (NLP): This approach involves using communication techniques to change behaviors. It can be used to overcome negative thought patterns and enhancing positive way of thinking and behaving (Bandler & Grinder, 1979). NLP emphasizes the importance of understanding one's own subjective experience and the language used to describe it. By identifying and modifying limiting beliefs, communication patterns, and internal representations, individuals can transform their behavior and improve their overall well-being. NLP has been widely used in various fields such as therapy, coaching, and personal development, and has shown promising results in facilitating behavioral change and enhancing communication skills (O’Connor & Seymour, 1995).

In summary, changing human behavior requires applying a combination of the strategies tailored towards the individual. It also requires consistent effort and support to ensure the enhanced desired behaviors do not relapse. Changing behaviours may take a considerable amount of time and maintaining the desired behavior requires a lot of patience.

7. Application of NLP in Changing Student Behaviors

Applying main principle of NLP that behaviour is shaped by our thoughts and beliefs, by identifying and challenging negative thoughts and beliefs, teachers can help students develop a more positive outlook and improve their behaviour in the classroom. NLP techniques such as Reframing, Visualization and Anchoring. These techniques are widely used in NLP to promote personal growth, enhance communication, and achieve positive behavioural outcomes (Dilts et al., 1980).

7.1 Reframing: Reframing involves shifting one’s perspective and interpreting situations or experiences in a different way. By reframing negative or limiting beliefs into more positive and empowering ones, individuals can change their emotional responses and behavioural patterns. Reframing can be used to help students reframe negative thoughts and beliefs in a more positive way. For instance, a student who believes they are not good at math can be helped to reframe that belief by focusing on their strengths and setting achievable goals.

7.2 Visualization: Visualization is the process of creating vivid mental images of desired outcomes or goals. It harnesses the power of the mind to visualize success, increasing motivation and enhancing performance. Visualization can be used to help students imagine themselves behaving in a positive way.

7.3 Anchoring: Anchoring involves associating a specific trigger, such as a gesture or word, with a desired emotional or mental state. Through repetition and reinforcement, the anchor can be used to access the desired state instantly, facilitating behavioral change. Anchoring can be used to help students overcome negative thoughts and beliefs and develop more positive and adaptive
behaviors and used to reinforce positive behaviours and emotions by associating them with specific cues or stimuli.

From the 14 presuppositions, the following can specifically be utilised effectively to develop positive student behaviours:

7.4 The Map is Not the Territory: Teachers need to perceive the larger picture rather than just focusing on the perceived behaviour of the students. They need to aside their own personal biases and identify the root causes such as motivation, intellectual capacity and how the students themselves perceive the world.

7.5 Communication is Key: Use positive and most appropriate words when communicating to students. Avoid attacks on their personality. Our body gestures reflect the sincerity of our communication. Thus, we need to be conscious that the purpose of our communication is to develop positive behaviours in students.

7.6 Mind and Body are Connected: To change student behaviours, we need to shift the way they think. This starts with the way they interpret what they perceive which in turn leads to their attitude. When they interpret what they perceive positively, they will have positive attitudes which eventually leads to positive behaviours. By the same token, teachers themselves need do the same; they need to have positive attitude to induce positive attitude in students.

7.7 Everyone is Unique: Teachers need to first respect each student for what they are. As mentioned above, each student has their own way of perceiving things. Thus, teachers need to adapt to this uniqueness and be flexible on how they react and treat each situation. They need to be flexible, which relates to another preposition that says those who is most flexible will eventually win.

7.8 Change is Possible: Teachers need to have a strong belief and conviction that there is no such thing as incorrigible behaviours. They need to have varieties of options to change students’ behaviours from negative to positive. If one approach is not effective, teachers need to change, however slightly, on their approach. As Albert Einstein has often been quoted: Madness is doing the same thing and expecting a different result.

8. Summary and Conclusion

Neuro-Linguistic Programming (NLP) is a psychological approach that focuses on the connection between neurology, language, and patterns of behaviour. It offers valuable techniques and strategies to address student behaviours’ problems effectively. By understanding and leveraging the power of communication and the human mind, NLP provides educators with practical tools to create positive changes in student behaviour and promote a conducive learning environment.

One key aspect of NLP is its emphasis on effective communication. NLP techniques enable educators to improve their communication skills and establish rapport with students. By understanding and utilizing different communication styles, such as visual, auditory, and kinesthetic, teachers can adapt their teaching methods to suit the individual preferences of students. This personalized approach helps students feel understood and valued, which in turn reduces behavioral issues in the classroom.

Additionally, NLP equips educators with tools to identify and address underlying causes of student behaviour problems. Through techniques like reframing, educators can help students reevaluate their perspectives and develop more positive thought patterns. This process assists students in overcoming negative behaviours and replacing them with more constructive ones.

Furthermore, NLP offers strategies to help students manage their emotions effectively. Techniques such as anchoring, and visualization enable students to regulate their emotional states and respond more
positively to challenging situations. By teaching student’s self-awareness and emotional intelligence, NLP empowers them to make better choices and control their behaviours.

Moreover, NLP fosters a solution-oriented mindset by encouraging students to set goals and work towards them. By guiding students to identify their desired outcomes and creating a clear plan of action, educators can motivate students to channel their energy into productive behaviours. This focus on positive goal-setting helps students develop a sense of purpose and direction, reducing disruptive behaviours caused by disengagement or lack of direction.

Numerous studies and research support the effectiveness of NLP in addressing student behaviour problems. For example, a study conducted by O’Connor and Seymour-Smith (2018) found that NLP interventions positively impacted student behaviour and self-perception, leading to improved academic performance and overall well-being. Similarly, a meta-analysis by Alladin and Athié (2017) demonstrated the efficacy of NLP techniques in reducing anxiety and behavioural problems among students.

In conclusion, Neuro-Linguistic Programming (NLP) offers a range of techniques and strategies that can be effectively applied to address student behaviour problems. By enhancing communication skills, identifying underlying causes, managing emotions, and fostering a solution-oriented mindset, NLP empowers educators to create a positive learning environment and promote positive behavioural change among students.

References


Determinant Factors of Corporate Sustainability Information Disclosure: An Empirical Study of Vietnamese Listed Companies

Tram Nguyen Thi Thanh* & Toan Pham Ngocb

*Faculty of Finance and Accounting, Nguyen Tat Thanh University, Vietnam
bSchool of Accounting, UEH University, Ho Chi Minh City, Vietnam
*ntttram@ntt.edu.vn

Abstract: According to GRI’s definition in 2016, sustainable development is the type of development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It encompasses three dimensions: economic, environmental, and social. Businesses that manage sustainability well are often financially successful and contribute to improving business performance. Consequently, more and more businesses decide to disclose Sustainability Information. This paper aims to examine the factors affecting the Sustainability Information Disclosure of listed companies in Vietnam. The study was conducted through two main stages: (1) Qualitative research to build a formal research model and complete a survey questionnaire for formal research; (2) Quantitative research to collect, analyze survey data, and test model assumptions. The study used partial least squares structural equation modeling tool to analyze data which provides evidence of reliability and validity. The empirical results show that Proactive sustainability strategy (Environmental strategy, Economic strategy, and Social strategy) and Top management’s commitment are significantly positive correlated with the Sustainability Information Disclosure. Another interesting finding is that Top management’s commitment has a positive influence on Environmental strategy. Finally, the study proposes recommendations related to factors to improve the corporate sustainability information disclosure in Vietnamese listed companies.

Keywords: Structural equation modelling, Proactive sustainability strategy, Top management’s commitment, Sustainability Information Disclosure.

1. Introduction

According to GRI (Global Reporting Initiative, 2016), sustainable development/sustainability is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Sustainable development covers three aspects: economic, environmental, and social. The content of sustainable development information includes economic information, environmental information, and social information. First, in terms of economic information, Basiago (1998) defines economic sustainability as a production system that meets current consumption levels without affecting future demand. Economic sustainability is a necessary condition for the existence of a company (Simpson & Radford, 2012). The content of information on economic sustainability is expressed through revenue, profit, contributions to the state, support from the state, ensuring benefits for shareholders, the presence of market presence, infrastructure investments, and supporting services (GRI, 2016). Second, in terms of environmental information, Morelli (2011) associates the word “environment” with the impact of the environment. Human impact on natural ecosystems defines the term environmental sustainability as meeting the resource needs of present generations without compromising the health of the ecosystem that provides resources for generations. The environmental sustainability of enterprises has been mentioned by Hart (1995) as the maintenance of business activities associated with the protection of natural resources and efforts in environmental protection. These efforts include minimizing environmental impacts and reducing resource consumption by engaging in green
activities, solving pollution problems, and reducing resource depletion (Gibson, 2001). Information content on environmental sustainability is expressed through criteria of environmentally friendly materials, recyclable, remanufactured, receiving products back at the end of their life cycle, resource conservation policy, natural resources, energy, and water consumption, policies to reduce energy consumption, waste, and wastewater treatment, air pollution levels during production and business (GRI, 2016). Third, regarding social information, according to Elkington (1997), social sustainability refers to long-term efforts that affect the welfare of society. These efforts include conducting charitable activities, reducing social inequality, protecting human rights, strengthening employee care activities such as employee health, training, and developing vocational skills. Industry, workplace health, and injury statistics as well as commitments to non-discrimination (GRI, 2016).

Disclosure of sustainable development information in Vietnam, in general, or according to specific industry groups is a relatively new field. In fact, many businesses do not have enough clear information on the economy and society or activities to ensure sustainability to disclose information. The lack of this information can lead to lost opportunities to attract capital from investors with high standards of social and environmental responsibility (Le Anh Tuan, 2022). Therefore, it is necessary to conduct a study to determine the factors affecting the disclosure of sustainability information, thereby suggesting implications for enhancing information disclosure at enterprises.

The next section features excerpts from existing literature on the selected constructs. Hypotheses have been drawn based on such review, and a research model has accordingly been proposed. Research plan is described thereafter, followed by the results obtained. Findings are discussed in the next section. The article ends with concluding remarks, containing managerial implications of our findings.

2. Theoretical Background and Hypotheses Development

2.1 Theoretical Background

Stakeholder theory: Researchers have determined that one of the reasons that businesses choose to publish social responsibility reports, environmental reports, sustainability reports, and integrated reports is due to pressure from stakeholders (Deegan & Blomquist, 2006; Schaltegger & Burritt, 2010). In the context of sustainability reporting, businesses can make voluntary disclosures to manage pressures or respond to stakeholder needs for this type of economic, social, and environmental information (Bebbington & Larrinaga, 2014). In this study, stakeholder theory is applied to explain the impact of pressure on stakeholders having an influence on sustainability information disclosure, top managers will commit to the implementation of sustainable development goals, businesses implement appropriate management strategies with stakeholders, and for sustainable development, businesses will implement strategies and actions related to sustainable development proactively in economic, social and environmental aspects to satisfy stakeholders. Therefore, this theory is applied to explain how top managers’ commitment and proactive sustainability strategy can influence the disclosure of corporate sustainability information.

Legitimacy theory: Stakeholder attitudes towards sustainability reporting can be explained through theories of legitimacy. The special nature of sustainability reporting has affected stakeholders, which is perceived as a symbolic action taken by businesses to ensure a good reputation for the business with stakeholders (Belal, 2002; Cho, 2015). The reputation of an industry may be affected if one or more enterprises in the industry commit irresponsible behavior towards the community, environment, and society (Lange, 2012). Legitimacy theory is used to explain the impact of proactive sustainability strategy on sustainability disclosure and corporate performance.

2.2 Hypotheses Development

According to Bansal and Pratima (2005), corporate sustainability is recognized as the result of three proactive sustainability strategies including economic, social, and environmental. The economic strategy involves “the creation and distribution of goods and services…to raise living standards.
worldwide” (Bansal & Pratima, 2005). According to Steurer et al. (2005), the economic strategy includes financial performance and long-term competitiveness. An environmental strategy ensures that human activities do not harm the land, air, and water resources (Bansal & Pratima, 2005). A proactive environmental strategy can be defined as a set of initiatives that can reduce the impact of operations on the natural environment through corporate products, processes, and policies such as reducing energy and waste consumption, sustainable green resource use, and environmental management system implementation (Bansal & Roth, 2000). The attention of managers to environmental issues activates the ability of enterprises to establish a proactive environmental strategy (Hart & Dowell, 2011). Social strategies ensure equal rights for members of society to access resources and opportunities (Bansal & Pratima, 2005; Torugsa et al., 2013). Aspects of a social sustainability strategy include corporate equality, international justice, improvement of the internal social environment, and improvement of the external social environment (Torugsa et al., 2013).

Legitimacy and stakeholder theory highlight the importance of communicating proactive environmental strategies to external stakeholders to achieve social legitimacy. (Peter et al., 2011) demonstrate that to achieve long-term benefits, good management adopting proactive strategies to control environmental pollution is essential. Review of literature prompts us to hypothesize that:

H1: Economic strategy is likely to influence sustainability information disclosure positively
H2: Environmental strategy is likely to influence sustainability information disclosure positively
H3: Social strategy is likely to influence sustainability information disclosure positively

Huang and Kung (2010) have demonstrated that the need and willingness of enterprises to carry out social responsibility is driven by the need to meet the expectations of various stakeholder groups. By accepting and practicing social responsibility, enterprises demonstrate their understanding of their social obligations and willingness to act on them. Environmental information disclosure is one way for businesses to demonstrate their corporate social responsibility. Lewis et al. (2014) conducted a study on the influence of managers' characteristics on environmental disclosure in enterprises. The research results show that new managers tend to publish more environmental information in enterprises run by managers with an MBA degree. Ma et al. (2019) studied the influence of top managers on environmental information disclosure in listed companies in China, and the research results show that the education level and age of management influence environmental accounting disclosure. Review of literature prompts us to hypothesize that:

H4: Top management’s commitment is likely to influence sustainability information disclosure positively

Top management's commitment refers to the involvement of top managers in an organization with regard to sustainability (González-Benito & Javier, 2010). Wijethilake (2017) points out that top management's commitment is an integral part of implementing any sustainability practice. Without top management’s commitment, implementation may not be realistic. Top management's commitment is present in strategy formulation, resource allocation, and implementation of sustainable activities. Top management plays an important role in implementing proactive sustainability strategies, as such decisions involve resource commitment and organizational change (Bansal & Roth, 2000). The most effective implementation of proactive sustainability strategies involves commitment or assurance from different departments (Lee, 2011), and this requires the support of top managers. Review of literature prompts us to hypothesize that:

H5a: Top management’s commitment is likely to have a positive influence on economic strategy
H5b: Top management’s commitment is likely to have a positive influence on environmental strategy
H5c: Top management’s commitment is likely to have a positive influence on social strategy
3. Methodology

3.1 Sample

With the goal of collecting data from businesses, potential respondents are senior or middle managers (CEO, CFO, general director, head/deputy head of accounting department, finance department, etc.), and at the same time, these respondents need to have worked for at least 3 years at the surveyed businesses. In this study, the unit of analysis is an enterprise, so there will be only one surveyor per enterprise. The survey form is sent to the respondents through an online survey link sent via email, Facebook, Zalo, or sent directly to the respondents in paper form. A total of 250 questionnaires were distributed, of these, 177 responses, complete in all respect, were returned.

3.2 Survey Instrument

To validate the proposed model, we have conducted a survey with a structured questionnaire. The questionnaire had two distinct sections. Demographic details of respondents, including age, gender, level of management, and years of experience, were sought in the first section. The second section consisted of statements on the selected constructs in the form of rating scales. The respondents are asked to volunteer to fill in the questionnaire. This research questionnaire uses Likert’s 5-point scale, with options including “strongly disagree”, “disagree”, “normal”, “agree”, and “strongly agree”.

Table 1. Questionnaire Items and Reference

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Questions</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental strategy (PROACENVI)</td>
<td>Promoting sustainable resources management (e.g., renewable energy) Reducing emissions into the air, water and ground Promoting and preserving biodiversity Minimizing the environmental consequences of products and services</td>
<td>(Wijethilake, 2017)</td>
</tr>
<tr>
<td>Economic strategy (PROACE)</td>
<td>Promoting sustainability innovations Engaging in sustainability learning and knowledge management Developing sustainability business processes</td>
<td>(Wijethilake, 2017)</td>
</tr>
</tbody>
</table>
Dimensions | Questions | Reference
--- | --- | ---
Social strategy (PROACSO) | Ensuring health and safety of employees | (Wijethilake, 2017)
 | Investing in human capital development | |
 | Promoting ethical behavior and protecting human rights | |
 | Avoiding controversial, corrupt, or cartel activities | |
 | Promoting corporate citizenship | |
Top management’s commitment (TMC) | Top management extends full support for sustainability practices | (Wijethilake & Lama, 2019)
 | Top management has a great understanding of competitors’ sustainability practices | |
 | Top management knows a great deal about customers’ sustainability requirements | |
 | Top management has a great knowledge of the industry’s sustainability requirements | |
 | Top management effectively communicates sustainability practices among stakeholders | |
Sustainability information disclosure (CBTT) | More comprehensive presentation and disclosure of non-financial information including environmental and social information | (Lê Anh Tuấn, 2022)
 | Presenting and disclosing information on annual sustainable development reports | |
 | Disclosure of information related to sustainability in a separate report | |
 | Voluntarily publish sustainability reports | |

3.3 Data Analysis

Partial least squares structural equation modeling (PLS-SEM) is an analysis technique for detecting or constructing predictive models. Especially for the causal model analysis between latent variables, it is better than the general linear structural relationship model, which is very suitable for exploratory research. Compared with covariance-based structural equation modeling (CB-SEM), which is evaluated by covariance matrix, the PLS-SEM is suitable for small sample analysis (Hair et al., 2017). Chin (1998) suggested that the sample size requirement of PLS should be collected at 10 times the dimension of most question items. The dimension of most question items are TMC and PROACSO. There are 5 question items. According to the principle of statistical conservativeness, a larger sample size should be used. Therefore, the minimum sample size for research must be at least 50. The sample size of this study is 177, which meets the minimum sample size requirement. PLS-SEM is mainly designed to detect whether the causal relationship has a statistically significant mutual linear relationship. It is rather suitable for the construction of theoretical models. This study uses PLS-SEM as a method to explore the relationship between the research variables. It mainly uses PLS Algorithm and Bootstrapping to perform the repetitive sampling 5000 times in order to derive path coefficients and significance (Chin, 2010). It can discuss the correlation and influence between the dimensions.

4. Results and Analysis

4.1 Measurement Model Assessment

The measurement model’s evaluation is carried out by means of reliability and validity testing. The reliability is assessed using Cronbach’s alpha and composite reliability (CR) measures, the approved value for both of which should measure ≥ 0.70 (Hair et al., 2017). The results seen in Table 2 indicate that the values of both measures are satisfactory. It, therefore, verifies the reliability. Concerning validity testing, the assessment of convergent and discriminant validities are recommended. The
average variance extracted (AVE) and Outer Loadings were assessed for convergent validity, the appropriate values for which are ≥ 0.50 and ≥ 0.60 for AVE and Outer loadings, respectively. As illustrated in Table 2, both measures resulted in acceptable values, confirming the convergent validity. Coming to discriminant validity, Table 3 shows that the square root value of the diagonal AVE is greater than other correlation coefficient values in the matrix. “Heterotrait-Monotrait ratio (HTMT)” testing of correlations was suggested to assess this validity, Table 4 shows that all values are less than 0.9, indicating good discriminant validity (Hair et al., 2014).

Table 2. Measurement Model Parameter Estimation

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Question Items</th>
<th>Outer Loading</th>
<th>Cronbach’s alpha</th>
<th>CR</th>
<th>AVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainability</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information Disclosure (CBTT)</td>
<td>CBTT1</td>
<td>0.810</td>
<td></td>
<td>0.820</td>
<td>0.881</td>
</tr>
<tr>
<td></td>
<td>CBTT2</td>
<td>0.753</td>
<td></td>
<td>0.788</td>
<td>0.871</td>
</tr>
<tr>
<td></td>
<td>CBTT3</td>
<td>0.788</td>
<td></td>
<td>0.810</td>
<td>0.820</td>
</tr>
<tr>
<td></td>
<td>CBTT4</td>
<td>0.871</td>
<td></td>
<td>0.788</td>
<td>0.871</td>
</tr>
<tr>
<td>Economic strategy (PROACE)</td>
<td>PROACE1</td>
<td>0.796</td>
<td></td>
<td>0.753</td>
<td>0.853</td>
</tr>
<tr>
<td></td>
<td>PROACE2</td>
<td>0.778</td>
<td></td>
<td>0.796</td>
<td>0.871</td>
</tr>
<tr>
<td></td>
<td>PROACE3</td>
<td>0.863</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental strategy (PROACENVI)</td>
<td>PROACENVI1</td>
<td>0.797</td>
<td></td>
<td>0.797</td>
<td>0.871</td>
</tr>
<tr>
<td></td>
<td>PROACENVI2</td>
<td>0.703</td>
<td></td>
<td>0.703</td>
<td>0.871</td>
</tr>
<tr>
<td></td>
<td>PROACENVI3</td>
<td>0.818</td>
<td></td>
<td>0.818</td>
<td>0.871</td>
</tr>
<tr>
<td></td>
<td>PROACENVI4</td>
<td>0.658</td>
<td></td>
<td>0.658</td>
<td>0.871</td>
</tr>
<tr>
<td>Social strategy (PROACSO)</td>
<td>PROACSO1</td>
<td>0.704</td>
<td></td>
<td>0.704</td>
<td>0.853</td>
</tr>
<tr>
<td></td>
<td>PROACSO2</td>
<td>0.708</td>
<td></td>
<td>0.708</td>
<td>0.853</td>
</tr>
<tr>
<td></td>
<td>PROACSO3</td>
<td>0.628</td>
<td></td>
<td>0.628</td>
<td>0.853</td>
</tr>
<tr>
<td></td>
<td>PROACSO4</td>
<td>0.748</td>
<td></td>
<td>0.748</td>
<td>0.853</td>
</tr>
<tr>
<td></td>
<td>PROACSO5</td>
<td>0.784</td>
<td></td>
<td>0.784</td>
<td>0.853</td>
</tr>
<tr>
<td>Top management’s commitment (TMC)</td>
<td>TMC1</td>
<td>0.709</td>
<td></td>
<td>0.709</td>
<td>0.853</td>
</tr>
<tr>
<td></td>
<td>TMC2</td>
<td>0.852</td>
<td></td>
<td>0.852</td>
<td>0.853</td>
</tr>
<tr>
<td></td>
<td>TMC3</td>
<td>0.799</td>
<td></td>
<td>0.799</td>
<td>0.853</td>
</tr>
<tr>
<td></td>
<td>TMC4</td>
<td>0.818</td>
<td></td>
<td>0.818</td>
<td>0.853</td>
</tr>
<tr>
<td></td>
<td>TMC5</td>
<td>0.765</td>
<td></td>
<td>0.765</td>
<td>0.853</td>
</tr>
</tbody>
</table>

Table 3. Fornell-Larcker Criterion Results

<table>
<thead>
<tr>
<th></th>
<th>CBTT</th>
<th>PROACE</th>
<th>PROACENVI</th>
<th>PROACSO</th>
<th>TMC</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBTT</td>
<td>0.807</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PROACE</td>
<td>0.281</td>
<td>0.813</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PROACENVI</td>
<td>0.403</td>
<td>0.031</td>
<td>0.747</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PROACSO</td>
<td>0.457</td>
<td>0.233</td>
<td>-0.122</td>
<td>0.716</td>
<td></td>
</tr>
<tr>
<td>TMC</td>
<td>0.407</td>
<td>-0.042</td>
<td>0.283</td>
<td>-0.074</td>
<td>0.790</td>
</tr>
</tbody>
</table>

Table 4. Heterotrait–monotrait Ratio of Correlations

<table>
<thead>
<tr>
<th></th>
<th>CBTT</th>
<th>PROACE</th>
<th>PROACENVI</th>
<th>PROACSO</th>
<th>TMC</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBTT</td>
<td>0.348</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PROACE</td>
<td>0.517</td>
<td>0.147</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PROACENVI</td>
<td>0.552</td>
<td>0.314</td>
<td>0.183</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PROACSO</td>
<td>0.467</td>
<td>0.105</td>
<td>0.329</td>
<td>0.155</td>
<td></td>
</tr>
<tr>
<td>TMC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4.2 Structural Model Assessment

![Path Analysis Results](image)

**Figure 2. Path Analysis Results**

<table>
<thead>
<tr>
<th></th>
<th>Original Sample (O)</th>
<th>Sample Mean (M)</th>
<th>STDEV</th>
<th>T Statistics</th>
<th>P Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROACE -&gt; CBTT</td>
<td>0.171</td>
<td>0.169</td>
<td>0.058</td>
<td>2.946</td>
<td>0.003</td>
</tr>
<tr>
<td>PROACEVI -&gt; CBTT</td>
<td>0.358</td>
<td>0.359</td>
<td>0.054</td>
<td>6.678</td>
<td>0.000</td>
</tr>
<tr>
<td>PROACSO -&gt; CBTT</td>
<td>0.487</td>
<td>0.487</td>
<td>0.049</td>
<td>9.913</td>
<td>0.000</td>
</tr>
<tr>
<td>TMC -&gt; CBTT</td>
<td>0.349</td>
<td>0.351</td>
<td>0.054</td>
<td>6.480</td>
<td>0.000</td>
</tr>
<tr>
<td>TMC -&gt; PROACE</td>
<td>-0.042</td>
<td>-0.035</td>
<td>0.074</td>
<td>0.567</td>
<td>0.571</td>
</tr>
<tr>
<td>TMC -&gt; PROACEVI</td>
<td>0.283</td>
<td>0.300</td>
<td>0.060</td>
<td>4.681</td>
<td>0.000</td>
</tr>
<tr>
<td>TMC -&gt; PROACSO</td>
<td>-0.074</td>
<td>-0.068</td>
<td>0.080</td>
<td>0.923</td>
<td>0.357</td>
</tr>
</tbody>
</table>

Table 5. Results of Direct Effects

Based on the data analysis, hypotheses H1, H2, H3, H4, and H5b were supported by the empirical data. The results showed that CBTT significantly influenced PROACE (β = 0.171, P < 0.05), PROACEVI (β = 0.358, P < 0.05), PROACSO (0.487, and TMC (β = 0.349, P < 0.05) supporting hypothesis H1, H2, H3, H4 respectively. The results showed that TMC significantly influenced PROACEVI (β = 0.283, P < 0.05) supporting hypothesis H5b. The paths TMC -> PROACE and TMC -> PROACSO had the t-values 0.567, 0.923 (< 1.645) at the significance level of 0.05, indicating that hypotheses H5a, H5c were empirically not supported. A summary of the hypotheses testing results is shown in Table 5 and Fig. 2. Based on the summary results of table 6, PROACEVI mediates the relationship between TMC and CBTT (β = 0.101, t = 3.935, p =0.000).
Proceedings of the 6th International Conference on Digital Innovation – Blockchain and Fintech

Table 6. Results of Specific Indirect Effects

<table>
<thead>
<tr>
<th>Path Analysis</th>
<th>Original Sample (O)</th>
<th>Sample Mean (M)</th>
<th>STDEV</th>
<th>T Statistics</th>
<th>P Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>TMC -&gt; PROACE -&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CBTT</td>
<td>-0.007</td>
<td>-0.007</td>
<td>0.014</td>
<td>0.514</td>
<td>0.607</td>
</tr>
<tr>
<td>TMC -&gt; PROACEVI -&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CBTT</td>
<td>0.101</td>
<td>0.107</td>
<td>0.026</td>
<td>3.935</td>
<td>0.000</td>
</tr>
<tr>
<td>TMC -&gt; PROACSO -&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CBTT</td>
<td>-0.036</td>
<td>-0.033</td>
<td>0.040</td>
<td>0.905</td>
<td>0.366</td>
</tr>
</tbody>
</table>

The R² value is used to evaluate the explanatory ability of the model. The R² value is between 0 and 1. The higher the value, the higher the explanatory power. When the R² value is close to 0.50, the model has a moderate explanatory power. When the R² value is close to 0.75, the model has a high degree of explanatory power. The explanatory power of PROACE, PROACEVI, PROACSO and TMC to CBTT is 55.7%. Therefore, the model in this study explains the latent variables very well and it has a moderate explanatory power. The explanatory power of TMC to PROACEVI is 8.7%, therefore the model explains the latent variables not well.

Effect size is the effect of exogenous variables on endogenous variables using the explanatory effect value f² to detect. When 0.02 < f² ≤ 0.15, it is a small effect. When 0.15 < f² ≤ 0.35, it is a medium effect. Additionally, when f² > 0.35, it is a large effect. It can be seen from Table 7 that the explanatory effect value f² of PROACE to CBTT is 0.062. It displays a small-effect explanatory ability. The explanatory effect value f² of PROACEVI to CBTT is 0.262, which displays a medium-effect explanatory ability. The explanatory effect value f² of PROACSO to CBTT is 0.498, which displays a large-effect explanatory ability. The explanatory effect value f² of TMC to CBTT is 0.253, which displays a medium-effect explanatory ability. The explanatory effect value f² of TMC to ROACEVI is 0.087, which displays a small-effect explanatory ability.

Table 7. R² Value and f² Value

<table>
<thead>
<tr>
<th>Path Analysis</th>
<th>R²</th>
<th>R² Adjusted</th>
<th>f²</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROACE -&gt; CBTT</td>
<td>0.062</td>
<td>0.062</td>
<td>0.062</td>
</tr>
<tr>
<td>PROACEVI -&gt; CBTT</td>
<td>0.557</td>
<td>0.547</td>
<td>0.498</td>
</tr>
<tr>
<td>PROACSO -&gt; CBTT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TMC -&gt; CBTT</td>
<td>0.253</td>
<td>-0.004</td>
<td>0.002</td>
</tr>
<tr>
<td>TMC -&gt; PROACE</td>
<td>0.002</td>
<td>-0.004</td>
<td>0.002</td>
</tr>
<tr>
<td>TMC -&gt; PROACEVI</td>
<td>0.080</td>
<td>0.075</td>
<td>0.087</td>
</tr>
<tr>
<td>TMC -&gt; PROACSO</td>
<td>0.005</td>
<td>-0.000</td>
<td>0.006</td>
</tr>
</tbody>
</table>

5. Discussion

Comparison of path coefficients supports stronger correlation between PROACSO and CBTT (0.487, p < 0.05) than between PROACEVI and CBTT (0.358, p < 0.05); between TMC and CBTT (0.349, p < 0.05); between PROACE and CBTT (0.171, p < 0.05). PROACEVI mediates the relationship between TMC and CBTT (β = 0.101, p < 0.05). To sum up, the structural model indices support the overall quality of the measurement model. Findings on the whole suggest that PROACE; PROACEVI; PROACSO and TMC all positively influence CBTT. This finding matches the stakeholder theory and legitimacy theory, that provides explanation of the sustainability information disclosure.
6. Conclusion

The research results show that the level of sustainability information disclosure of listed companies in Vietnam is influenced by top management’s commitment and proactive sustainability strategies, including economic, social, and environmental strategies. The social strategic factor has the strongest impact, while top management’s commitment has the weakest impact on sustainability information disclosure. In addition, the research results also show that the environmental strategy plays a moderate role in the impact relationship of top management commitment and sustainability information disclosure.

In the context of sustainable development, the commitment of top managers plays an important role, as reflected in strategy setting, resource allocation, and implementation of sustainable activities and strategies for the business.

A business’s sustainability strategy requires the consensus and action of stakeholders, including investors, customers, employees, communities, and governments. As the business develops and implements its sustainability strategy, information on its sustainability activities will be disclosed to these stakeholders. Sustainability disclosure helps stakeholders evaluate and compare the performance of the business with other competitors in the same industry.

In addition, the disclosure of sustainability information is also a way for businesses to improve the reputation and trust of stakeholders. By being transparent and ensuring that sustainability activities are properly implemented, businesses will gain the interest and support of stakeholders and the community.

References


5Q Factors for Professional and Personal Success

Khairir Khalil* & Barjoyai Bardai

*Malaysia University of Science and Technology, Malaysia

Abstract: This is a concept paper on the 5Q factors that contribute towards professional and personal success of individuals. The five factors are Intelligence Quotient, Emotional Intelligence, Entrepreneurial Intelligence, Creative Intelligence, and Spiritual Intelligence. Through literature review, the descriptions of each of these factors and how they contribute towards individuals’ success are obtained. Conceptual framework has been developed based on the literature review. This can be the basis for research on the subject. It has been proposed that quantitative research be carried out to determine the influence these five quotients on professional and personal success.

Keywords: intelligence quotient, emotional intelligence, entrepreneurial intelligence, creative intelligence, spiritual intelligence, professional success, personal success

1. Introduction

The measure of intelligence, Intelligence Quotient or IQ has long been known as a factor contributing to someone being successful in life. The measurement of high IQ level in early childhood has been shown to be related to high socioeconomic status (SES) in adult life (Ritchie & Bates, 2013). Another study shows that high IQ level at 4 years old can predict the cognitive and academic abilities at the age of 6 (Tucker-Drop, 2013).

After IQ, Emotional intelligence (EQ) has emerged as a crucial factor in leadership success. Research has shown that leaders with higher levels of EQ tend to be more effective in managing teams, resolving conflicts, and inspiring and motivating their followers. A study found that EQ accounted for up to 85% of the factors that contribute to outstanding performance in leadership roles (Goleman et al., 2002). Goleman (1995) suggests that EQ has more impacts than IQ in terms of leadership success.

In terms of business success, research has shown that Entrepreneurial Intelligence (PQ) plays a significant role in the success of entrepreneurs and their ventures (Cetindamar et al., 2012). The study indicates that entrepreneurial intelligence positively influences the performance and growth of new ventures. Entrepreneurs with higher levels of entrepreneurial intelligence are more likely to identify viable business opportunities, develop innovative solutions, and navigate challenges successfully.

Creative Intelligence (CQ) is related to both leadership effectiveness and entrepreneurial success. Creative leaders are more likely to inspire and motivate their teams, encourage out-of-the-box thinking, and foster a culture of innovation within their organizations. They can identify new opportunities, develop unique business strategies, and adapt to changing market dynamics. In the entrepreneurial context, creative intelligence is essential for identifying gaps in the market, conceptualizing innovative products or services, and developing competitive advantages. A study by found that creative intelligence positively predicts leadership effectiveness (Tierney et al., 1999). Research by Hsiao and Wang (2019) demonstrated that creative intelligence is positively associated with entrepreneurial success.

Research has shown that Spiritual Intelligence (SQ) is strongly associated with overall well-being, personal fulfilment, and the ability to navigate life’s challenges with resilience and inner harmony. A study by found that individuals with higher levels of spiritual intelligence reported greater life satisfaction, higher levels of happiness, and lower levels of psychological distress. Moreover, spiritual
intelligence has been linked to positive coping strategies, increased emotional well-being, and a sense of purpose and meaning in life (Emmons & Paloutzian, 2003). Developing and nurturing spiritual intelligence can contribute to holistic well-being and enhance one's ability to find fulfillment and navigate life's complexities.

The above indicates that overall success in life is related to having the 5Q factors (Intelligence Quotient (IQ), Emotional Intelligence (EQ), Entrepreneurial Intelligence (EQ), Creative Intelligence (CQ), and Spiritual Intelligence (SQ)). Note that the Q that is used in the abbreviation actually means quotient. While "EI" could be a logical alternative abbreviation for Emotional Intelligence, the term "EQ" gained popularity through the work of researchers and authors such as Daniel Goleman (1995), who used the term extensively in their writings on emotional intelligence. As a result, EQ has become a commonly used term to refer to Emotional Intelligence in both academic and popular literature.

2. Literature Review

2.1 Intelligent Quotient (IQ)

Intelligence Quotient is a numerical score derived from standardized tests designed to measure a person's intelligence. These tests assess various cognitive abilities such as logical reasoning, problem-solving, spatial awareness, verbal comprehension, and mathematical skills. IQ scores are often used as a rough estimate of a person's intellectual capabilities, although they do not capture the entirety of human intelligence.

A study published in intelligence journal (Strenze, 2007) examined the relationship between IQ and occupational success. The research found that there is a positive correlation between IQ and job performance, with higher IQ scores generally associated with higher levels of professional success. However, the study also noted that other factors, such as personality traits and social skills, also contribute to success in the workplace. It is important to note that success can be defined in various ways, and intelligence is just one factor among many that contribute to an individual's achievements. While a high IQ can provide certain advantages, such as enhanced learning ability and problem-solving skills, success is influenced by a combination of intelligence, creativity, hard work, perseverance, social skills, and opportunity.

Another study by Duckworth and Yeager (2015) explored the relationship between IQ and lifetime success. The research suggested that while IQ is an important predictor of educational attainment and certain job outcomes, it is not the sole determinant of success. The study emphasized the significance of non-cognitive factors, such as motivation, emotional intelligence, and social skills, in achieving long-term success. They highlighted that higher IQ can contribute to certain aspects of success, it is not the sole factor, and other personal attributes and circumstances play significant roles as well. IQ scores are just one way to measure intelligence, and there are different types of intelligence that cannot be fully captured by a single metric.

Although the studies by Strenze (2007), and Duckworth and Yeager (2015) also explore the relationship between childhood IQ and later-life outcomes, they do not provide a definitive answer to the question of whether early IQ measurement can accurately predict success in all aspects of later life. Success is also influenced by various factors, including socio-environmental factors, personality traits, motivation, and opportunities for growth and development.

An example of a personality well-known for high IQ level was Elbert Einstein. He was a renowned physicist who is often regarded as one of the greatest scientific minds in history. His theories of relativity revolutionized our understanding of space, time, and gravity. Einstein's IQ has been estimated to be around 160, which is considered highly exceptional. However, it's important to note that IQ scores for historical figures may not be precisely accurate since they are often based on retrospective assessments. According to an article published in the journal "Nature," Einstein's IQ was estimated to be around 160 (Nature, 2002).
Another personality with a high IQ level was Marilyn Vos Savant. She was an American author and columnist who gained fame for having one of the highest recorded IQ scores. In 1986, she was listed in the Guinness Book of World Records under "Highest IQ" with an IQ score of 228. Vos Savant's intelligence and ability to solve complex problems have been recognized widely (Guinness World Records, 1986).

2.2 Emotional Intelligence (EQ)

Emotional Intelligence refers to the ability to understand, manage, and express emotions effectively. It involves being aware of one's own emotions and those of others, and using this understanding to navigate social interactions, build relationships, and make sound decisions. EQ encompasses skills such as empathy, self-awareness, self-regulation, and social awareness. When it comes to the relationship between EQ and success, it has been observed that emotional intelligence plays a crucial role in various areas of life, including personal relationships, career advancement, and leadership effectiveness. Leaders with high EQ are better equipped to navigate the complexities of human interactions, foster a positive work environment, and make sound decisions that consider the emotional impact on their team members. Developing and honing EQ skills can significantly enhance leadership effectiveness and contribute to long-term success (Goleman et al., 2002).

A meta-analysis published in the journal "Leadership Quarterly" (Joseph & Newman, 2010) examined the impact of emotional intelligence on leadership effectiveness. The study found that leaders with higher levels of emotional intelligence tend to demonstrate stronger leadership skills, build more positive relationships with their subordinates, and achieve better performance outcomes.

Another study published in the journal "Personality and Individual Differences" (O’Boyle et al., 2011) investigated the relationship between emotional intelligence and job performance. The research found a positive association between emotional intelligence and job performance across various occupations and industries. Individuals with higher emotional intelligence were more likely to exhibit stronger interpersonal skills, adaptability, and better problem-solving abilities, leading to greater success in their careers.

While high EQ can contribute to success, particularly in leadership roles and job performance, it is important to recognize that success is multifaceted and influenced by a combination of factors, including cognitive abilities, personality traits, and other competencies.

2.3 Entrepreneurial Intelligence (PQ)

Entrepreneurial Intelligence, also known as Business Intelligence or Business Acumen, refers to the ability to identify, capitalize on and seize business opportunities, make effective decisions, and manage risks in the entrepreneurial context. It involves a combination of business knowledge, strategic thinking, financial acumen, and the ability to navigate market dynamics. It encompasses traits such as creativity, resilience, problem-solving ability, and a strong drive for achievement (Cetindamar et al., 2012).

When it comes to the relationship between PQ and success, having a high level of entrepreneurial intelligence can significantly contribute to entrepreneurial success. Successful entrepreneurs often possess strong PQ, allowing them to understand market trends, make informed business decisions, and create innovative strategies that lead to business growth and profitability. A study published in the journal "Small Business Economics" (Zahra & Covin, 1995) examined the relationship between entrepreneurial intelligence and business performance. The research found a positive association between entrepreneurial intelligence and various indicators of business success, including revenue growth, profitability, and market share. The study suggested that entrepreneurs with higher PQ are better equipped to identify business opportunities, adapt to changing market conditions, and make effective strategic decisions.
Another study published in the journal "Journal of Business Venturing" (Wiklund & Shepherd, 2005) explored the role of entrepreneurial intelligence in venture growth. The research found that entrepreneurs with higher levels of PQ are more likely to engage in proactive behaviours, identify growth opportunities, and effectively manage the challenges associated with scaling a business. The study highlighted the importance of entrepreneurial intelligence in achieving sustainable growth and long-term success. Developing and enhancing entrepreneurial intelligence can enhance an entrepreneur's ability to make informed decisions, build a competitive advantage, and achieve long-term success in a dynamic and challenging business environment.

2.4 Creative Intelligence (CQ)

Creative Intelligence refers to the ability to generate new ideas, think critically, and find innovative solutions to problems. It involves the capacity to approach challenges from different perspectives, think outside the box, and engage in divergent thinking. Creative intelligence encompasses traits such as originality, flexibility, curiosity, and the willingness to take risks. They are valuable traits that can contribute to both leadership effectiveness (Tierney et al., 1999) and entrepreneurial success (Hsiao Wang, 2019). Cultivating and leveraging creative intelligence can enhance both leadership capabilities and entrepreneurial outcomes. When it comes to the relationship between CQ and success, creativity is often considered a valuable asset in various domains, including entrepreneurship, arts, science, and leadership. Successful individuals often exhibit high levels of creative intelligence, as it enables them to identify unique opportunities, adapt to changing circumstances, and come up with novel solutions. A study published in the journal "Psychological Science" (Baron & Tang, 2011) examined the link between creative intelligence and entrepreneurial success. The research found that entrepreneurs with high creative intelligence tend to identify and exploit unique business opportunities, leading to greater venture success and financial outcomes.

Another study published in the journal "Creativity Research Journal" (Mumford et al., 2002) investigated the relationship between creative intelligence and leadership effectiveness. The research found that leaders with higher levels of creative intelligence tend to be more adaptable, open-minded, and able to inspire and motivate others. These leaders are often seen as more innovative, leading to organizational success.

2.5 Spiritual Intelligence (SQ)

Spiritual Intelligence refers to the capacity to explore and understand deeper meanings, values, and purposes in life. It involves the ability to transcend material concerns, connect with others on a deeper level, and find a sense of inner peace and fulfillment. SQ encompasses qualities such as self-awareness, empathy, compassion, gratitude, and the ability to integrate spirituality into daily life. SQ also provides a connection with something greater than oneself and integrates spiritual values into daily actions and decision-making (Emmons & Paloutzian, 2003).

Emmon and Paloutzians (2003) also explored the concept of spiritual intelligence and its relationship with well-being. The research suggests that individuals with higher levels of spiritual intelligence tend to experience greater psychological well-being, satisfaction with life, and a sense of purpose and meaning. Developing and nurturing spiritual intelligence can contribute to holistic well-being and enhance one's ability to find fulfillment and navigate life's complexities (Deshpande & Joseph, 2009).

Fry (2003) examined the role of spiritual intelligence in ethical decision-making among business leaders. The research suggests that individuals with higher levels of spiritual intelligence are more likely to exhibit ethical behaviour, engage in responsible decision-making, and consider the well-being of stakeholders beyond mere financial gains. The potential benefits of spiritual intelligence include enhanced well-being and ethical decision-making. Cultivating spiritual intelligence can contribute to a more meaningful and fulfilling life, which is often considered a form of personal success.
2.6 Conceptual Framework

Figure 1 below shows the conceptual framework linking the five quotients to professional and personal success. Professional success can be measured and assessed through various dimensions such as career advancement, financial well-being, recognition, and reputation (Schlechter & Strauss, 2015). Personal success can be measured through various dimensions related to individual well-being, growth, and fulfillment (Luthans et al., 2008).

![Conceptual Framework Diagram]

**Figure 1. Conceptual Framework**

The dimensions for each of the quotients can be measured through the following:

**Intelligence Quotient (IQ):**
Cognitive abilities such as logical reasoning, problem-solving, spatial awareness, verbal comprehension, and mathematical skills. (Strenze, 2007).

**Emotional Intelligence (EQ):**
Ability to understand, manage, and express emotions effectively. It involves being aware of one’s own emotions and those of others, and having understanding to navigate social interactions, build relationships, and make sound decisions (Goleman, 1995).

**Entrepreneurial Intelligence (PQ):**
Ability to identify, capitalize on and seize business opportunities, make effective decisions, and manage risks in the entrepreneurial context (Cetindamar et al., 2012).

**Creative Intelligence (CQ):**
Capacity to approach challenges from different perspectives, think outside the box, and engage in divergent thinking (Tierney et al., 1999).

**Spiritual Intelligence (SQ):**
Ability to transcend material concerns, connect with others on a deeper level, and find a sense of inner peace and fulfilment (Emmons & Paloutzian, 2003).
3. Research Methodology

It is proposed that a quantitative research methodology is adopted. The respondents can consist of people from various types and levels of profession. The data can be analysed to determine how each dimension of quotients influences the dimensions of professional and personal success. It would also be interesting to determine if there are people who are successful professionally but not personally and vice versa. The results can be beneficial to be applied in developing people to be successful both professionally and personally.

References


Hybrid Workplace Management and the Future of Work

Douglas Karboni* and Vijayan Ramasamy*
*a,bMalaysia University of Science and Technology, Malaysia

Abstract: Hybrid workplace management and the future of work are becoming key concerns in the contemporary evolving work environment. Hybrid workplaces combine in-person and remote employees, offering them great flexibility and work-life balance and fostering productivity. This paper explains the hybrid workplace, its impacts on organizational management, strategies for effectively managing a hybrid work environment, and future work directions. High flexibility, technological integration, robust collaboration, and communication tools characterize hybrid workplaces. Organizations embracing hybrid work models have embraced numerous strategies, including designing, and implementing adjustable work policies, embracing employee engagement in decision planning and decision making, and adopting advanced technological infrastructure. A hybrid work model can positively impact an organization's space management/utilization, talent retention, acquisition, diversity, employee work-life balance, and overall institutional culture. Nevertheless, the emerging work models negatively affect organizational management, such as disruptions in the onboarding approaches, collaboration, and communication issues. For entities to effectively embrace a hybrid work approach, they should invest massively in modern technological infrastructure, embrace a ‘hybrid-first thinking’ and promote endless development and learning. Therefore, organizations adopting the suggested strategies can position themselves strategically for triumph in an evolving and dynamic work environment.

Keywords: remote work, hybrid workplace, flexibility, management strategies, leadership, employee well-being.

1. Introduction

The outbreak of COVID-19 and the evolving technological advancements have caused a great shift in organizations' and individuals' expectations regarding how and where to work with a lot of convenience and flexibility. Hybrid workplaces are growing rapidly and are considered one of the most influential transformations in the 21st century (Ancillo et al., 2020). The hybrid workplaces concept presents numerous benefits to both the employees and organizations, such as enhanced life-work balance, increased flexibility, higher productivity, greater access to a broad talent pool globally, as well as cost savings in commuting and office space (Hopkins & Bardoel, 2023). Nevertheless, hybrid workplace management's success faces challenges that should be tackled comprehensively if the potentials of the new working style are to be leveraged. Identifying and understanding the different constant changes associated with hybrid workplaces is pivotal for institutions striving to optimize their routine operations. This can also help organizations create environments that foster employee engagement, productivity, and satisfaction which present the possibility to embrace the future of work by unlocking the transformative potential (Iqbal et al., 2021). Therefore, this paper's primary goal is to delve into the hybrid workplace management realm and discuss its associated implications, including benefits, characteristics, and recommendations for the effective adaptation and implementation of the evolving workplace.
2. Defining Hybrid Workplace and Its Benefits or Challenges

The hybrid workplace concept exhibits a cardinal shift in the structuring and execution of work. According to Grzegorczyk et al. (2021), hybrid workplaces blend remote work and the traditional ‘walk-in’ office work model, offering employees great flexibility in choosing when and where to work from. For organizations to successfully leverage and manage emerging workplaces, they need to understand their related dynamics and characteristics. Iqbal et al. (2021) assert that hybrid workplaces are mainly distinguished by the work environment's flexibility, enabling employees to decide on their time for in-person (present in physical offices) and remote work. Other characteristics of hybrid work include technology integration which involves collaboration and robust digital communication tools, as well as agile workplaces to allow team interactions and individual work.

3. Benefits and Challenges of Hybrid Workplaces

3.1 Benefits

Hybrid workplaces foster employees' work-life balance and flexibility by allowing them to have higher control over their work volumes and schedules. According to Ancillo et al. (2020), work flexibility allows employees to accommodate personal challenges or responsibilities, such as taking care of their families.

Hybrid workplaces also foster employee productivity. Sørlie et al. (2022) and Johannsen and Zak (2020) assert that employees often exhibit greater levels of productivity when given autonomy to decide on their work atmosphere, which enables them to minimize distractions and leverage peak performance.

Additionally, hybrid workplaces allow organizations to minimize costs. Blended workplaces minimize the expenses associated with utilities, commuting, and renting office spaces, allowing entities to allocate the saved resources to other productive areas to support their growth.

Lastly, blended workplaces expand the talent pool for organizations. Adopting remote work allows entities to attract talented employees from different geographical locations (Braesemann et al., 2022). Hybrid workplaces allow flexibility by allowing employees to work from different locations under various time zones.

3.2 Challenges

Blended workplaces often face issues related to collaboration and communication. Such issues result from needing a robust technological infrastructure in many organizations to support clear and effective communication channels. Therefore, ineffective collaboration and communication adversely affect teamwork and the execution of routine institutional activities.

Similarly, hybrid workplaces are associated with issues about employee connections and engagement. According to Morrison-Smith and Ruiz (2020), establishing and sustaining a sense of trust, collaboration, and connection among employees working in various geographical locations can be complex. Employee confidence sometimes requires employers to establish specific mechanisms to enhance organizational culture among employees, which requires more effort and resources.

Hybrid workplaces require heavy investments in cybersecurity and technology to deter unauthorized access to sensitive data and guarantee uninterrupted remote work experience among their employees.
4. Various Hybrid/Blended Workplace Management Strategies

Effective hybrid workplace management demands effective policies, proactive approaches, and careful planning to tap into unique opportunities and challenges it presents. However, for organizations to effectively embrace blended workplaces, they should adopt the following key management strategies:

Organizations should develop flexible work policies to allow swift and effective adoption of hybrid work practices by conducting the following;

Management should identify the various roles and activities that are suitable to be performed in a hybrid working style. To identify these roles, the managers or leaders should conduct extensive evaluations of job functions and roles to decide on the positions appropriate for remote work and those requiring physical presence (Parker et al., 2020). In this case, the management may consider various factors, such as employees’ access to resources, client interactions, and collaboration needs.

Besides, the organizational management should develop and implement guidelines to support employees working remotely, including creating realistic expectations and transparent rules, such as availability, deliverable deadlines, and communication protocols (Wang et al., 2021). Management’s provision of clear frameworks to employees helps them effectively structure their routine work to foster teams’ cohesive workflow.

Lastly, management should design practices to create a hybrid working environment that promotes employees’ work-life balance. Organizational leaders or managers should encourage their subordinates to set healthy work-life boundaries by encouraging them to take breaks, dispiriting overtime work, and fostering time management approaches (Hopkins & Bardoel, 2023). Therefore, the management should foster the cultural norm that treasures employees’ well-being.

Organizations should focus on aligning management and leadership practices to hybrid working styles by embracing the following;

Institutions should develop unique leadership skills and abilities to support the management of remote teams and individuals. According to Sørlie et al. (2022), such development can be attained by providing relevant leadership training sessions and offering adequate support to the leaders in addressing the different obstacles encountered in hybrid teams’ leadership. Therefore, such support to leaders could foster trust building, effective communication across all teams, reports workers' empowerment, and facilitate resolutions of conflicts.

Institutions should concentrate on building effective and trustworthy communication channels to support a hybrid work environment to support the condonation of activities between in-office and remote employees. Trust connection can be attained by providing routine updates, encouraging open communication by availing straightforward feedback channels, and supporting an open dialogue culture.

Organizations should adopt different management practices to foster the supervision of remote employees. The practices may include management’s focus on measuring the results, establishing clear expectations, and offering resources and other support to off-office employees to succeed (Fuertes et al., 2020). Besides, managers can foster hybrid work environments by empowering remote employees and encouraging their autonomy in decision-making.

Further, institutions should develop and implement strategies aiming at enhancing employee productivity through increased engagement; mainly explained by the following sub-strategies.

Organizational management should foster a sense of inclusivity and belongingness among their employees. This can be attained by implementing different initiatives such as training, diversity policies, and clear communication aiming at increasing employee collaboration, engagement, team bonding, and
collaboration both virtually and in person (Fuertes et al., 2020). Therefore, by fostering diversity policies, the management can offer employees opportunities to connect and form formidable relationships.

Besides, the management should develop and implement appropriate performance management schemes for remote employees. This can be attained by setting clear and realistic performance expectations, metrics, and objectives for non-physical workers.

Lastly, institutions should foster teamwork and collaboration among their employees, both working from physical offices and online. It can be attained by arranging regular team meetings and encouraging open communication (LeBlanc & Nosik, 2019; Mroz et al., 2019). Thus, teamwork fosters a culture of teamwork and knowledge sharing among the employees, which boosts and enhances their innovativeness.

Institutions embracing hybrid workplaces should invest massively in technology infrastructure to support employees’ work or coordination of activities, with no or minimal interruptions by implementing the following sub-strategies:

Firstly, institutions should adopt and implement reliable and efficient digital collaboration and communication tools, like project management software, instantaneous messaging applications, and video conferencing platforms. In addition, organizations should provide full access and training to all employees to optimally use them.

Secondly, the management of different entities should establish robust security to guarantee privacy and data security. The leaders can set up ‘stringent security protocols’ by offering remote employees the required guidelines to protect data from unauthorized access, such as using VPNS (virtual private networks) and encrypted communication channels to protect sensitive information (Jyothi & Reddy, 2023).

Lastly, organizations should ensure that all infrastructure requirements are fulfilled to support the smooth work of remote employees. For instance, remote employees can be supported with access to a fast and reliable internet connection, appropriate software, and hardware to execute their work.

5. Impacts of Hybrid Work on Institutions Embracing It

The growing embracement of hybrid workplace environments has impacted organizations in various ways. Firstly, hybrid working models affect change management and organizational cultures. According to Parker et al. (2020), blended work compels entities to adopt the culture that grips trust, collaboration, and flexibility across in-office and remote teams. Organizations are induced into celebrating diversity, establishing shared values, and encouraging open communication. Besides, the hybrid working models pose challenges to organizations, especially in change management during the transition. For instance, some companies find it complex to effectively communicate the associated benefits, tackle stakeholders’ concerns, and avail sufficient resources and training to support employees’ adoption of new working ways (LeBlanc & Nosik, 2019). Such challenges arise because establishing newly supportive environments requires extensive learning and experimentation, which is a constraint to many entities.

Secondly, organizations are forced to adjust their office space management strategies due to the hybrid work model adoption. According to Barker and Manning (2022), blended work allows entities to rethink space utilization of their physical office spaces by optimizing the office layout to accommodate innovation, team-building tasks, and collaboration. Consequently, entities can implement multipurpose spaces, spontaneous activity areas, and flexible workstations, which helps in rent cost minimization. Besides, hybrid work approaches enable organizations to create adaptable and dynamic physical workplaces that entertain different work modes (Barker & Manning, 2022). Conducive workspaces are attained by designing quiet zones, meeting spaces, and collaborative areas to support the needs of both in-office and remote employees.
Thirdly, hybrid work models allow organizations to tap into a wider talent pool and enhance employee retention strategies. Blended working styles allow entities to revise their recruitment strategies since it allows employees to work from different geographical locations (Morrison-Smith & Ruiz, 2020). Organizations can attract a wide pool of top talent due to their commitment to professional growth, supportive work culture, and work-life balance. However, attracting and allowing talents to work from different locations breeds support and onboard issues for some institutions. Nevertheless, Hopkins and Bardoel (2023) suggest these challenges can be addressed by providing virtual training sessions, mentorship, and onboarding resources to new employees, which ensures swift and smooth integration of new recruits into the organization's workflows and culture.

Generally, the consequences of hybrid work environments on institutions call for 'proactive management approaches' to foster employee engagement and enhance the benefits of remote work or flexibility and organization effectiveness. Therefore, recognizing the aforementioned impacts and their measures could help various entities capitalize on the opportunities associated with blended work models.

6. Recommendations and Future Directions for Hybrid Workspaces

With the increasing prevalence of hybrid work modes, institutions are compelled to relentlessly adapt and change to benefit from their potential for long-term success. Therefore, for different organizations to ensure progress and sustainability in their hybrid environments, they should adopt the following recommendations.

Organizations, their management, and employees should embrace hybrid-first mindsets. Rather than just considering remote work, institutions should adopt a 'hybrid mindset," which makes blended work the primary operating mode. This mindset prioritizes collaboration, employee well-being, and flexibility above anything else. Besides, the management should conduct regular assessments to determine the effectiveness and relevancy of blended work processes, technologies, and policies (Hopkins & Bardoel, 2023). Managers can also attain this by soliciting employees' feedback and monitoring the set performance metrics.

Besides, entities should invest substantial resources in strengthening technology and digital infrastructure to support uninterrupted communications, data sharing, and collaborations. Keeping a high pace with advancements in technology can enable organizations to leverage the modern emerging platforms and tolls to foster remote productivity and collaboration. For instance, business and non-business entities can consider implementing AR (Augmented Reality) and VR (Virtual Reality) technologies to close the existing gaps between in-office and remote employees. These allow organizations to set up virtual whiteboards and virtual meeting spaces, which are vital in enhancing the participation of online workers, thus creating an interactive and engaging hybrid work environment.

Further, organizations should prioritize promoting employees' work-life balance and well-being. Koenig and Diehl (2021) assert that employees' well-being can be promoted when the organization prioritizes their mental and physical health. This can be exhibited by providing the support, initiatives, and resources necessary for workers to manage stress, create boundaries in their work and integrate their work-life into their activities. Besides, organizations can promote employees' well-being by designing schedules that accommodate individual needs and preferences by allowing the latter to have independence in their working hours to meet other obligations.

Moreover, institutions should develop and implement different programs to foster employee connections and collaboration. Organizations can attain such programs by creating team-building tasks and in-person interaction facilitation such as gatherings, life offsite meetings, or team retreats (Buljac-Samardzic & Doekhie, 2020). These strategies can help different entities to strengthen collaboration and foster relationships between in-office and remote workers.
Lastly, the organization's management embracing hybrid work environments should embrace the culture of continuous development through learning. The managers can develop their subordinates by offering professional development activities and training programs to address the competencies and skill gaps hindering the successful implementation of hybrid work environments (Mikołajczyk, 2022). In addition, employees can be encouraged to share knowledge and learn from each other both in-office and remotely through cross-functional projects and virtual mentorships.

7. Conclusion

The way organizations and individuals work are being greatly shaped by the emerging popularity of hybrid working environments, which combine in-person and remote person collaborations. The hybrid work model is characterized by flexibility, employee autonomy, and diversity. Organizations embracing this mode of work benefit from its ability to attract talent globally, cost minimization, time-saving and employee retention. In addition, entities that adopt the hybrid-first mindset tend to invest substantial resources in building robust technology infrastructures and prioritize employee decisions and well-being in all their programs. Nevertheless, a hybrid workplace is associated with some challenges, such as collaboration and communication issues resulting from the inability of some entities to adopt modern technologies. To address such issues, institutions conduct careful assessments of industry dynamics, employee preferences, and their unique needs to support the development of appropriate strategies. It is paramount for business and non-business entities to adopt agile approaches, listen actively to the employees' needs, and embrace continuous change to reap increased employee satisfaction, collaboration, and productivity from hybrid work models, contributing to organizational success. Generally, hybrid is the future of work, and entities that manage and proactively embrace the shift are expected to be at the innovations' forefront, attain sustainable growth, and attract a pool of top talents in the near future.

References


Optimal Choice of Funding Equity or Debt: An Empirical Evidence in Industry of Vietnamese Plastics and Rubber

Thai Hong Thuy Khanh\textsuperscript{a*}, Nguyen Cao Anh\textsuperscript{b}, Nguyen Mai Lan\textsuperscript{c} & Nguyen Thi Hai\textsuperscript{d}

\textsuperscript{a,b,c,d}University of Nguyen Tat Thanh, Vietnam
*thtkhanh@ntt.edu.vn

Abstract: This article analyzes two indexes between long-run return on equity (ROE\textsuperscript{*}) and long-run return on total asset adjusted to net operating profits after tax (ROA\textsubscript{L}*\textsuperscript{*}) for efficient financial leverage, combining an index of long-run market return with equilibrium price (R\textsubscript{m}*\textsuperscript{*}) to represent a proxy of firm market value for issuing equity. The research methodology is based on the theory of market-timing to develop financial meanings of alternative long-run measure for ROA\textsubscript{L}*\textsuperscript{*} and R\textsubscript{m}*\textsuperscript{*} to give optimal choice of funding capital. The model uses data of plastics and rubber firms listed on the Vietnamese Stock Exchange and the result is that the downtrend of ROA\textsubscript{L}*\textsuperscript{*} and ROE\textsuperscript{*} with ROA\textsubscript{L}*\textsuperscript{*} < ROE\textsuperscript{*}, so firms in the industry of plastics and rubber should not use financial leverage for long-run investment, and the trend of R\textsubscript{m}*\textsuperscript{*} have still been lower this industrial capital cost so that it is not time to market for issuing equity under the condition that capital market, including stocks and bonds, have been seriously illiquidity.

Keywords: capital cost, financial leverage, market return, return on equity, return on total asset

1. Introduction

On the trend of deep integration into the world economy, there is a requirement for the Vietnamese plastic and rubber industry to meet international standards that is committed to. The development trend of the plastic and rubber industry has changed radically in increasing competitiveness in the production of products in general and supporting industrial products in particular. According to Ministry of Industry and Trade, the supply capacity of enterprises producing plastic and rubber components meets 85-90% on the motorcycle manufacturing and assembling industry, 20% on the automobile manufacturing and assembly industry; 40% on the consumer electronic industry, 5% on the high-tech industry, 15% on the electronics and telecommunications industry, and the localization rate of plastic industry on the ancillary products is 59%. In fact, over the years, plastic and rubber enterprises have developed in the form of family complexes with small-scale production. The biggest limitation for small and medium-sized enterprises in the plastic industry is the lack of capital, difficulty in accessing credit, and difficulty in technological innovation, so they cannot deeply research and produce product details to meet the requirements. Increasing number of industrial production enterprises. In addition, product quality and competitiveness are limited, while high prices are difficult to compete with FDI enterprises. Upon the difficult situation after the period of Covid-19 pandemic, the economic growth in the period 2020 to 2021 only reached 2.87% and 2.56% with the inflation prices of inputs and outputs, accessing the sources of capital funding has some following problem statements in plastic and rubber industry:

Problem Statement 1. Higher real interest rate than real equity cost and the inefficacy of financial leverage in accessing the credit source of commercial banks to finance investments.

It is known that the plastic and rubber industry is the traditional industry which is passive in accessing capital sources for financing activities of investments and business, although there are only some stated-ownership enterprises borrow loans from commercial banks with preferential interest rate lower than market interest rate about two percent. In the theoretical framework of the Modigliani and Miller (1958) to analyze the efficient financial leverage, the prior condition in accessing credit sources from commercial banks should be set up on the lower real interest rate than the real equity cost so that the
enterprises could use the financial leverage from the source of commercial banks only if the interest rate is lower than the equity cost to formulate the positive premium for firms in accessing the outside sources of debt in accordance with the Modigliani and Miller (1958) second theorem of financial leverage:

\[ R_e = WACC + \frac{D}{E} \times (WACC - R_d). \]  

(1)

Where \( WACC \) is weighted average capital cost, in which \( R_e \) is equity cost on book equity \( E \), and \( R_d \) is debt cost on book debt \( D \).

In Figure 1, long-run equity cost of the Vietnamese Plastic and Rubber industry in 2022 only reached at \( R_e^* = 5.42\% \), which is lower than long-run real interest rate of the industry \( R_d^* = 5.71\% \). Therefore, there are difficulties for firms of the industry in accessing the credit source of Vietnamese commercial banks to finance investment projects that need the large amount of money to buy the equipment and build the plants or to expand manufactures and business in the Vietnamese Plastic and Rubber industry, \( R_e^* < WACC^* < R_d^* \). The inefficacy of financial leverage in accessing the debt sources of commercial banks to finance long-run investments of firms.

![Figure 1. Long-run Equity Cost \( R_e^* \) and Long-Run Real Interest Rate \( R_d^* \)](vietstock.com.vn)

**Problem Statement 2.** The crisis in issuing the corporate bonds of Vietnamese real-estate industry affecting the other industries after the Covid-19 pandemic.

The difficulties in accessing the source of Vietnamese corporate bonds were due to the crisis of Vietnamese real-estate corporate bonds that have affected issuing corporate bonds in the other industries. The main reason is derived from the difficulties of economic activities after the Covid-19 pandemic to break down the stable incomes of Vietnamese people leading to the shortfall in the manufactures and consumptions in Vietnam economy; meanwhile the inflation price of real estates in the prior period 2016-2018 and the latter period 2020 to 2022 to make the double effect of real-estate inflation price on the real demand of the real-estate ownership, so-called price bubbles of real estates. And it is easily found that the activities of speculative trading of real estates spread over the areas of cities and countryside in Vietnam to form a consequence that other ancillary industries such as interior
equipment, construction and others take part in dangerous games of speculation to stimulate the price bubbles of real estates. When the market uptrend of Vn-Index crashes, the real estate firms’ debt maturity payment is not manageable in short-run capital capability to make a bad precedent in issuing corporate bonds that could affect the corporate-bond issue of other industries.

Typically, after the market uptrend crash at the market peak of January 2022, the Vietnamese State Bank has tightened monetary policies due to the crisis of corporate-bonds affecting banking system, particularly the key phenomenon of bank-run in Saigon Commercial Bank (SCB) attached to the corporate bonds of Van Thinh Phat Corporations; the auction of real estates in the ThuThiem new city with the bidding price 2.4 bil./m² to make price bubbles by real-estate corporations that use the debt source of corporate bonds.

**Problem Statement 3.** Disadvantage of market timing in issuing equity to increase chatter capital and surplus capital of Vietnamese real-estate industry after the market uptrend crash.

The stock market had the volatility of Vn-Index, a market index of Ho Chi Minh City Stock Exchange (HOSE) strongly to increase from 659.21 to 1528.48 point in the period Mar-2020 to Jan-2022, golden time for issuing the equities of Vietnamese real-estate industry, but it is shown in the estimation from the financial statements that the share-equity growth in market uptrend of Mar-2020 to Jan-2022 only reached at 17.3 % due to the policy of share dividends in Vietnamese real-estate industry, lower than industrial revenue growth 38.1% in Figure 1.

![Vietnamese Plastic and Rubber Industry](image)

*Figure 2. Share-Equity Growth and Revenue Growth*

It is known that the favorable condition of the increase chatter capital and surplus capital is based on the investment cycle in accordance with the market cycle in the maximization of shareholders’ valuation. However, the special conditions of Vietnamese real-estate industry are mainly considered in long-run investment performance, the disadvantage of the increase chatter capital and surplus capital is hard for these firms to issue equity if investment cycle is different from the market uptrend of Vietnamese stock market.
Based on three mentioned-above problem statements, seeking sources of capital funding in current period is essential for firms in Vietnamese plastics and rubber industry for capital restructure and risk management. In the context of this research, the authors use the yearly data of firms’ financial statements in Vietnamese plastics and rubber industry to analyze the optimal choice of equity or debt funding with the structure of contents in the context of this research as follows:

a. Introduction to problem statements of capital funding in Vietnam.
b. Literature Reviews, providing the authors’ viewpoint for developing practical framework of optimal choice of equity and debt funding for Vietnamese Plastic and Rubber industry.
c. Research Methodology, suggesting the methods to measure optimal choice of equity and debt funding for Vietnamese Plastic and Rubber industry.
d. Section IV. Research Results and Discussions, gathering 23 firms of financial statements in Vietnamese Plastic and Rubber industry combined with the Vn-Index, a market index of Hochiminh City Stock Exchange to analyze the optimal choice of equity and debt funding for Vietnamese Plastic and Rubber industry.
e. Conclusion.

2. Literature Reviews

The problem statements given in section I is much related to theoretical groups of capital structure, including the investment theory in designing two theorems of the capital cost and the financial leverage (Modigliani & Miller, 1958), the trade-off between debt benefits and debt costs (Campbell & Kelly, 1994; Graham, 2003; Haugen & Senbet, 1978; Myers, 1984; 1994; Kraus & Litzenberger, 1973; Leary & Roberts, 2005), the pecking-order in the prior sources of capital funding (Myers, 1984; Myers & Majluf, 1984; Cadsby et al., 1990; Eckbo & Masulis, 1992; Eckbo & Norli 2005) and the market-timing in the favorability of issuing equity (Myers, 1984; Graham & Harvey, 2001; Baker & Wurgler, 2002). On the background of theoretical groups, the authors give the methodology to find out research gaps for examining the research results of optimal choice in funding equity or debt.

![Figure 3. Periods of Inefficient and Efficient Capital Funding](image)

Note: $R_0$ is short-run ratio of net operating profits after tax NOPAT to total asset TA, $R_0^*$ is long-run ratio of net operating profits after tax NOPAT to total asset TA, WACC is short-run capital cost, and WACC* is long-run capital cost
In theoretical framework, the reviews of this research include:

a. Describing theoretical background
b. Giving our viewpoint of development for the background
c. Exploiting limitations in the extent of the optimal choice in capital funding.

2.1 The Modigliani and Miller (1958) Theorems

The investment theory of Modigliani and Miller (1958) gives two basic elements of capital cost and financial leverage in capital funding under certain investments in which the equity $E$ is financed by shareholders with payable equity cost $R_e$ and the debt is financed by banks or bondholders with payable debt cost $R_d$ in measurement of weighted average capital cost:

$$WACC = \frac{E}{E + D} \times R_e + \frac{D}{E + D} \times R_d.$$  \hspace{1cm} (2)

The viewpoint of Modigliani and Miller (1958) is laid on financing certain investments that the firms are payable for capital cost. The highlight in the equation (2) reflects the efficacy of holding capital assets in process of investment and business, in which the cheaper debt cost leads to the more funding debt from banks or bondholders, or the cheaper equity cost leads to the more funding equity from shareholders or outside investors in stock market. To consolidate the equation (2), capital cost should be split into short-run and long-run ratios so that it could exploit the trend of capital cost, the uptrend of capital cost happens when the short-run capital cost is greater than the long-run capital cost, and then the opportunities of capital funding is easier for issuing equity or borrowing debt due to the attractive capital cost in process of capital funding.

However, the Modigliani and Miller (1958) theorems are exposed in the equity funding in stock market and the refinancing under the firm’s illiquidity or financial stress for running investment and business in commodity market. Two limitations have not been found in the Modigliani and Miller (1958) theorems because the equation (2) is lack of profitability in both stock market and commodity market.

2.2 Limitation

2.2.1 Funding Equity in Stock Market

Because of a key difference of cashflows between stock market and commodity market, the market value of equity $E$ and return $R$ should be evaluated on both stock and commodity markets. Nguyen Cao Anh and Thai Hong Thuy Khanh (2021; 2022) studied the disconnection that the change in stock price is distributed by investors’ cashflows and trading-volumes in stock market, and the retained earnings which is accumulated into equity is distributed by shareholders’ cashflows in commodity market. The limitation of equity $E$ should be clearer in the valuation on both cashflows for funding equity at market-time.
Moreover, the return $R$ is the basis of issuing and holding stocks. The Miller & Modigliani (1961) evaluation formula gives two key elements: (i) the yield of capital gain or loss $\partial P$ to reflect the change in stock price $P$ and (ii) the yield of dividend to reflect amount of money shareholders receive for calculating for a volatile return $R$:

$$R = \frac{\partial P + Div}{P}.$$  \hspace{1cm} (3)

Although the volatile return $R$ in the equation (3) gives the role of holding stocks, but the market timing for issuing equity is not exploited thoroughly in measurement of consistency. The return $R$ should be classified into: (i) long-run return $re^*$ to represent speculation and long-run return $ca^*$ to represent holding stocks. And the favorable condition for financing investments as well as funding equity or increasing chatter capital when the long-run holding return $ca^*$ has the beginning of the uptrend and a signal of internal market risk happens when long-run speculating return $re^*$ is greater than long-run holding return $ca^*$ in stock market. In the Figure 4, market timing for issuing equity and financing investment was the most favorable periods June 2004 and April 2014 for companies listed in Hochiminh City Stock Exchange (HOSE).

2.2.2 Refinancing under Illiquidity or Financial Stress for Debt Payments

The financial management has studied much in theories of trade-off and pecking-order to refinance reinvestment. In the context of Modigliani and Miller (1958) theorems, refinancing is considered under firm’s illiquidity or financial stress for debt payments, defined as borrow new debt to pay old debt. This situation happens when the firm want to maintain the liquidity of cashflows for short-run business operating, such as pressures of working capital, interests, corporate-income tax, operating expense, long-run debt maturity. A crisis of capital funding in Vietnamese real-estate industry has been the attribute of unfavorable capital structure for financing investments in long-run. Refinancing of these firms has still been out of controls in periods 2002 until now so that they have faced the problems of insolvency risk. Moreover, the usage of short-run deposits for lending long-run investments in banking system have still been in the state of illiquidity such as the phenomenon of the bank-run at Saigon Commercial Bank (SCB) in Vietnam, Silicon Valley Bank (SVB) in United States, leading to refinancing under bank risk-taking. So, central banks force to run regulatory interest rate with high level.
Proceedings of the 6th International Conference on Digital Innovation – Blockchain and Fintech

for controlling cashflows in banking system. The reason of bank risk-taking is due to volatile market value of financial assets in capital market.

2.2.3 The Myers (1984) Theoretical Sets of Trade-Off, Pecking-Order and Market Timing

The Myers (1984) theoretical sets exploit the efficacy of capital market for financing the investment and reinvestment. In theoretical frameworks, he breathed a new life for financial analysts in financial management under uncertainty of investors’ behaviors in capital market so that he gave some limitation part of funding equity from the Modigliani and Miller (1958) theorems that the capital structure is irrelevant to the efficacy of capital funding. So, theories of trade-off, pecking order and market timing had a new look of capital funding in financial management that the attributes of capital is laid on the profitability of funding stakeholders. The capital funding is described from basic funding sources for financing the certain and the uncertain investments in capital market:

Loans from commercial banks are a debt kind with periodical principals and interests or periodical principals so that the financial stress is under the pressure of short-run payments. The attribute of debt from commercial banks belongs to the short-run funded deposits and the long-run credits for financing investments so that commercial banks usually control debts by the borrowers’ periodical payments in short-run. Funding bank-debt will be efficient for the usage of financial leverage if its debt cost is lower than other funding sources and firm’s cashflows should be stable for the payments.

Bonds from bondholders are a debt kind with periodical interests and maturity principals so that there will not be financial stress in short-run payments if the maturity principals are lesser than total retained earnings in the validity period of bonds. Funding bond-debt will be efficient for the usage of financial leverage when the firms face the financial stress. Funding bond-debt usually have a high interest rate, and the financial risk of bonds does not have the collateral insurance for bonds and the transparency and feasibility of financed investments are essential for buying bonds.

Stocks from issuing equity are a kind of equity evaluated by stock market. The attractive profitability of arbitrary and dividend attached to the condition that investors buy stocks at the price if and only if the long-run holding return \( r_a^* \) is greater than the long-run speculating return \( r_e^* \) when starting the uptrend of \( r_e^* \) in stock market, shown in the figure 3.

The viewpoint of Myers (1984) exploits the efficiency of capital sources that stakeholders in capital market finance firms’ investment or reinvestment on three theoretical groups of trade-off, pecking-order, and market-timing. The highlight of choice in the debt funding is trade-off for financing reinvestment to describe the tradeoff of debt between benefits and costs. He implied that benefits of debt from the amount of interest tax-shield is greater than the costs of debt from the new interests of reinvestment. The favorable condition of funding debt is based on the strong profitability for accumulating equity and expanding business. So, it is defined as borrow the cashflows of future assets to decrease current business expenses, such as tax avoidance, dividend reduction; so, the conflicts of debtholders and shareholders are also arisen over time.

The other highlight of theoretical sets is derived from the research of Jensen and Meckling (1976), Jensen (1986) that free cashflows is a central key in corporate-finance management. When the profitability reaches at high-level, the managers are agents of shareholders to run financing investments from the equity funding of external investors. This way is based on the trust of external investors for financing the investments, and the conflicts of managers or internal shareholders and external investors when their real dividends are lower than their expected dividends, or the stock price in issuing equity is greater than overvalued firm due to the control of asymmetrical information such as moral hazard, adverse selection found in the theory of pecking-order in equity funding.

Though the theoretical sets of Myers (1984) analyze benefits and costs of capital funding as well as resolve the conflicts among stakeholders for financing investments, but factors of inefficacy of financial
leverage at market level and insolvency risk for financing investments and reinvestment is not implied in the theoretical sets.

2.2.4 Inefficacy of Financial Leverage at Market Level

Increasing financial leverage under condition that downtrend of long-run market return combined with higher real interest rate is a signal of inefficacy using financial leverage for financing investments and business. Then, the volatility of capital assets could be able to change the capital structure of firms, and essential tasks of firms need decreasing the ratio of financial leverage for the prior liquidity of short-run business. For instance, the inefficacy of financial leverage in Vietnamese real-estate industry has been in the state of inefficacy for high financial leverage at market level, they forced to narrow the scale of investments and control expenses of business operating.

2.3 Limitation

2.3.1 Insolvency Risk for Financing Investments and Reinvestment

Although Jensen and Meckling (1976), Jensen (1986) implied the free cashflows to control the insolvency risk flexibly with high financial leverage of financing sources for investment and reinvestment in the normal condition that the stock market is efficient. But, misusing financing sources, such as short-run funding sources for financing long-run investments and reinvestments continuously with large scale is easy for the managers to face unforeseeable risks out of control from changes in economic policies, volatility of politics, and tightening monetary policy.

3. Research Methodology

On the basis of theoretical framework, the aim of this paper is to seek the optimal choice of capital funding for investment and business in industry of Vietnamese Plastics and Rubber so that the research designment is described in the following diagram:

![Research Designment for Optimal Choice of Capital Funding](image)

*Figure 5. Research Designment for Optimal Choice of Capital Funding*
Step 1. Aims and scopes of the research

On three mentioned-above problems statements in Section I of introduction, the research evaluates the efficiency of financial factors in industry of Vietnamese plastics and rubber in proposing short-run and long-run plans of capital funding at industrial-level for determining advantages and disadvantages of funding sources. The financial factors are evaluated:

a. Evaluating real interest rate and financial leverage
b. Evaluating working capital and output growth
c. Evaluating market timing

Step 2. Theoretical framework

The research uses two group theories of the capital structure (Modigliani & Miller, 1958) for analyzing the efficacy of financial leverage and the market timing for issuing equity or increasing chatter capital in industry of Vietnamese plastics and rubber. The detailed theoretical framework is shown in Section II of Literature Reviews, and then our viewpoint of development is given for optimal choice of capital funding in industry of Vietnamese plastics and rubber.

Step 3. Selecting quantitative tools for evaluating optimal choice of capital funding

In evaluating financial leverage, the research uses two financial indexes: return on equity \( ROE \) and return on total assets adjusted to financial leverage \( ROA^l \) at industrial level for the comparison:

a. \( ROA^l > ROE \): return on total assets having financial leverage is greater than return on equity in long run so that increasing debt funding source is essential for financing investment and business in industry of Vietnamese plastics and rubber.
b. \( OA^l = ROE \): return on total assets having financial leverage is equal to return on equity in long run so that the firms is neutral with debt funding source
c. \( ROA^l < ROE \): return on total assets having financial leverage is lesser than return on equity in long run so that decreasing the ratio of financial leverage is essential for firms to increase the liquidity of business operating in industry of Vietnamese plastics and rubber.

In evaluating the market timing for issuing equity or increasing chatter capital and surplus capital, the research uses the daily data of Vn-Index, which is a market index of Hochiminh City Stock Exchange (HOSE) for seeking favorable market timing to issue equity in the next market uptrend.

Step 4. Results, discussion, and conclusions

After giving some quantitative tools for evaluating the efficacy of equity and debt sources, the research result is estimated on secondary data of yearly financial statements of firms in industry of Vietnamese plastics and rubber and daily trading stock in HOSE. And then, these results are given on discussion of advantages and disadvantages in optimal choice of equity or debt funding in industry of Vietnamese plastics and rubber. Some conclusions are implied for financial analysts and scholars in further research for optimal choice of capital funding of other industries in Vietnam. And the research hope that the key findings could help firms of Vietnamese plastics and rubber industry to accessing efficient capital funding for the risk management in activities of investment and business.
4. Research Results and Discussion

In Section II and III, the authors provide the theoretical and methodology framework of optimal choice of equity and debt funding for the firms of the Vietnamese Plastic and Rubber industry. In this section, the authors use the yearly data of this industrial financial statements to find out the research results and give some discussion on these research results.

4.1 Descriptive Statistics of Research Data

The research gathers 23 firms of the Vietnamese Plastic and Rubber industry listed in the Hochiminh City Stock Exchange (HOSE) in the period from 2005 to 2022 to describe raw variables related to calculating the proxy variables in the industrial optimal choice of equity and debt funding.

Table 1. Descriptive Statistics of Raw Variables in the Whole Period 2005 to 2022

<table>
<thead>
<tr>
<th>id</th>
<th>Raw variables</th>
<th>Mean</th>
<th>Max</th>
<th>Min</th>
<th>Std.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cash (CASH)</td>
<td>1,761,299</td>
<td>5,906,680</td>
<td>63,447</td>
<td>1,761,894</td>
</tr>
<tr>
<td>2</td>
<td>Total assets (TA)</td>
<td>24,657,901</td>
<td>70,527,120</td>
<td>1,346,784</td>
<td>22,392,661</td>
</tr>
<tr>
<td>3</td>
<td>Book debt (D)</td>
<td>13,378,666</td>
<td>39,907,261</td>
<td>824,725</td>
<td>13,036,549</td>
</tr>
<tr>
<td>4</td>
<td>Book equity (E)</td>
<td>11,271,304</td>
<td>30,619,859</td>
<td>522,058</td>
<td>9,405,142</td>
</tr>
<tr>
<td>5</td>
<td>Share equity (SE)</td>
<td>5,870,285</td>
<td>15,691,646</td>
<td>309,098</td>
<td>4,910,644</td>
</tr>
<tr>
<td>6</td>
<td>Revenue (REV)</td>
<td>26,647,038</td>
<td>78,846,827</td>
<td>2,226,837</td>
<td>21,957,393</td>
</tr>
<tr>
<td>7</td>
<td>Interests ($Rd)</td>
<td>764,260</td>
<td>2,507,064</td>
<td>48,508</td>
<td>702,275</td>
</tr>
<tr>
<td>8</td>
<td>Earnings after tax (EAT)</td>
<td>1,459,529</td>
<td>2,702,847</td>
<td>193,219</td>
<td>732,847</td>
</tr>
<tr>
<td>9</td>
<td>Cash dividends (DIV)</td>
<td>610,888</td>
<td>1,303,609</td>
<td>1,905</td>
<td>425,016</td>
</tr>
</tbody>
</table>

(Source: vietstock.com.vn)

Table 1 describes the basic statistics of raw variables in Vietnamese Plastic and Rubber industry to estimate some primary structural index of business and capital financing that the asset turnover ratio $\frac{REV}{TA} = 1.08$, that is the one unit of this industrial total assets to generate 1.08 unit of this industrial revenue, in which the ratio of dynamic assets sold for the customers to total assets occupies $(REV - $Rd - EAT)/TA = .99$ in running the activities of the industrial business and the ratio of net operating profit after tax to total assets maintains $(NOPAT)/TA = .09$ in using the policies of the industrial capital funding on the evaluation of business performance. And the primary structural index of business and capital financing is shown that the industrial profitability is not attractive enough for the outside investors for equity ownership when the stocks of this industry are overvalued at market risk.

Next, these raw variables are used to calculate proxy variables for evaluating the optimal choice of capital funding designed in Section III, including total assets adjusted to financial leverage $ROA_L$ and return on equity to reflect the efficacy of the industrial financial leverage.

4.2 Measure and Result for Evaluating the Industrial Debt Financial Leverage

The measure of efficient financial leverage for Vietnamese Plastic and Rubber industry is based on the comparison between the profitability on total assets or total capital financing $ROA_L$ and the profitability

---

5 Asset turnover ratio is defined as the generative level between static total assets and revenues, including the dynamic assets sold for customers and profitability.
on equity financing $ROE$ under the requirement of the following formula for evaluating the industrial efficient financial leverage:

$$
\frac{ROA^I}{ROE} = \frac{EAT + Rd}{TA} > \frac{EAT}{E}.
$$

The result of two indexes from Table 1 is shown that the profitability on total asset is lower than the profitability on equity financing, that is $ROA^I = .09 < ROE = .13$ to reflect the inefficient financial leverage in the Vietnamese Plastic and Rubber industry if the firms of this industry borrow more loans for the activities of long-run investment.

However, accessing the debt sources of commercial banks and corporate bonds could be temporarily acceptable for maintaining the liquidity of short-run business activities in some firms of the Vietnamese Plastic and Rubber industry.

### 4.3 Measure and Result for Market Timing for Issuing Equity

Based on the daily data of Vn-Index, the market index happened the market uptrend crash from 1528.6 point dated on 6 January 2022 to 1042.9 dated on 23 April 2022 with the current long-run market return $r_m^* = .14$, still greater than the profitability on total capital financing of the Vietnamese Plastic and Rubber industry $ROA^I = .09$. Therefore, the market timing is unfavorable for issuing equity in the period from market downtrend to market recovery.

![VN-INDEX](image)

**Figure 6.** The Stochasticity $P_m$, the Equilibrium $P_e$ and the Persistency $P_a$ of Vn-Index

The result in Figure 5 is shown that the third market peak of Vn-Index in Jan-2022 made a financial shock due to the crisis of issuing the exceed corporate bonds to make the market uptrend crash, forcing the firms listed on stock market sold the overloaded quantity of stocks to make the effect of the stock supply on the Vn-Index, $P_e > P_a$. Therefore, it would take the several years to exchange from the market downtrend to the market recovery in controlling the overloaded stocks in Vietnamese stock market, and the market recovery would be stable when the equilibrium market price is equal to the persistent market price, $P_e = P_a$. 
4.4 Some Conclusions from the Research Results

In accessing the credit source of commercial banks, this is unfavorable for funding this source to finance the long-run investments in Vietnamese Plastic and Rubber industry, but it is still some consideration of borrowing the loans of credit source when some firms are the state of illiquidity for the short-run business activities.

In accessing the debt source of issuing corporate bonds in Vietnamese Plastic and Rubber industry, the firms should be laid on the transparency and insurance for bondholders in the whole process of the industrial firms’ long-run investments under the close supervision of the Vietnamese Ministry of Finance and the Vietnamese State Securities Committee.

In accessing the equity source of the increase in the chatter capital and the surplus capital in Vietnamese Plastic and Rubber industry, the firms should be waited for few years in the next market cycle when the Vietnamese stock market recovery, which is golden time for issuing equity of the Vietnamese Plastic and Rubber industry.

5. Conclusion

This research analyzes two indexes between long-run return on equity $ROE^*$ to represent the profitability on the equity financing and the long-run return on total asset adjusted to the net operating profits after tax $ROA^*_L$ to represent the profitability on total capital financing for seeking the efficacy of financial leverage in the Vietnamese Plastic and Rubber industry, but the research result is shown in the opposite that the profitability on equity financing is lower than the profitability on total capital financing in evaluating the source of debt funding for the long-run investment; and the second research result of market timing for issuing the equity to increase chatter capital and surplus capital, the firms of the Vietnamese Plastic and Rubber industry lost the opportunity of golden time in the period Mar-2020 to Jan-2022 for accessing the source of equity funding.

References


Tax Management in E-Commerce from Theory to Practice in Vietnam and Learnings

Sang Huu Vo*, Khanh Thai Hong Thuyb & Thuy Pham Thi Phu芒c

*Faculty of Finance and Accounting, Nguyen Tat Thanh University, Vietnam
vbhansang@ntu.edu.vn

Abstract: The industrial revolution 4.0 affects many fields such as culture, economy, society... the digital transformation step by step give out the problem for businesses to change their methods in addition to meet consumer culture. Vietnam is gradually becoming one of the potential e-commerce markets in the Southeast Asia in particular and the World in general. To ensure correct and sufficient tax collection and prevent loss of state budget revenue, state agencies are gradually building a legal framework to manage e-commerce activities in the most effective way. In recent years, the National Assembly, the Government and the Ministry of Finance have issued a number of regulations to tighten the budget revenue on the income of foreign organizations, business households and individuals doing business on the digital platform in Vietnam. However, the current tax management model in Vietnam is not really effective in controlling and managing taxes for this transformation of digital transformation. Accordingly, the article aims to establish a theoretical basis and draw experiences from countries around the world that are applying tax management to e-commerce. Combined with the analysis of the current situation, the author proposes appropriate solutions to control, manage and exploit tax revenue more effectively in the context of the current digital economy.

Keywords: e-commerce, tax management, business, enterprise

1. Literature Review

1.1 Foreign Research

According to research by Olbert and Spengel (2019), the digital transformation process is happening rapidly on a global scale. The birth of e-commerce is an inevitable rule in accordance with the law (Cassar et al., 2010) and it will change the business methods of enterprises, thereby adjusting the consumption culture of customers. Therefore, businesses need to find new directions in business, especially when e-commerce is growing. The authors mention a number of studies by developing countries on tax administration for specific e-commerce: the research of Argilés-Boschet et al. (2020) highlights the influence of e-commerce business activities for tax evasion and that e-commerce companies evade taxes significantly more than traditional companies; Aizhen Li’s research (2018) refers to the relationship between e-commerce and economic growth, and proposes e-commerce tax policy in China; Liu Zhenyan’s research (2017) presents challenges for managers about tax loss, including illegal behavior such as tax evasion. Besides, research by Mihaela Tofan et al. (2022) deals with the current European tax administration process by means of existing legislation and their impact on the facilitation of remote payment control.

1.2 Domestic Research

The strong development of business on the digital platform has made the number of subjects participating in this activity increase. However, the situation of entities that have made transactions to buy and sell goods and services in the virtual environment but do not declare them to state management agencies is quite common, creating unequal competition between actors in the economy (Anh, 2019). In addition, according to research by Thu (2022), violations in e-commerce are becoming more and more complicated, making consumers more concerned about buying and paying online. It is the rapid, explosive development and many new forms of e-commerce mentioned above that in recent years have
posed significant new challenges for state management agencies, including tax authorities (Dung, 2020; Trang, 2020). One of the challenges is the loss of tax revenue, so in order to combat this, as well as support e-commerce business to be effective, it is necessary to promote the application of information technology in tax administration to tax administration for this activity; building a data warehouse of tax authorities, integrating with the database of relevant ministries and branches, especially the banking system and network and telecommunications providers etc. to serve the management work tax (Hieu, 2022; Kien, 2022; Thuc, 2017).

Through a review of related studies, the authors found that there are many studies that refer to the content of tax administration for e-commerce activities. However, this research topic still has many limitations, especially in the context of Vietnam. Therefore, the study focuses on understanding tax administration for e-commerce in Vietnam, and at the same time analyzes the current situation and proposes recommendations suitable to the current context of our country.

2. Theoretical Basis

2.1 Overview of E-Commerce

2.1.1 E-Commerce Concept

According to Mihaela Tofan et al. (2022), e-commerce is online shopping on the World Wide Web and it can be described as the process of buying/selling through remote data transmission. In Vietnam, e-commerce activities are the conduct of part or the whole process of commercial activities by electronic means connected to the Internet, mobile telecommunications networks or other open networks. E-commerce activities, in addition to the provision of ordinary goods and services, also include the provision of digital technology products such as digital services, digital products, and digital resources (Anh, 2019).

2.1.2 Difference Between E-Commerce and Traditional Commerce

E-commerce and traditional commerce are fundamentally different in terms of participants, forms of implementation, scope of transactions, payment methods, etc., and are governed by different legal bases.

2.2 Classification of E-Commerce Activities

In the form of implementing e-commerce, common forms of implementation include: electronic mail (e-mail); retail website and electronic trading platform.

According to subjects participating in e-commerce, there are 9 participants including: B2B (Business to Business), B2C (Business to Consumer), B2G (Business to Government), G2B (Governent to Business), G2C (Governmen to Citizen), G2G (Governent to Goverment), C2G (Citizen to Government/ Consumer to Goverment), C2C (Consumer to Consumer), C2B (Consumer to Business).

2.2.1 Tax Management for E-Commerce Activities

The requirements for e-commerce tax management include: (1) Managing participants, (2) Ensuring tax revenue in accordance with regulations into the state budget, (3) Improve tax administration by specific measures, (4) Tax administration must ensure fairness, (5) Modernize tax administration, (6) Strengthen the role of inspection and supervision, coordination of state management agencies (Anh, 2019). In particular, the issue of effective tax management for e-commerce activities has been of great interest to world scientists, specifically challenges in tax administration as studied by Garkushenko and Thiel (2018), Olbert and Spengel (2019); and Moreno and Brauner (2019). Factors such as identification
of business entities, transaction value, applied monetization strategies, scope of activities, functions and roles of the parties in the transaction to tax collection efficiency of this tax because e-commerce business is an extension of the multi-party business model and has many payment methods. Therefore, the above factors make the possibility of double taxation and loss of tax revenue between traditional commerce and e-commerce increase. Challenging example of scope of action according to the research by Yapar et al. (2015), e-commerce companies have the advantage that location does not affect their operations because they do not need to register a specific business location, but can use the internet to distribute transactions. From this, it is possible to find the most favorable jurisdiction for tax evasion which is the expected behavior of these companies. In addition, the digital economy is also one of the risks of Base Erosion and Profit Shifting (BEPS). Thus, OECD and G20 countries have implemented and developed BEPS as the basis for a modern international tax framework, from which profits are taxed on economic activity and value creation Argilés-Boschet et al. (2020). In 2016, when it came to the relationship between tax evasion and the digital economy, the European Commission ruled against the Republic of Ireland for an unreasonable tax subsidy to Apple of $13 billion. Specifically, Apple did not sell products to customers through stores, but instead established sales operations in Europe under a contract from Apple Sales International in Ireland. According to Wessel's research (2016), the EU Commission continues to investigate similar tax evasion practices.

From the above research in the world and in the country, it shows the similarity between the government's e-commerce tax administration and academic analysis. Factors that challenge tax administration by the Ministry of Finance include: digital, business entity identification, transaction value, scope of activities, functions and roles of parties in the transaction, etc. asked Vietnam to make improvements on the legal basis in order to gradually improve the e-commerce tax management more effectively.

3. Actual Situation of Tax Administration for E-Commerce in Vietnam

Currently, the e-commerce industry is growing rapidly in Vietnam. Big corporations such as Facebook, Google, Yahoo, etc. have appeared in our country through services such as booking, buying air tickets, online transportation.

a. According to statistics, the growth rate of e-commerce transactions is quite high. Specifically: the e-commerce market in Vietnam grew quite rapidly with 35.4 million users and generated more than $2.7 billion in revenue in 2019; According to a report of the Ministry of Industry and Trade, Vietnam's e-commerce revenue in 2021 is estimated at 13.7 billion USD, up 16% compared to 2020 and accounting for 6.5% of the total retail revenue of the country.

b. Legal documents on e-commerce tax administration have been adjusted, amended and supplemented to suit the situation and scale of operation.

c. E-commerce tax obligations are governed by three taxes: value added tax, corporate income tax, and personal income tax.

d. Some e-commerce activities of foreign-based companies doing business the online form in Vietnam (Grab, Agoda, Traveloka, and Booking) reveal limitations and need an appropriate solution soon.

e. There are still a few e-commerce activities that are not included in the list of business lines in Vietnam. Therefore, it makes it difficult to determine the nature to give the appropriate type of tax.
f. The rate of cash payment in e-commerce transactions is still high, accounting for about 80% of the total transactions according to the report of the Vietnam E-commerce Association (Vecom). This reduces the likelihood of a successful connection between businesses and consumers.

g. The management of e-commerce does not have a tool to strictly control the sales volume and revenue, so the problem of determining taxable income is facing difficulties.

h. Failure to business register in the field of e-commerce is quite common, for example, with online advertising and online sales which have not been adequately sanctioned.

---

**Figure 1.** Vietnam, Indonesia, and the Philippines are Most Likely to Attract More Investors Over the Long Term

(Source: Bain, SEA Venture Capital Investors Survey, Q3 2022)

---

**Figure 2.** The Proportion and Growth Rate of E-Commerce Compared to Other Digital Business Models in Vietnam in the Period of 2019-2025

(Source: Bain Analysis)
4. Countries’ Lessons Learned in E-Commerce Tax Management

4.1 Regulations and Circulars Applied

E-commerce platforms are required to aggregate orders, thereby determining the amount of tax to be paid and are responsible for paying tax authorities according to the OECD's proposal. Typically, through e-commerce platforms in countries such as the UK, USA, Australia, and Germany, tax collection has been successfully carried out. Tax administration for electronic transactions has difficulty in identifying transaction entities and arising transactions, as the OECD said in 2019. To solve this problem more than 130 countries have negotiated under the OECD to regulate the international tax system and according to research by The Guardian in 2021, the group of G7 countries have reached an agreement on the minimum tax rate in the world (Kien, 2022).

Some experiences in Asian countries such as Korea, Japan, China, specifically in Korea, have issued regulations on taxing value added tax for Korean customers since July 1, 2015, at a tax rate of 10% whether they are present in Korea or not. China is also one of the countries with a rapidly growing digital economy. Therefore, since 2014 the government has applied many measures to effectively manage taxes on e-commerce (Ha, 2017). In Japan, e-commerce has characteristics such as: easy implementation, wide range, encrypted data in secure digital form, high anonymity, etc. To identify e-commerces service providers, the government has asked banks to provide account numbers used to pay for e-commerce transactions. Specifically, in the field of retail export of cross-border e-commerce goods, the exemption and refund of value-added tax for these businesses only requires specific and simple proofs.

4.2 Tax Registration Form

According to a report by the OECD (2019), the online registration form of individuals has accounted for 80% of the past. Thus, taxpayers have more options in registering tax with the authorities. In addition, in Korea, the procedures for registration and concretization of requirements at the tax authority's website have been minimized; made on the website http://nts.go.kr/eng and submitted via e-mail.

4.3 Department in Charge of Tax Administration and Cross-Border Taxpayer Information Exchange

In Japan, a specialized group on e-commerce was established in 2000 and under the supervision and direction of the chief inspector of the tax department managing electronic transactions. This specialized team is trained in IT inspection skills, network security system monitoring, accounting software to perform the tasks of building databases collected from e-commerce service providers, developing developed an automatic detection system on the internet to collect information from websites... Also in Korea, similar to Japan, there is a tax administration office for e-commerce that collects information from sources such as from the General Statistics Office of Korea, the Association of Online Store Managers in Korea, or collected from the sales websites of businesses, from which the Korean tax authorities can detect suspicions corporate tax evasion. In addition, the High-Tech Tax Evasion Center under the Seoul Regional Tax Department aims to investigate tax evasion cases for e-commerce activities.

The coordination between government agencies and other agencies, especially customs agency, for tax inspection in the field of cross-border e-commerce in China according to the research of Li in 2017 and Yu in 2018. As for OECD countries, it provides good quality data sources, especially external data sources (international information exchange) according to the OECD report in 2019 (Kien, 2022).
4.4. Identify the Transaction Subject

In Japan, tax authorities have conducted trial shopping on e-commerce sites to receive emails from sellers and to identify e-commerce service providers (Viet, 2022).

In OECD countries, the common method to authenticate the transaction subject is through electronic signatures (Kien, 2022).

5. Tax Management Solution for E-Commerce

Step by step perfect and upgrade the technology infrastructure in a synchronous manner to apply digital to tax administration with the goal of controlling and managing e-commerce activities.

a. Building a separate tax administration apparatus specifically to manage e-commerce activities.

b. Building an effective information collection and processing mechanism.

Therefore, the Ministry of Finance and the General Department of Taxation need to study the development trend of e-commerce in order to choose an effective information collection channel and most importantly, a coordination mechanism between agencies to collect information in a multidimensional way. The inspection and examination of e-commerce requires the management agency to invest in resources, equipment, etc. to support the performance of official duties in order to detect and prevent fraudulent acts promptly (Ha, 2017).

6. Conclusions

This research gives an overall picture of tax administration for e-commerce in Vietnam. Through the review of domestic and foreign research, the authors have gathered lessons learned and offered solutions for effective tax management. In addition, tax administration for e-commerce needs to be oriented to achieve the goals set out in the short and long term when the Vietnamese economy is taking the first steps to integrate into the development of digital economy.

References


Digital Financial Education for University Students of Finance and Banking in the Process of Digital Banking Transformation

Anh Nguyen Lan*, Khanh Thai Hong Thuyb & Hang Nguyen Thi Thuč
a,b,cFaculty of Finance and Accounting, Nguyen Tat Thanh University, Vietnam
*anhnl@ntt.edu.vn

Abstract: Digital financial education has become an extremely urgent issue in the social economy. Technology is rapidly reshaping the human resources of the banking and financial services industry. Vietnam's banking industry is considered to have many initial results and has the most positive signs in the Asian region (e-Conomy SEA 2022 Report by Google Temasek Bain and Company). In the paper outlining the roles of Digital financial education in the digital transformation process of commercial banks in Vietnam, we collected data from a survey of 300 personnel from expert level upwards, including 60 officers who are competent leaders in the recruitment of commercial banks. Research survey on the skills, knowledge, and attitudes needed by university graduates in banking and finance for the digital transformation in banking. Based on the conceptual framework of ASEAN University Network - Quality Assurance and the set of professional ethical standards of the Vietnam Bankers Association. This study applies the Exploratory Factor Analysis (EFA) tool in SPSS to determine the most important group of factors for new graduates working in the banking and finance majors during the digital transition period. Using the multiple linear regression model, 240 valid questionnaires, were through the questionnaire method. The results show the extent of factors affecting the dependent variable "Intention to recruit". The most important evaluated variables include (1) the attitude and ethics of the recruited; (2) Basic skills of the student such as change management, planning, self-study, and research; (3) Basic knowledge of banking and finance majors; (4) Skills related to information technology and foreign languages. From the above results, the researchers discuss and propose some necessary solutions for digital finance education in the transition period toward a sustainable digital economy.

Keywords: digital financial education, commercial banks, financial technologies, human resources, Vietnam

1. Introduction

The Industrial Revolution 4.0 has had the impact of changing production methods, and business models, changing the way manual and intellectual workers work, and the interaction between stakeholders, that related to each economic sector in society. Human capital stimulates society to adopt environmental and energy-efficient technologies, which productive outcomes through such capital (Zafar et al., 2019). Currently, the banking and finance sector is facing the problem of a lack of high-quality human resources, especially in specialized fields that need both knowledge-skills in accounting-finance-banking and receptive ability financial technology innovations. The digital transformation of the banking industry requires a human resource with good ethics, a constant creative attitude, mastering expertise, mastering soft skills and simultaneously having a basic understanding of emerging financial technologies such as AI, Big Data, Data Analytics, Blockchain, Cloud Computing, and biometrics. Therefore, researching updating, and adding knowledge and skills for students in the digital transformation period is necessary. Current research focuses on new FinTech startups worldwide and their adoption, implying the need for studies assessing and identifying human resource competencies that will assist banks in addressing future FinTech requirements (Sana Arz Bhutto et al., 2023). The financial and banking sector is entering a transition period and it is necessary to prepare human resources to compete with Fintechs start-up and Bigtechs.
Improving the quality of digital financial education is the survival mission of universities so that learners can be highly adaptable to changes in the business environment, including breakthroughs in financial technology. Accessing and investing in technology, and people, and then changing business models and strategies is the sustainable direction that banks are aiming for. Several studies highlight the need for developing human capital in banking for the professional and competitive banking industry to emerge (Borish et al., 1995; Brandt & Li, 2003; Bonin et al., 2014; Claessens, 1998a; Claessens, 1998b). To safeguard both systemic soundness and fair competition in banking, the literature highlights the importance to develop strong financial sector institutions—notably regulation and supervision (Azam et al., 2004; Estrin & Pelletier, 2018; Reinhart & Rogoff, 2013). Human resources in the banking and finance sector need to be educated to meet the realities that businesses need, so university education programs must change in time, the direction of providing additional knowledge about financial technology and innovative technology access skills. In this study, the researchers delve into the study of digital finance education for university students of banking or the requirements of teachers and learners of finance and banking in the technology age. What knowledge and skills do the parties need to prepare and equip? What do users of banking services require from a banker? What knowledge and skills does the employer require the recruited personnel to meet? The answer will be given by the study, through qualitative and quantitative research methods, the researchers propose a model of the factors affecting the recruitment intention of the bank. The team carried out experimental research on the requirements that both recruiters and professionals working in the financial and banking industry require for recruits, thereby proposing some additional orientations to further improve the current program education and future banking and finance industry, especially in digital finance education.

2. Conceptual Framework and Literature Review

2.1 Education Program

Program of Education is an overall design for an education course activity. The education program shows all the content to be trained and indicates what can be expected of learners after the education course. Outlining the necessary process to implement the education content (Wentling, 1993). The content of the education program is usually designed to include education objectives, output standards, and knowledge standards. Theory of professional behavioral competence by McClelland (1973) describes "competence as a fundamental characteristic for performing work". Competence is several knowledge, skills, abilities, personality, work-related motivation, performance at work, and some other important outcomes in life. This is the basic concept, laying the first foundation of competence.

The concept of Lucia and Lepsinger (1999) states that behavioral competence is a tool to identify the skills, knowledge, attitudes, and personal characteristics required to effectively perform a role in an organization, thereby helping the organization achieve its strategic goals. Dubois and Rothwell (2004) define competencies with more characteristics, including knowledge, skills, personal image, thinking-acting personality, social awareness, perception of the surrounding world, etc. The characteristics of Boyatzic's professional competence about an individual are more specifically defined by Spencer and Spencer (2008), including three basic criteria related to performance evaluation criteria: knowledge, skills, and attitudes.

Knowledge includes facts, information, understanding, or skills acquired through experience, education, or self-study. Or is understood as the ability to collect information and data, the ability to apply, the ability to analyze, and the ability to synthesize, and evaluate. To accept a job these are the basic abilities of an individual.

Skill is the ability to act with a defined result usually within a certain amount of time and energy. Skill is the highest expression of applying knowledge or experience that a student has learned and accumulated into practice. Skills often require certain environmental and situational stimuli to gauge the extent to which the skill is demonstrated and used. This is the ability to perform, to turn knowledge into action.
The set of professional attitude and ethics standards of the Vietnam Bankers Association (VNBA, 2022), argue that Attitude and Ethic is the expression in words, gestures, and actions about things, and phenomena with valuable evaluations and comments, including awareness, influence, and perception. and behavior. And ethics is a system of rules about the standards of the community and society. This is an extremely important factor to create true and complete capacity. If Employees are indifferent to the development of technology, then it is difficult to combine knowledge or skills to make themselves progress, and without ethics to guide that behavior, it can cause deviations in standards in the workplace. Attitudes and ethics are the right behavioral factors that combine knowledge and skills to create real capacity and adapt to the development of today's society.

In short, professional behavioral competence is the total knowledge, skills, and ethical attitudes of a person. It is related to qualities and personality expressed through specific behaviors to achieve high efficiency in their work. The professional capacity of employees in general and employees of the banking and finance industry, in particular, can be assessed according to three components: knowledge, skills, and attitudes.

2.2 Technological Revolution

According to Schwab (2016), the Industrial Revolution fundamentally changed lifestyles, working styles, and ways of communicating. In terms of scope, magnitude, and complexity, this technological shift is unlike any others. Up to now, four industrial revolutions have taken place and profoundly changed all aspects of the economic, political, and social life of the world. The first revolution changed mechanization with steam power. The second has replaced the mechanization system with a new production engineering system that uses electrical energy to create large-scale production. Thirdly, this revolution has replaced the production engineering system from the electro-mechanical background to the mechatronics and micro-mechatronics platforms, the production has shifted to production based on high technology. Sustainable technology, and environmentally friendly such as information technology, nanotechnology, new energy technology, renewable energy technology. And now, the industrial revolution 4.0 has been changing production methods, business models, value chains, supply chains, changing working methods of employees, and modes of interaction between sectors in the economy. This revolution is being built on a digital platform, and the intersection of technologies from informatics and physics science, math, and biology.

Vietnam's banking industry is no exception to the general trend of the world, most banks are in the process of developing digital transformation strategies, including digitizing certain business segments, internal processes, and terminal channels. With embedded sensor technology, the banking industry will seize the opportunity to collect valuable customer biometric data through all smart devices and sensors. With IoT technology, banks can offer financial services tailored to the behaviors and preferences of their customers. At the same time, IoT will help banks predict which services need to be launched and when is the right time to launch the service to the market. NFC (near fast connect) technology will help automatically make cashless payments without touching the user's phone or bank card. Blockchain supports the development of smart and transparent credit or deposit channel. Industry 4.0 has brought about opportunities to apply technology that makes financial institutions and banks more flexible, and the user experience of financial services superior.

2.3 Research Hypothesis

The Industrial Revolution 4.0 has had the impact of changing the content and techniques of the financial-banking industry, changing the process and method of providing modern financial services. Therefore, this field has been changing requirements for human resources. Fintech innovations require people working in the financial-banking sector to have new skills, acquire and master current and future technologies, and have a continuous innovative learning attitude. Three factors influencing employer satisfaction identified are professional skills, attitudes, and knowledge (Trang Huynh, 2019). If considered above the customer side is the direct user of the results of education – graduates from
university - then satisfaction is the assessment of the user knowledge, skills, and attitude of students graduates against the requirements of the agencies or enterprises (Nguyen Hoang Lan & Nguyen Minh, 2015). As a result, based on a review of the literature, the following hypothesis was established in this study:

a. Hypothesis 1: Knowledge positively influences recruitment intention
b. Hypothesis 2: Skills positively influence recruitment intention
c. Hypothesis 3: Attitude & ethic positively influences recruitment intention

The proposed model is as follows:

![Figure 1. The Proposed Model](image)

3. Research Methods
3.1 Survey Design

This study was collected from a questionnaire-based survey. We adapted the measurement items from output standards - knowledge standards of Nguyen Tat Thanh Finance and Accounting Faculty, the faculty’s education program has been accredited by AUN and the Ministry of Education and Training. Throughout graduate attributes (GAs), ten items were used to measure the knowledge of the graduated student. The measurement items from program expected outcomes (ELOs), twelve items were used to measure the Skill of graduated students. Six items of The set of professional ethical standards of the Vietnam Bankers Association (VNBA) were used to measure Attitude & ethics. The list of measurement items was sent to six experts working in various universities in Vietnam to check the content validity, including three Senior leadership Banking, and three Ph.D. in Banking and Finance. Researcher consults the applicability and representativeness of each measurement item for its associated construct. The questionnaire was modified based on the feedback from the expert panel. The scales of the independent and dependent variables are designed based on previous studies and evaluated according to Likert 5 levels. The link to the questionnaire is:

https://docs.google.com/forms/d/1hYzXJMtpNeabqLZTLqiSx4kAf7nxBXBzpAtVWwH1-Bo/

3.2 Data Collection

Based on the objective of the study, the survey subjects of this study are leaders, specialists, and employees, mainly in Vietnamese commercial banks, mainly in Hanoi and Ho Chi Minh City. Hair et al. (1998) suggest that the minimum sample size should be in the ratio 5:1, 5 observations for an independent variable. Thus, if 4 independent variables are participating in the regression, the minimum sample size will be 5 x 4 = 20. The number of turn-by-turn questionnaires was 300. After filtering and
cleaning the data, 240 standard questionnaires were included in the official analysis, the research model includes 31 variables observation, and the minimum sample size is 31*5=155 so n=240 is acceptable.

3.3 Data Analysis

Model of factors affecting recruitment intention of Vietnamese banking and financial service providers including:

Independent variables:

a. Knowledge (KN) consists of 10 observed items.
b. Skill (SK) consists of 12 observed items.
c. Attitude & Ethic (AE) consists of 6 observed items.

Dependent variable: The intention recruitment of organizations providing financial services in Vietnam Bank (IR), has 3 observed variables.

According to the model proposed for exploratory purposes in this study. We used SPSS 23.0 to analyze the data. To analyze the data, the researcher uses analytical techniques: descriptive statistics, exploratory factor analysis (EFA), and evaluation of the linear regression model.

4. Research Results

4.1 Reliability Test

According to the standard of choosing the scale when having reliability Cronbach's Alpha ≥0.6 is acceptable (Hoang Trong & Chu Nguyen Mong Ngoc, 2019). Cronbach's Alpha of the component scales is presented in the tables below.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Cronbach's Alpha</th>
<th>N of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td>.873</td>
<td>10</td>
</tr>
<tr>
<td>Skill</td>
<td>.899</td>
<td>12</td>
</tr>
<tr>
<td>Attitude &amp; Ethic</td>
<td>.886</td>
<td>6</td>
</tr>
<tr>
<td>Intention recruitment</td>
<td>.703</td>
<td>3</td>
</tr>
</tbody>
</table>

We see that the Cronbach's Alpha of all variables are ≥0.7 and ≤0.95, proving that this scale is good. If a measurement variable has a correlation coefficient of the total variable (Corrected Item - Total Correlation) greater than or equal to 0.3, that variable meets the requirements (Nunnally, 1978, Psychometric Theory, McGraw – Hill), according to the results of the analysis of SPSS 23.0, there is no scale below 0.3, so the measurement variables are used in the next EFA exploratory factor analysis.

4.2 Exploratory Factor Analysis for Independent Variables

<table>
<thead>
<tr>
<th>Table 2. KMO and Bartlett's Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kaiser-Meyer-Oklin Measure of Sampling Adequacy</td>
</tr>
<tr>
<td>Bartlett's Test of Sphericity</td>
</tr>
<tr>
<td>Approx. Chi-Square</td>
</tr>
<tr>
<td>df</td>
</tr>
<tr>
<td>Sig.</td>
</tr>
</tbody>
</table>
The researcher uses the method of eliminating one bad variable in the first EFA analysis. From 28 observed variables to explain the independent variable in the first EFA analysis, remove SK6 and include 27 observed variables. The remaining independent variable is suitable for the second EFA analysis. After the second exploratory factor analysis, Table 2 shows the results.

Bartlett and KMO test: The results of exploratory factor analysis EFA (Principal components with Varimax rotation) show that KMO (Kaiser - Meyer - Olkin measure of sampling adequacy) = 0.931 meets the condition 0.5 ≤ KMO ≤ 1 to perform EFA; The results of the EFA suitability test show that the coefficient KMO = 0.931 satisfies the condition 0.5 < KMO = 0.931 < 1, so the EFA is consistent with the data. The results of the correlation test between the observed variables, through the KMO and Bartlett test, the Bartlett test has Sig.<0.01 observed variables are linearly correlated with the representative factor.

Table 3. Total Variance Explained

<table>
<thead>
<tr>
<th>Component</th>
<th>Initial Eigenvalues</th>
<th>Extraction Sums of Squared Loadings</th>
<th>Rotation Sums of Squared Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>% of Variance</td>
<td>Cumulative %</td>
</tr>
<tr>
<td>2</td>
<td>2.390</td>
<td>8.853</td>
<td>48.310</td>
</tr>
<tr>
<td>3</td>
<td>1.745</td>
<td>6.462</td>
<td>54.772</td>
</tr>
<tr>
<td>4</td>
<td>1.335</td>
<td>4.946</td>
<td>59.718</td>
</tr>
</tbody>
</table>

There are 04 factors extracted according to Eigenvalue ≥ 1 and Total Variance Explained is 59.718% ≥ 50% according to Hair et al. (2010), from Table 3 data for the conclusion, after analyzing The EFA analysis has four factors affecting the recruitment intention. In which, there is a newly discovered factor, and the total variance extracted is 59.718% of the variation in the data.

Factor Loading, also known as factor weights, this value represents the correlation relationship between the observed variable and the factor, according to Hair et al (2010), Multivariate Data Analysis coefficient load from 0.45, the observed variables have relatively good quality.

So, after analyzing EFA, the results are as follows: The results of factor analysis to explore EFA with the rotation matrix (2 times) show that all 3 factors introduced in the study influence recruitment intention. (Table 4). However, out of 28 observed variables, only 27 have an effect (Table 4).

The first factor (F_AE) – "attitude and ethics" has all 6 observed variables that have the strongest influence on the intention to hire, which is compliance, caution, integrity, dedication and diligence, initiative, creativity, adaptability, and sense of information security. The second factor (F_SK) – "skills" has 7 influencing variables including time management skills, scientific document management skills, planning and organizational skills, implementation of plans, teamwork skills, conflict management skills, critical thinking skills, creativity, synthesis and evaluation of results, self-study skills, self-education and research of knowledge, change management skills and adapting to new technologies. The third factor (F_KN) - "knowledge" has 7 influential observed variables including legal knowledge, basic knowledge of accounting-tax, and knowledge of operating principles of the financial market and financial intermediaries, knowledge of social sciences, politics, and government plans-directions in the field of banking and finance, knowledge of banking and non-banking payment infrastructure knowledge of monetary policy, fiscal policy, knowledge of new terminology in the field of banking and finance, knowledge of business administration. The fourth newly discovered factor (F_DS) - "digital technology-related skills and knowledge" includes the ability to solve problems-situations arising in traditional banking operations by applying technology, knowledge of technological innovation in the field of finance and banking, skills in using foreign languages, basic knowledge of common software systems in the field of finance-banking-accounting such as Core banking, ERP, MPA, CRM, ODS. This shows
that employers in the banking and finance sector have begun to have newer requirements for skills and knowledge in the digital transformation period, and the researcher’s study is relevant and necessary for supporting additional human resources for the banking and finance industry from the focal point of digital financial education.

Table 4. Rotated Component Matrix (2 times)

<table>
<thead>
<tr>
<th>Component</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>AE3</td>
<td>.778</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AE2</td>
<td>.778</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AE4</td>
<td>.729</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AE6</td>
<td>.712</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AE1</td>
<td>.667</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AE5</td>
<td>.609</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SK8</td>
<td></td>
<td>.713</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SK10</td>
<td></td>
<td>.677</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SK4</td>
<td></td>
<td>.662</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SK9</td>
<td></td>
<td>.656</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SK11</td>
<td></td>
<td>.637</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SK12</td>
<td></td>
<td>.624</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SK5</td>
<td></td>
<td>.574</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SK2</td>
<td></td>
<td>.456</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KN6</td>
<td></td>
<td></td>
<td>.776</td>
<td></td>
</tr>
<tr>
<td>KN5</td>
<td></td>
<td></td>
<td>.701</td>
<td></td>
</tr>
<tr>
<td>KN7</td>
<td></td>
<td></td>
<td>.669</td>
<td></td>
</tr>
<tr>
<td>KN4</td>
<td></td>
<td></td>
<td>.668</td>
<td></td>
</tr>
<tr>
<td>KN8</td>
<td></td>
<td></td>
<td>.641</td>
<td></td>
</tr>
<tr>
<td>KN2</td>
<td></td>
<td></td>
<td>.606</td>
<td></td>
</tr>
<tr>
<td>KN10</td>
<td></td>
<td></td>
<td>.533</td>
<td></td>
</tr>
<tr>
<td>KN3</td>
<td></td>
<td></td>
<td>.454</td>
<td></td>
</tr>
<tr>
<td>SK1</td>
<td></td>
<td></td>
<td></td>
<td>.797</td>
</tr>
<tr>
<td>KN1</td>
<td></td>
<td></td>
<td></td>
<td>.747</td>
</tr>
<tr>
<td>SK3</td>
<td></td>
<td></td>
<td></td>
<td>.723</td>
</tr>
<tr>
<td>KN9</td>
<td></td>
<td></td>
<td></td>
<td>.697</td>
</tr>
<tr>
<td>SK7</td>
<td></td>
<td></td>
<td></td>
<td>.678</td>
</tr>
</tbody>
</table>

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 7 iterations.
4.3 Exploratory Factor Analysis for the Dependent Variable

Table 5. Results of Testing KMO and Bartlett's Dependent Variable

<table>
<thead>
<tr>
<th></th>
<th>Kaiser-Meyer-Olkin Measure of Sampling Adequacy.</th>
<th>.674</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bartlett's Test of Sphericity</td>
<td>Approx. Chi-Square</td>
<td>126.846</td>
</tr>
<tr>
<td>df</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Sig.</td>
<td></td>
<td>.000</td>
</tr>
</tbody>
</table>

Table 5 shows that KMO = 0.674 meets the condition of $0.5 \leq KMO \leq 1$, and EFA results show that there is a factor extracted at the Eigenvalue equal to $1.884 > 1$. This factor explains $62.792\%$ of the variation in the data. Particularly, the Rotated Component Matrix table has the message: “Only one component was extracted. The solution cannot be rotated.” That means that the scale ensures unidirectionality, EFA can only criticize one factor from the observed variables, which is the recruitment intention of Vietnamese banking and financial service providers.

4.4 Evaluation of the Linear Regression Model

After analyzing EFA, the researchers determined that there is only 1 dependent variable and 4 independent variables, so the study continues to perform linear regression analysis (MLR-Multiple Linear Regression) to evaluate the impact of these independent variables $F_{AE}$, $F_{SK}$, $F_{KN}$, $F_{DS}$ on the dependent variable $F_{IR}$.

Table 6. Evaluation of the Linear Regression Model

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Regression</td>
<td>164.475</td>
<td>4</td>
<td>41.119</td>
<td>129.660</td>
<td>.000b</td>
</tr>
<tr>
<td>Residual</td>
<td>74.525</td>
<td>235</td>
<td>.317</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>239.000</td>
<td>239</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Dependent Variable: $F_{IR}$
b. Predictors: (Constant), $F_{DS}$, $F_{KN}$, $F_{SK}$, $F_{AE}$

Model Summary b

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
<th>Durbin-Watson</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.830a</td>
<td>.688</td>
<td>.683</td>
<td>.56314016</td>
<td>2.019</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), $F_{DS}$, $F_{KN}$, $F_{SK}$, $F_{AE}$
b. Dependent Variable: $F_{IR}$

According to the output results in Table ANOVA, parameter Sig < 0.05: Rejecting the hypothesis H0, $R$ Square $\neq 0$ statistically significant, the regression model is suitable. The Model Summary table has: $R$ Square reached .688, showing that most of the data points focus close to the regression line, $R$ Square Adjusted reached .683 showing that the independent variables included in the regression analysis affect $68.3\%$ of the variation of the dependent variable, the remaining $31.7\%$ is due to variables outside the model and random error. Durbin–Watson value (to evaluate first-order series autocorrelation) = 2.019, ranging from 1.5 to 2.5, so the result does not violate the assumption of first-order series autocorrelation (Yahua Qiao, 2011).
Table: Statistical Parameters in the Regression Model by the Enter Method

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
<th>Collinearity Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
<td>Tolerance</td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>-2.086E-16</td>
<td>0.036</td>
<td>.000</td>
<td>1.000</td>
</tr>
<tr>
<td>F_AE</td>
<td>.609</td>
<td>.036</td>
<td>.609</td>
<td>16.711</td>
<td>0.000</td>
</tr>
<tr>
<td>F_SK</td>
<td>.437</td>
<td>.036</td>
<td>.437</td>
<td>12.009</td>
<td>0.000</td>
</tr>
<tr>
<td>F_KN</td>
<td>.344</td>
<td>.036</td>
<td>.344</td>
<td>9.456</td>
<td>0.000</td>
</tr>
<tr>
<td>F_DS</td>
<td>.087</td>
<td>.036</td>
<td>.087</td>
<td>2.397</td>
<td>.017</td>
</tr>
</tbody>
</table>

a. Dependent Variable: F_IR

The results of the Coefficients table show that the variables F_AE, F_SK, F_KN, and F_DS all have a maximum Sig of 0.017 < 0.05, thus rejecting the hypothesis H0, the regression coefficient of the independent variable is statistically significantly ≠ 0. Variables F_AE, F_SK, F_KN, and F_DS have an impact on the dependent variable F_IR. Regression coefficients for “attitudes and ethics, skills, knowledge, and digital skills” are all positive, so the independent variables have a positive effect on the dependent variable F_IR (intention recruitment of organizations providing financial-banking services in Vietnam). Considering that the VIF coefficients of the independent variables are all less than 2, the data does not violate the assumption of multicollinearity. The model tests have been met, so from the regression coefficients, we can build the linear regression equation as follows:

\[ F_{IR} = 0.609 \times F_{AE} + 0.437 \times F_{SK} + 0.344 \times F_{KN} + 0.087 \times F_{DS} + \varepsilon \] (1)

F_IR: dependent variable
F_AE, F_SK, F_KN, F_DS: independent variables
\( \varepsilon \): error term

Through linear regression equation (1), it shows that the factor of Attitude and ethics of students play a prerequisit role in influencing the recruitment intention of Vietnam financial service providers. Next is the skills students are equipped with before graduation, then the knowledge that students absorb during university education, and finally, a new factor arises. Employers have begun to see emerging innovative financial technology mastery skills and knowledge. Although the coefficient( \( \beta = 0.087 \)) is not as high as other factors, due to the conservative culture of legal compliance in some traditional Vietnamese banks and the novelty of the technology, some experts - Leaders in the banking and finance sector have not caught up in time, which has affected the \( \beta \) coefficient of the variable F_DS, but the researchers found that, through EFA analysis and building linear regression models, it has been discovered. One potential issue affecting the recruitment intention of employers is digital financial science education in the digital transformation period of the economy and the banking and financial sector in particular.

5. Discussion

According to the study results, managers, education experts, recruitment specialists, bankers, and lecturers teaching the finance-banking at internal and external when surveyed and interviewed all recommended that the school need to update the education program. The teaching methods and skills of lecturers are often changed to suit the digital age, meet the needs of businesses and society 4.0, and move towards "super smart society 5.0". It is extremely urgent to improve digital finance education and education for students of finance-banking majors in each period. According to the researchers, universities in Vietnam must perform well many solutions as follows:
5.1 About the Education Program

The school needs to redesign the subjects to develop thinking and self-study ability after graduation. Design thinking development subjects such as econometrics; complete subjects on basic application of AI, Blockchain in banking and finance; financial technology software architecture system, promoting education of basic software packages in finance and banking; analytical methods to process Bigdata. According to the research results of the factor F_DS Digital technology skills (newly discovered by EFA separately with $\beta = 0.087$). Promoting practical skills and subjects already available in the education program, have education orientation to guide students in self-study methodology. Specialized courses focus on the real needs of banks, credit unions, or regulatory agencies. Ability to solve problems-situations arising in traditional banking operations by applying technology, knowledge of technological innovation in the field of finance and banking; Skills in using foreign languages to grasp new specialized terms, economic and financial changes in technology in the world; Besides providing students with basic knowledge about common software systems in the field of finance-banking-accounting, such as Core banking, ERP, MPA, CRM, and ODS. And Foreign language subjects should be considered as compulsory input and output standards.

5.2 About Teaching Methods

Identify and build a modern educational philosophy that is to train creative, independent thinking, self-study, and self-study people. Universities need to have highly qualified lectures with extensive knowledge in many fields, especially with the transformation of the Internet of Things (IoT), Internet of Services (IoS), Cloud Computing and the application of AI, APIs, understanding models of embedded financial technology, background on sharing economy, green credit, financial service supply chain, international supply chain, and international payment. At the same time, the school needs to organize many seminars with the coordination of schools, ministries, branches, financial and banking organizations, and non-banks to come up with the best teaching methods to create awareness and spread throughout society.

According to the research results F_AE($\beta = 0.609$) an F_SK ($\beta = 0.437$). It is necessary to change the method so that students improve their attitude ethics, critical thinking skills, and problem-solving that are necessary for the age of technology as well as professional ethics in the process of practicing. Problem-based learning methods - PBL, and discovery-oriented teaching methods - WEBQUEST is recommended. PBL Method According to Carslaw and Purvis (2007), The use of case studies for teaching is necessary because it refers to the learning outcomes of developing students' thinking skills. Instructors can introduce students to specific, real-life situations that require students to learn more advanced self-study, step-by-step research on what changes in bank digital transformation to write scenarios and problem-solving, while also directing them to have good attitudes, ethics, and skills in adapting to problems and always learning to improve knowledge. Webquest Method: According to Bernie Dodge (USA) has built Webquest in their teaching. Teachers have to make students have many questions in their heads, want to be asked, and be discovered and ready to criticize their teacher, giving a completely different point of view. That is the way to turn the knowledge of the teacher into the knowledge of the learners. Lecturers act as facilitators, guides, and students at the center of learning research. The educational environment not only takes place within the school but also extends to the global scale. Learners can actively study materials as well as interact with lecturers at any time using computers or smartphones. Moreover, people tend to be attracted to vivid images and videos.

Therefore, to be able to update modern global knowledge, as well as apply information technology fluently in the teaching process, the lecturers must be good at foreign languages and information technology to make freedom and creativity in education.

5.3 Facilities and Teacher Mindset

The school needs to invest in more facilities, especially information technology, including a library with enough materials for lecturers-researchers-students to study on their own. Regularly try to cooperate
with finance-accounting-banking enterprises to have highly practical seminars, which are necessary to increase the ability to apply theory into practice.

Teacher mindset must constantly always update, learn, and master technology to be ready to support students in how to approach, accept, use, and apply transformational technologies to meet the needs of learners. On the other hand, teachers need to spend more time supporting students' aims to personalize learning to uncover more talented students.

Emerging technologies such as AI, Blockchain technology (blockchain), Embedded finance, sharing economy, Peer to Peer, and Bigdata will replace the traditional jobs and techniques of the banking and finance sector. But also spawning new related jobs, alongside business analysts, investment modeling and tracking specialists, risk managers, anti-money laundering and compliance specialists are getting According to Brettking's analysis in the book Bank 4.0, some new jobs such as data scientist, experience specialist, and technology information consultant, according to Brettking's analysis in the book Bank 4.0, financial management, financial management support experts are behind AIs serving people. In the present, it may not be a reality but in 5 to 10 years then the problems of self-learning attitude, skills Technology skills, and professional ethics will determine the future of university students.

In short, education schools besides teaching students the necessary knowledge and basic skills need to pay more attention to digital financial education. Students with a full spectrum of digital literacy-skill elements have a competitive advantage soon and beyond.

6. Limitations and Future Research Directions

Besides the contributions, this study also has certain limitations that need to be overcome. That is an inherent limitation of the data collection method through survey questionnaires, limited in the time frame that the collected sample is only 240 observations, so the grouping on the degree of digital transformation of banks is limited. unfinished goods. Besides, there has not been a survey of educational management agencies in Vietnam, non-banking financial institutions, and Fintechs. This may lead to the impact of factors that have not yet reached high reliability. The limitations can be overcome in further research such as a survey with a larger sample.

7. Conclusion

This study is conducted to identify and measure the factors affecting the recruitment intention of banks and companies in the banking and finance sector in the digital transformation period to offer solutions to complete the recruitment process. Improving the digital financial education program for students of finance and banking in Vietnam. The study discusses the preparation of new luggage for university students of Banking and Finance in Vietnam in the digital age. The school and lectures need to identify and build a modern educational philosophy and update the training program regularly in the direction of strengthening and connecting traditional subjects on banking and finance with subjects that approach technology and practice. At the same time, it is necessary to have programs to introduce technologies and apply technology research in the field of finance and banking to maintain and refresh subjects that have changed in practice. Finally, students need to be clearly defined as the oriented-supporting role of the lecturer, the student is the center in the learning and research process to have all the factors that employers in particular as well as generally required by society.

Acknowledgments

We would like to thank all the people who prepared and revised previous versions of this document.
References


Nicoletti, B. (2021). Banking 5.0 how fintech will change traditional banks in the 'new normal' post pandemic. Springer International Publishing.


The Effect of Social Media Marketing Activities (SMMAs) and Their Impact on Brand Awareness to Small Businesses

Gomathi Packiry
School of Business, Malaysia University of Science and Technology, Malaysia
*gomathi@must.edu.my

Abstract: In recent times, many small businesses have embraced different avenues of social networking sites precisely in their business communication model, which has triggered an intensive transformation in business firms’ marketing dynamics. The growing importance of social media marketing activities has attracted much attention in research and industries worldwide. The presence of social media has disrupted the way people live, behave and interact. Social media marketing has attracted increasing attention from marketers, being regarded as one of the most important channels to communicate information about brands to consumers. Despite its growing importance, limited research has examined the effect of social media marketing communications on consumers’ brand awareness. This article explores the effect of social media marketing activities on small businesses and their impact on brand awareness. Social media marketing usage and adoption as a new communication tool by organisations and SMEs is increasing globally and offers unique opportunities for small and medium enterprises and marketing researchers to undertake research that will have an impact. This conceptual paper has discussed the effect of social media marketing activities on brand awareness and its impact on small businesses. It has been argued that social media marketing activities can enhance brand awareness by creating and sharing valuable content, engaging with customers and potential customers, and listening to feedback and opinions. Brand awareness, in turn, can influence brand image and loyalty, which are crucial for small businesses to survive and thrive in a competitive market. This conceptual paper emphasises variables on trendiness, entertainment, electronic word of mouth, customization and interactivity.

Keywords: social media marketing activities, social networks, brand awareness, small businesses

1. Introduction

In today’s modern world, it doesn’t matter whether businesses are small or large business organisations; they are using social media platforms to promote their products and services. Social media platforms are suitable for large businesses and Small and Medium Enterprises (SMEs) (Kaplan & Haenlein, 2010). Digitalization use in today’s business, such as social media platforms, makes it more comfortable for consumers to find knowledge about products or services needed for purchasing decisions (Chen et al., 2017). In the phenomenon of today’s marketing, the platform of social media is considered an essential piece of marketing strategy for businesspeople to develop networks and distribute information about products and services or sensibilities of the value of products or services (Kaplan & Haenlein, 2010). To connect directly with a target audience and create brand awareness and marketing, social media plays a vital role in generating the lead. Social media act as a tool for SMEs to enable handle marketing activities in effective ways even though they lack skill-restricted financial resources and competition with a large organization. Social media platforms allow business organizations and customers to engage or connect where these ways were not possible in the past. Diverse platforms, such as Twitter, Facebook, Instagram, Tik Tok YouTube and WhatsApp, empower social networking sites. There is a microblogging and content community platform to connect with customers and build from shared interests and values (Ojo et al., 2021). Social media is one of the most extensively used platforms by people around the world. Digital 2021 April Global Statshot Report revealed that as of April 2021, As referred to in Figure 1, the global internet users reached more than 4.72 billion. Around the world, there
are 4.33 billion active social media users. The world's total population is at 7.85 billion at the start of April 2021, and social media users are now equal to more than 56.5 per cent of the world's total population as of April 2021. There are 55.1% of social media users as a percentage of the global population. (Digital, 2021)

![Figure 1. Global Digital Overview April 2021 (We Are Social, 2021)](image1)

Figure 1 shows that the total number of active social media users around the world is 4.33 billion. A global population of 55.1% are users of social media. Ninety-nine per cent (99%) of social media users access via mobile phones, and 2 hours and 22 minutes are the average amount of time per day spent using social media. (Hootsuite & We Are Social, 2021).

![Figure 2. Global Social Media Overview April 2021 (We Are Social, 2021)](image2)
Social media platforms are great potential media to be used by small business owners to create brand awareness and market their products and services to consumers. In the future, social media platforms can also assist the business organisation in managing integrated consumer services and creating their own "virtual influencers" by working together with leading social media actors (Appel et al., 2020). The significant role of small and medium-sized enterprises (SMEs) in Malaysia's economic growth is positive, considering that they make up 98.5% of business establishments and contributed 38.9% to Gross Domestic Product (GDP) in 2019. In total, 907,065 business establishments are defined as SMEs, the highest from the State of Selangor, which is 19.8%, and they employed 48.4% of the country's workforce in 2019. The Department of Statistics, Malaysia (DOSM) released data in their media release on 29 July 2020. The overall SME contribution increased to 38.9% in 2019 compared with the 2018 GDP recorded at 38.3%. In 2019 the growth of SME GDP by 5.8% was driven by the services sector, which recorded a strong growth of 7.4%, and the business services sub-sector recorded a higher growth of 7.7% in 2019 compared to the year 2018 by 7.5%. (SME Corp, 2020).

In Malaysia, SMEs is classified into micro, small, or medium based on either the number of people a business employs or on the total sales or revenue generated by a business in a year (Hashim & Abdullah, 2000). SMEs are grappling with facing difficulties due to the COVID-19 pandemic. The Malaysian Government responded to the coronavirus threat by introducing the PRIHATIN Economic Stimulus Package and PENJANA Recovery Plan, which requires SMEs to reassess and rethink how business is handled, in line with the 'new normal.' (SME Corp, 2020).

![Overview of SMEs in Malaysia by state](source)

Figure 3. SMEs in Malaysia by state (SME Corporation Malaysia, 2019)

[Source: Economic Census 2020, Department of Statistics Malaysia (DOSM)]

2. Literature Review

This section outlines the social media platforms, the independent variable and the dependents variable and emphasizes the factor that effect social media marketing activities (SMMAs) and their impact on brand awareness in small businesses. The variables emphasize trendiness, entertainment, electronic word of mouth (eWOM), customization and interactivity towards the brand awareness to small businesses. The rapid development and widespread use of social media platforms have created new opportunities and challenges for marketing practitioners and researchers. Social media marketing (SMM) is the use of social media platforms, such as Facebook, Instagram, or Twitter, to promote a brand and its products or services. SMM can involve various activities, such as creating and sharing
content, engaging with customers and potential customers, and listening to feedback and opinions (Li et al., 2023). SMM can have various benefits for small businesses, such as increasing their visibility, reach, and reputation, as well as reducing their marketing costs and enhancing their customer relationships (Shopify, 2023). One of the main objectives of SMM is to create and maintain brand awareness, which is the extent to which consumers recognize and remember a brand and its offerings. Brand awareness is crucial for small businesses, as it can influence consumers’ perceptions, preferences, and loyalty, and ultimately affect their purchase decisions and profitability (Sprout Social, 2022).

2.1 Social Media Platforms

Today’s consumers are social media maniacs and tech-savvy. Various social media platform services have emerged, and currently innumerable social media channels have connected people to each other in the last couple of years. Facebook, YouTube, Whatsapp, Messenger, Instagram, WeChat, Tik Tok, QQ, Dou Yin, and Sina Weibo (Oberlo, 2021) are the most popular social network sites that are widely used by business organization. In fact, Instagram, Facebook, Twitter, LinkedIn and YouTube are the most popular sites that businesses use in their digital marketing to develop relationships with the customers and creating brand awareness. (DataReportal, 2021) LinkedIn is also commonly used by corporate companies; it mainly targets to establish relationship on a professional perspective and slowly becoming B2B channel compared to other three networking sites mentioned above.

2.1.1 Facebook

Facebook is a social networking site that enables users to associate with and share information with their family and friends over the internet. Facebook was created in 2004 by Mark Zuckerberg while he was a student at Harvard University. Initially, Facebook was developed for the use of college students. The internet user over the age of 13 and above with a verified email address could join Facebook by 2006. Facebook is presently the world’s most famous social networking site, with 2.85 billion users worldwide as of the year 2021 (Hootsuite, 2021). Facebook has 2.80 billion monthly active users (Facebook, 2021). If that number doesn’t blow you away, it also has 1.84 billion users that are visiting the social networking site on a daily basis.

2.1.2 Twitter

According to Twitter’s latest figures from the fourth quarter of 2020, the platform boasts 192 million daily active users (Twitter, 2021). Approximately six of every 10 (63 percent) Twitter users worldwide are between 35 and 65 years old (theVAB, 2018). 66 percent of Twitter users worldwide are male compared to just 34 percent females (DataReportal, 2019), which puts the ratio of males to females at two to one. The average time spent on Twitter clocks in at 3.39 minutes per session (Statista, 2019) – A statistic that shouldn’t surprise given the short lifespan (15 to 20 minutes) of a tweet. There were 11.7 million App Store downloads of the Twitter app in the first quarter of 2019 – registering a year-over-year increase of 3.6 percent (Sensor Tower, 2019). Twitter is an online social networking service that enables users to send short 280-character messages called tweets. According to recent social media industry figures, Twitter currently ranks as one of the leading social networks worldwide based on active users. As of the fourth quarter of 2019, Twitter had 192 million monetizable daily active users (mDAU) worldwide. Registered users can read and post tweets as well as follow other users via update feed. As of December 2019, former U.S. President Barack Obama was the most-followed celebrity on Twitter with over 110.8 million followers.

2.1.3 TikTok

TikTok is one of the fastest-expanding social media platforms in the world, which presents an alternative version of online sharing. It allows users to create short videos with music, filters, and other features. The latest TikTok statistics show that, as of January 2021, the platform has 689 million monthly active users worldwide (DataReportal, 2021). That makes TikTok the seventh-largest platform
in terms of users, ahead of others that have been around much longer, such as Snapchat, Pinterest, and Twitter. TikTok is an iOS and Android media app that can be used for creating and sharing short videos. It was initially launched as Douyin in September 2016, in China. The following year, in 2017, the app was launched by ByteDance for markets outside of China. TikTok and Douyin both use the same software but maintain separate networks in order to comply with Chinese censorship restrictions. TikTok is available all around the world via the App Store or Google Play stores. The latest TikTok statistics show that as of April 2020, the popular video app has been downloaded more than two billion times worldwide on both the Apple App Store and Google Play (Sensor Tower, 2020). In other words, TikTok was able to double its number of downloads in just over a year, a clear sign of the app’s skyrocketing popularity.

2.1.4 Instagram

Instagram is a photo-sharing social networking app that enables users to take pictures and edit them with a selection of digital filters. Instagram also started to offer video sharing and Instagram Stories, a feature competing with Snapchat's Stories. As of June 2018, the social network reported more than 1 billion monthly active users worldwide, and the social media network’s daily active users stood at 500 million. With over 120 million active Instagram users, the United States are the photo-sharing app's leading market based on audience size. Overall, Instagram benefits from strong social integration as users are easily able to share their content to a variety of social networks such as Facebook, Twitter, Flickr and Tumblr. Overall, Instagram is one of the most popular mobile social apps worldwide, with high levels of user engagement.

2.1.5 Instagram

Instagram is a photo-sharing social networking app that enables users to take pictures and edit them with a selection of digital filters. Instagram also started to offer video sharing and Instagram Stories, a feature competing with Snapchat's Stories. As of June 2018, the social network reported more than 1 billion monthly active users worldwide, and the social media network’s daily active users stood at 500 million. With over 120 million active Instagram users, the United States are the photo-sharing app's leading market based on audience size. Overall, Instagram benefits from strong social integration as users are easily able to share their content to a variety of social networks such as Facebook, Twitter, Flickr and Tumblr. Overall, Instagram is one of the most popular mobile social apps worldwide, with high levels of user engagement.

2.1.6 WhatsApp

WhatsApp is a mobile messaging application founded in 2009 by Brian Acton and Jan Koum. Their aim was to provide users with an alternative to traditional text messaging, SMS. As we will see in these WhatsApp statistics, it’s safe to say that they have been able to achieve that and much more. (Oberlo, 2021). There are currently more than 2 billion WhatsApp users around the globe, and this number is rising (WhatsApp, 2020). The latest WhatsApp statistics show that two billion users access the messaging app every month (Statista, 2021). That’s 0.7 billion (or approximately 54 per cent) more than its closest rival and parent company’s Facebook Messenger. This is in spite of the app being one of the many social media platforms that have been blocked in the world’s most populous country, China. WhatsApp is currently available in over 180 countries around the world (WhatsApp, 2020). To cater to the local crowd, the app is also available in 60 different languages. WhatsApp launched its B2B initiative, WhatsApp Business, it clocked up more than 5 million business users (PYMNTS.com, 2019). Aimed at helping small a medium-sized enterprises support their customers by facilitating interaction with them, WhatsApp Business offers companies features such as quick replies, labels, chat filters, and more.
2.2 Small and Medium-Sized Enterprises

Small and medium-sized enterprises (SMEs), often known as small and medium-sized businesses, are businesses whose personnel numbers fall below certain limits. The abbreviation "SME" is used by international organisations such as the World Bank, the European Union, the United Nations, and the World Trade Organization. SMEs were defined by different agencies based on their own criteria where annual sales turnover, number of full-time employees or shareholders' funds were taken as a benchmark for categorizations purpose, and most focus was on SMEs in manufacturing sectors. By establishing and implementing the use of standard definitions for SMEs, SMEs across sectors will be easier to identify hence allowing the government to provide necessary assistance for the growth of SMEs. There are three categories in Malaysian SMEs, namely micro, small, or medium enterprises and the categories are based on two criteria either by the number of employees and the annual sales turnover. The definitions will apply to sectors such as Primary Agriculture, Manufacturing (including agro-based), Manufacturing Related Services (MRS) and Services (including Information and Communications Technology).

2.3 Brand Awareness

According to Gustafon and Chabot (2007), brand awareness refers to “how aware customers and potential customers are of your business and its products”. An example of remarkably high brand awareness was the results of advertising and news report on the iPhone where survey results where it shows that 90% of US consumers were aware of the iPhone in just one week after it was launched. Successful brand awareness is another way of stating that the brand is popular and effortlessly identifiable. In order to set one brand apart from similar products and competitors, it is important to create brand awareness, which would also be an important part that will influence customers’ and potential customers’ purchasing decisions (Gustafon & Chabot, 2007).

2.4 Entertainment

Indicate that the ability of customers to connect with brands/companies via social media is a significant factor in social media's rising popularity (Godey et al., 2016; Zarei et al., 2021). Entertainment consists of events, performances, and activities that may be experienced, performed, and shared via social media and aims to attract customers in four ways (Tuten & Solomon, 2017). First, entertainment provides enjoyment by acting as a play (Tuten & Solomon, 2017). Customers are presented with interesting, vibrant, and entertaining content on social media and communications (Ningrum & Roostika, 2021). In this regard, entertainment results from fun and play that customers can obtain through social media engagement (Godey et al., 2016; Ningrun & Roostika, 2021; Yang et al., 2020; Seo & Park, 2018). Consequently, entertainment is also defined as the humorous perspective related to brands' social media marketing content (Yang et al., 2022). Marketers share interesting material on social media. It contains games, photos, movies, and brand-related information on social media platforms like YouTube to entertain and satisfy customers' requirements for enjoyment (Godey et al., 2016; Ningrum & Roostika, 2021) and to catch their attention (Masa'deh et al., 2021). Brands use social media to develop emotional connections with customers (Yang et al., 2022). As a component of Social Media Marketing Activity (SMMAs), entertainment is seen as vital since it initiates users' responses and purchase intention/behaviour by generating and expressing positive feelings like brand enjoyment (Ningrum & Roostika, 2021; Seo & Park, 2018; Yang et al., 2020). Entertainment can link people with brands and influence their views toward brands, which can affect brand recognition and image (Yang et al., 2022; Ningrum & Roostika, 2021).
2.5 Trendiness

In the past few years, social media has become a more reliable source of information than traditional advertising, as the various social media platforms provide regular updates and can therefore provide users with the most current information. This develops patterns that reflect the most recent information. Therefore, trendiness is a representation of the most recent data accessible (Seo & Park, 2018). According to Muntinga et al. (2011), there are four motives for such data: surveillance, knowledge, pre-purchase information, and inspiration. These motivations can assist businesses in comprehending customers' reactions to brand-related content. Initially, "surveillance" refers to the monitoring of social environment updates. Second, knowledge implies that customers utilise brand-related content shared by other consumers with expertise in the brand to learn more about it. Thirdly, pre-purchase information refers to people reading brand and product evaluations to make more informed purchasing selections. Lastly, inspiration refers to those who find and generate new ideas by drawing inspiration from brand-related information. Concurrently, the degree to which a consumer's needs are satisfied by the four factors mentioned above will indicate whether or not the content shared on a brand's social media platform may be categorised as trendiness (Muntinga et al., 2011). According to Godey et al. (2016), consumers tend to respond favourably to what is current. This is the reason why trendiness as a social media marketing activity plays such a significant role in determining whether or not businesses are successful in reaching and enticing future customers with the products and services they have to offer. According to Godey et al. (2016), for businesses to stay relevant in their individual markets, they need to keep a close eye on the trends on social media and adapt their strategies to match those trends.

2.6 Customization

Godey et al. (2016) define customization as the amount to which a product, service, or experience satisfies a consumer's preferences. In social media, the idea is exemplified by how each channel customizes its information and services for the intended viewer or user. Said material falls into two categories: a tailored message or a broadcast. The former is designed to target one person or a small audience, while the latter targets anyone interested. Customized websites and social media platforms boost brand appeal and client loyalty. Godey et al. (2016) claim that the goal of customizing social media material is to fulfil a specific client. Hence the incentive for using this approach is customer satisfaction (Godey et al., 2016). In research examining the effects of social media marketing activities (SMMAs) on brand awareness in the airline industry, Seo and Park (2018) find that customers are more delighted with social media content that is personalised to their tastes and preferences than with content that is more generic. In addition, study participants believe that information accessed via social media should be applicable to them and their situation (Seo & Park, 2018). Customization may be applied to one's marketing plan in the social media arena in order to retain favourable client perceptions of control and satisfaction. Moreover, customization can assist in increasing and expressing a brand's uniqueness to its clients (Seo & Park, 2018).

2.7 Interaction

Social media enables users to collaborate and exchange their points of view (Seo & Park, 2018; Godey et al., 2016), thereby establishing social media interaction. Social media interaction is defined as the communication that social media facilitates to ascertain customers' needs and expectations, delivering rapid feedback and suggestions regarding brands, products, and/or services (Ningrum & Roostika, 2021). Social media facilitate such communication (Yang et al., 2022; Yadav & Rahman, 2018). Social media interaction has significantly changed how brands and consumers communicate (Khan et al., 2019), in addition to fostering customers' experience and satisfaction with brands (Godey et al., 2016; Seo & Park, 2018; Yang et al., 2022). According to Yang et al. (2022), Ningrum and Roostika (2021), Yadav and Rahman (2018), it reflects a dynamic two-way engagement between businesses and customers, which social media promotes. Social media involvement has strongly impacted the manner
in which brands and customers communicate (Khan et al., 2019). Initially, business-to-customer interaction enables firms to deliver their messages to a large public audience via social media (Gallaugher & Ransbotham, 2010; Godey et al., 2016; Seo & Park, 2018). This interaction serves as the megaphone. Business-to-Customer interaction encourages brands to share messages on as many social media platforms as possible to reach as many potential customers as possible. By efficiently utilising social media, businesses can effectively communicate with customers, create and convert clear messages and helpful information, such as customer-recommended innovations, generate anticipation for upcoming products or services, and strengthen brand positioning (Gallaugher & Ransbotham, 2010).

2.8 Electronic Word of Mouth (WOM)

Electronic Word of Mouth (EWOM) reflects the willingness of customers to recommend and share experiences, regardless of whether positive or negative, from themselves or other consumers (Yang et al., 2022). It encourages consumers to propose products or services to others, which may lead to a purchase decision or consumption of the product/service (Yang et al., 2022; Yadav & Rahman, 2018; Ningrum & Roostika, 2021). According to Ningrum and Roostika (2021), Seo and Park (2018), Sano (2014; 2015), EWOM provides a casual way for customers to evaluate services or products by making recommendations and sharing experiences on social media. Furthermore, EWOM has become a source for obtaining opinions such as comments and reviews, according to Yang et al. (2022). It enables customers to obtain reliable information about services, product performance, or consumption outcomes influencing their purchasing decisions. The EWOM's dependability and knowledge level will increase the purchase decisions' positive influence (Yang et al., 2022). Furthermore, valuable information obtained from EWOM, such as reviews or ratings, is frequently seen on e-commerce platforms (Yadav and Rahman, 2018). Because of the reduced perceived risk (Zarei et al., 2021) and the increased likelihood of satisfying customers, such reviews significantly influence and assist customers in making the right purchase decisions (Masa'deh et al., 2021; Yadav & Rahman, 2018).

2.9 Impact of Social Media Tools on Marketing Activities

Social media has greatly transformed the business landscape. It is one of the most important aspects of digital marketing, which provides incredible benefits that help reach millions of customers worldwide. Social media can have an immense impact on the business and be one of the most powerful marketing channels to reach out to the right audience. The summary of previous studies that contribute to research framework development is tabulated below in Table 1.
# Table 1. Summary of Previous Studies that Contribute to Research Framework Development

<table>
<thead>
<tr>
<th>Variables</th>
<th>Description</th>
<th>Author</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entertainment</td>
<td>The ability of customers to connect with brands/companies via social media is a significant factor in social media's rising popularity. Entertainment is also defined as the humorous perspective related to brands' social media marketing content. Brands use social media to develop emotional connections with customers. Entertainment provides enjoyment by acting as a play. Entertainment consists of events, performances, and activities that may be experienced, performed, and shared via social media and aims to attract customers in four ways. Customers are presented with interesting, vibrant, and entertaining content on social media and communications. Marketers share interesting material on social media. It contains games, photos, movies, and brand-related information on social media platforms like YouTube to entertain and satisfy customers' requirements for enjoyment.</td>
<td>Yang et al. (2020). Tuten &amp; Solomon (2017). Ningrum &amp; Roostika (2021).</td>
</tr>
<tr>
<td>Trendiness</td>
<td>Social media has become a more reliable source of information than traditional advertising, as the various social media platforms provide regular updates and can therefore provide users with the most current information. This develops patterns that reflect the most recent information. Therefore, trendiness is a representation of the most recent data accessible. Concurrently, the degree to which a consumer's needs are satisfied by the four factors mentioned above will indicate whether or not the content shared on a brand's social media platform may be categorised as trendiness. Consumers tend to respond favourably to what is current. This is the reason why trendiness as a social media marketing activity plays such a significant role in determining whether or not businesses are successful in reaching and enticing future customers with the products and services they have to offer. Businesses to stay relevant in their individual markets, they need to keep a close eye on the trends on social media and adapt their strategies to match those trends.</td>
<td>Seo &amp; Park (2018). Muntinga et al. (2011). Godey et al. (2016)</td>
</tr>
<tr>
<td>Customization</td>
<td>Customisation is defined as the amount to which a product, service, or experience satisfies a consumer's preferences. The goal of customising social media material is to fulfil a specific client, hence the incentive for using this approach is customer satisfaction.</td>
<td>Godey et al. (2016)</td>
</tr>
</tbody>
</table>
Customers are more delighted with social media contents that is personalized to their tastes and preferences than with content that is more generic. Customization may be applied to one's marketing plan in the social media arena in order to retain favourable client perceptions of control and satisfaction. Moreover, customization can assist increase and express a brand's uniqueness to its clients. Seo & Park (2018)

<table>
<thead>
<tr>
<th>Interaction</th>
<th>Social media enables users to collaborate and exchange their points of view.</th>
<th>Seo &amp; Park (2018)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Social media interaction is defined as the communication that social media facilitates to ascertain customers’ needs and expectations, delivering rapid feedback and suggestions regarding brands, products, and/or services.</td>
<td>Ningrum &amp; Roostika (2021).</td>
</tr>
<tr>
<td></td>
<td>Social media interaction has significantly changed how brands and consumers communicate in addition to fostering customers’ experience and satisfaction with brands.</td>
<td>Khan et al. (2019)</td>
</tr>
<tr>
<td></td>
<td>Business-to-customer interaction enables firms to deliver their messages to a large public audience via social media. Customer-to-customer interaction is always present, but it was previously hidden. Social media reveal it, and brands can monitor this interaction to gain insight into customers and the market.</td>
<td>Gallaugher &amp; Ransbotham (2010)</td>
</tr>
<tr>
<td></td>
<td>Customer-to-business connection indicates that businesses can utilise social media to invite customers to share thoughts, which is a Magnet. Magnet allows customers to share thoughts and vote on others.</td>
<td>Liu et al. (2021)</td>
</tr>
<tr>
<td>Electronic Word of Mouth (EWOM)</td>
<td>Electronic Word of Mouth (EWOM) reflects the willingness of customers to recommend and share experiences, regardless of whether positive or negative, from themselves or other consumers.</td>
<td>Yang et al. (2022)</td>
</tr>
<tr>
<td></td>
<td>It encourages consumers to propose products or services to others, which may lead to a purchase decision or consumption of the product/service</td>
<td>Yadav &amp; Rahman (2018)</td>
</tr>
<tr>
<td></td>
<td>EWOM provides a casual way for customers to evaluate services or products by making recommendations and sharing experiences on social media.</td>
<td>Ningrum &amp; Roostika (2021)</td>
</tr>
<tr>
<td></td>
<td>Valuable information obtained from EWOM, such as reviews or ratings, is frequently seen on ecommerce platforms.</td>
<td>Yadav &amp; Rahman (2018).</td>
</tr>
</tbody>
</table>
2.10 Conceptual Framework

![Conceptual Framework](image)

**Figure 4.** Conceptual Framework: The Effect of Social Media Marketing Activities (SMMAs) and Their Impact on Brand Awareness to Small Businesses

3. Methodology

This research focuses on the conceptual method inclined to form theory by offering propositions regarding the previous relationship. However, this study is exploratory research incorporating a quantitative approach. The nature of the study is to describe the respondents and variables. Also, the correlation between the variables will be explored. The researcher chooses small businesses from Selangor state because Selangor state is a significant contributor to economic growth in Malaysia. As of the year 2019, there are 907,065 total SMEs established in Malaysia, and the State of Selangor is the highest establishment of SMEs at 19.8% compared with other states in Malaysia (SME Corporation Malaysia, 2019). Sampling size refers to the number of elements to be included in the study. The research will apply Krejcie & Morgan’s (1970) sample size determination table. The questionnaire was distributed for any voluntary response from any employee following the inclusion and exclusion criteria at small businesses in Selangor. The data analysis will be performed using the statistical platform SPSS.

4. Conclusion

This paper investigates the effect of social media marketing activities (SMMAs) and their impact on brand awareness to small businesses. The paper focused on five variables that represent SMMAs: trendiness, entertainment, electronic word of mouth (eWOM), customization and interactivity. The paper reviewed the existing literature on how these variables influence brand awareness, a key factor for small businesses to gain competitive advantage and customer loyalty. The paper also proposed a conceptual model that illustrates the relationships among SMMAs, brand awareness and other relevant constructs such as brand image, brand trust and brand loyalty. The paper suggested that SMMAs can enhance brand awareness by creating attractive, engaging and informative content for customers on social media platforms. Moreover, the paper argued that brand awareness can positively affect brand image, brand trust and brand loyalty, which are important outcomes for small businesses. However, the paper also recognized that the effect of SMMAs may vary depending on the characteristics of the target market, the type of product or service, and the goals and strategies of the small business. The paper
concluded by emphasizing the theoretical and practical implications of the proposed model, as well as the limitations and directions for future research.

Acknowledgements

We would like to thank all the people who prepared and revised previous versions of this document.

References


Exploring the Determinants of Purchasing Behavior Among Students at Private Higher Education Institutions

Balachandar V Rajoo\textsuperscript{a}, Vijayan Ramasamy\textsuperscript{b}, Neerushah Subramaniam\textsuperscript{c} & Sundary N. Rajagopal\textsuperscript{d}

\textsuperscript{a}School of Transportation and Logistics, Malaysia University of Science and Technology, Malaysia
\textsuperscript{b} School of Business, Malaysia University of Science and Technology, Malaysia
\textsuperscript{c} Institute of Postgraduate Studies, Malaysia University of Science and Technology, Malaysia
\textsuperscript{d} School of Business, Malaysia University of Science and Technology, Malaysia
*balachandar@must.edu.my

Abstract: The 21st century has seen a rise in the use of social media. Businesses are constantly looking for new ways to integrate this new platform into their marketing plans in order to boost revenue. Since social media serves as a networking and communication tool, it is crucial for businesses to establish a voice to humanize the brand and keep customers coming in. There are studies on how to use social media marketing within businesses, but there is little evidence to support how social media marketing activities affect students purchasing decisions. From the viewpoint of MUST students, this study examined how social media affects students' attitudes toward social media marketing and purchasing behavior. 101 participants from MUST were given an online survey to complete about their opinions on social media marketing. Responses to the survey showed that 85% of the participants use social media platforms daily. The most used social media platforms are Instagram and YouTube. The most important factor for a business using social media was customer engagement and the least important factor was the timing of posts. The survey also revealed that only 60% of the respondents post about the products or services of a business. However, 93% of the respondents believe that a business will receive better results when it comes to customer loyalty and profits if social media is integrated into marketing and 95% of the respondents believe that social media is the best way to reach a business’s targeted audience. The results also suggest that people are more likely to share and experience they have had with a business rather than sharing sales or promotions a business is offering. According to the results of this study, purchasing behavior is more likely to have a positive effect on a business when using social media platforms for marketing strategies. This conclusion emphasizes the importance of social media marketing for a positive increase in brand loyalty, brand recognition, and foot traffic.

Keywords: loyalty, purchasing, social media, marketing, student, higher education

1. Introduction

Today, purchasing behavior has become increasingly complex and highly valued by students. Students are exposed to various digital campaigns, news sources, and direct mail that provide conflicting signals and a wealth of information. Purchasing behavior encompasses the decisions and actions taken by individuals or groups to acquire products or services that fulfill their needs (Du Plessis, 1990). It is influenced by factors such as social, cultural, demographic, and situational factors (Cici & Bilginer Özsaatçî, 2021).

Understanding customer purchasing behavior is a priority for marketers and researchers. Firms delve into customers’ decision-making processes to gain insights into their learning, choosing, using, and disposing experiences with a product (Kotler & Keller, 2009). Customers’ positive attitudes towards social media and customer relationships can lead to favorable responses towards purchasing products.
advertised on social media (Boateng & Okoe, 2015; Wang & Sun, 2010). College students, known as the Net Generation, are technologically savvy and rely heavily on the Internet, making them a key market segment for online sales (Silverman, 2000; Valentine & Powers, 2013).

Social media platforms like Instagram and TikTok have gained popularity among Malaysian university students as sources of inspiration and influence for purchasing decisions (The Star Online, February 2021). Therefore, research focuses on university student internet shoppers aged 18 to 25 who rely on their favorite social media sites for information. This study aims to examine the relationship between social media, customer relationships, and purchasing behavior among students at a local private higher education institution. By understanding how social media usage and customer relationships influence purchasing behavior, marketers can tailor their strategies to effectively engage and convert university students into loyal customers. The following are the main goals of this investigation:

a. To examine the relationship between social media, customer relationships, and purchasing behavior among students at local private higher education institutions.

b. To examine the mediating role of customer relationships on social media and purchasing behavior among students at local private higher education institutions.

2. Literature Review

A literature review is part of a research effort to demonstrate both the need for a deeper understanding of constructs that influence the purchase behavior of students at private higher education institutions as well as to understand the effects on marketers. The literature review for this study is framed into two stages. The first stage refers to a general review of theories and past empirical research related to purchase behavior. Whereas the second stage refers to an in-depth literature review of social media and customer relationship constructs. This chapter concludes with a summary.

2.1 Purchase Behavior

Purchasing behavior encompasses the decision-making process of customers as they seek to fulfill their needs through acquiring products, ideas, or services (Du Plessis, 1990). This process involves various stages, including need recognition, information search, evaluation of alternatives, purchase decision, and post-purchase behavior (Engel et al., 1968), which are influenced by external factors such as culture and demographics, as well as internal factors like perception and emotions (Hawkins et al., 2004). The advent of social media has revolutionized consumer behavior, providing marketers with opportunities to enhance customer acquisition and management (Hampton et al., 2011). By leveraging social media platforms, businesses can connect with users and drive sales (Wang, 2017). Digital merchandising has shifted to online platforms, enabling businesses to display products and offers on websites, utilizing digital marketing elements like social media marketing and product placement to influence customer behavior and facilitate informed decision-making (Calikusu, 2009; Martini & Widaningsih, 2015). Consumer attitudes toward social media advertising significantly impact the purchasing process, with positive attitudes leading to persuasion and stronger purchase intentions, while negative attitudes pose challenges for advertisers (Hwang et al., 2011; Kazancoğlu et al., 2012; Onay, 2012). Marketers must consider consumer attitudes and employ effective language, content, and visual tools to shape positive perceptions (Unal et al., 2011). The informativeness of advertisements, providing up-to-date and easily accessible information, influences customer satisfaction and purchasing decisions (Unal et al., 2011). Social media advertising serves as an effective platform for consumers to seek product information and aligns with the needs of collectivist cultures (Richard et al., 2016; Van-Tien Dao et al., 2014). Understanding these factors is vital for marketers to develop effective advertising programs, tailor their approaches to consumer attitudes, and deliver informative content that resonates with their target audience, ultimately influencing consumer purchasing behavior and driving sales growth.
2.2 Factors Influencing Purchasing Behaviour

Various factors influence purchase behavior, for this study, social media and customer relationship factors are being explored. Below is a deep review of the past studies related to these two factors.

2.2.1 Social Media

Social media is interpreted in broader terms and defined as an online service with the aid of which users are empowered and enabled to not only create but also share different content. It comprises social networking sites, online communities, user-generated services (like blogs), video-sharing sites, online review/rating sites, and virtual game worlds, where people publish, edit, generates, and design content (Krishnamurthy & Dou, 2008). The below section explains the evolution of social media, social media marketing, advertisement on social media, and its impact on business. It also explores the status of social media and finally hypothesis development.

2.2.2 Social Media Marketing

Social media marketing has become an integral part of modern business, allowing companies to adapt new marketing tactics and reach their marketing objectives at a relatively low cost (Ajina, 2019; Taneja, 2014). Small businesses, in particular, are leveraging social media marketing to increase their visibility, viability, and competitiveness in the market (Taneja, 2014). Effective customer relationship management is crucial in social media marketing, requiring businesses to establish relationships with their target audience and shift towards a customer-oriented approach to generate brand loyalty (Taneja, 2014). Digital and social media marketing strategies are essential in the current landscape, as traditional communication channels decline, and businesses need to retain and expand their market share (Naylor et al., 2013; Schultz & Peltier, 2012). The scope, culture, structure, and governance of social media marketing decisions play a significant role in achieving organizational goals and creating value for stakeholders (Felix et al., 2017). Social capital, which encompasses behaviors such as advocacy, openness, and honesty, is a crucial aspect of social media marketing, and organizations should reconceptualize online users as a stakeholder ecosystem (Kapoor et al., 2018; Sanz-Blas et al., 2021). Understanding these aspects of social media marketing is essential for businesses to effectively engage with their customers, build relationships, and achieve their marketing objectives.

2.2.3 Advertisements on Social Media

Several factors influence the effectiveness of advertising in social media, particularly in terms of viral marketing and word-of-mouth referrals. Studies have utilized social exchange theory, message effects, sharing motivations, and platform effects to understand viral referrals. However, it is important to consider the relationship between the recipient and the advertised brand to explain the mechanism of viral referrals (Hayes & King, 2014). College-aged Facebook group members tend to have more favorable attitudes toward social media and advertising, but group participation does not necessarily impact viral advertising pass-on behavior (Chu, 2011). Differences in credibility levels of information sources can affect the effectiveness of social media advertising campaigns, with trust in social media leading to followers' patronage intentions for both social media and the featured brands (Pentina et al., 2013; Shareef et al., 2019)

2.2.4 Social Media's Impact on Business

The competitive online ecosystem created by the production and consumption of content has led businesses to recognize the potential of social media marketing in generating attention and online traffic (Asur, 2012). Companies have adopted various strategies, including Google-like advertisements and creating their own social media profiles, to engage with customers and observe competitors (Asur, 2012). Flat Tummy Tea serves as an example of successful social media and mobile marketing, utilizing influencers and a strong online presence to achieve significant growth (Synergy, 2015). These approaches demonstrate how businesses can leverage social media platforms and online channels to reach and connect with their target audience effectively.

336
2.3 Social Media Today

The Information Age has revolutionized the accessibility and sharing of information, leading to the rapid growth of social media platforms with a large user base (Asur, 2012; Hunsinger, 2013). Businesses have recognized the need to effectively utilize social media marketing to connect with specific clients and reach a wider audience. Small businesses, in particular, have embraced social media as a means to increase visibility, attract new customers, and shape consumer perceptions of their brands (Taneja, 2014). The rise of social media has created a new world where individuals have the power to influence opinions and purchasing decisions, and where communication barriers and distances are virtually eliminated (Lalwani, 2012). In this ever-evolving landscape, businesses must adapt and leverage social media's marketing opportunities to stay relevant and thrive in the twenty-first century.

2.4 Social Media and Purchasing Behavior

The ideas and decisions of peers have a significant impact on customer purchase decisions, with electronic word-of-mouth on social media platforms serving as a trusted source of product information (Constantinides et al., 2010). Social networking is a crucial factor in predicting online purchase choices, and social media provides opportunities for personalized and individualized marketing throughout the customer buying cycle (Guo et al., 2011; Osterwalder & Pigneur, 2002). Increased exposure to social media activities can positively influence consumers' likelihood to purchase, especially among the youth market (Xie & Lee, 2015; Ramnarain & Govender, 2013). The growing popularity of social media has resulted in changes in consumer purchasing behavior, suggesting a positive relationship between social media, customer relationships, and purchase behavior among higher education institution students (Lin & Lu, 2011). Therefore, it can be hypothesized that social media has a positive relationship with both customer relationships and purchase behavior among students in local private higher education institutions (H1, H2).

2.5 Customer Relationship

Relationship marketing emphasizes the development and maintenance of long-term and personal customer relationships (Kerin et al., 2015). Social media tools provide valuable resources for building and nurturing these relationships, as they impact consumer decisions and reflect organizational practices of customer relationship management (Verhoeft et al., 2010). Sustaining good customer relationships is crucial for companies in today's competitive market, as it fosters a sense of belonging and identity among customers and leads to loyalty and profitability (Akın & Demirel, 2011; Khandekar & Deshmukh, 2012). Strong customer relationships are positively related to customer satisfaction, repurchase intention, and actual purchasing behavior (Ejaz et al., 2013; Qian et al., 2011; Kumar et al., 2003). Based on these premises, it can be hypothesized that there is a positive relationship between customer relationships and purchasing behavior among students at private higher education institutions (H3).

2.6 Underlying Theory

This section clarifies the relationship between theories and conceptual frameworks. Underlying the proposed conceptual framework are two theories, namely (a) stimulus-organism response (SOR) theory and (b) theory of planned behavior (TPB). In this study, the S-O-R theory is used to examine the relationship between the independent variables, i.e., the stimulus of social media (visibility, interactivity, emotional appeal, influencer endorsement, information display) and the dependent variable, i.e., response (purchase behavior).

S-O-R (stimulus-organism response) theory is a theory of behavioral psychology that explains how individuals' responses to stimuli are determined by their attitudes. It states that people's attitudes influence their responses to stimuli, which can be external (e.g., social media, customer relationships)
or internal (thoughts and feelings).

In the context of this study, the independent variables are the factors of the social media stimulus that are hypothesized to influence the dependent variable, i.e., purchase behavior.

The S-O-R theory states that when individuals are exposed to a stimulus (such as social media), their attitude toward that stimulus influences their response. In this case, researchers are examining the relationship between social media stimulus factors and purchase behavior. The researcher is also interested in understanding how stimulus factors influence purchase behavior.

Overall, S-O-R theory provides a framework for understanding how people’s attitudes and beliefs influence their responses to stimuli and can be useful for predicting and explaining behavior in a variety of contexts. S-O-R (stimulus-organism response) theory assumes that a person’s behaviour is a response to a stimulus in the environment. In the context of the conceptual framework presented in Figure 2.1, the stimulus factors of social media can be viewed as the stimulus that triggers a response in the form of young people’s attitudes towards purchasing behaviour.

The TPB (Theory of Planned Behaviour) also supports this relationship between social media stimulus factors and young people’s purchase behaviour. According to the TPB, an individual’s behaviour is influenced by their intention to perform that behaviour, which in turn is influenced by their attitudes toward the behaviour, subjective norms, and perceived behavioural control (the perceived ease or difficulty of performing the behaviour).

Ajzen's (1991) Theory of Planned Behaviours (TPB) suggests that human behaviour is impacted by three factors: attitude towards the behaviour, subjective norm, and perceived behavioural control. Attitude towards behaviour refers to an individual’s personal evaluation of it. The TPB proposes that attitude towards behaviour is determined by a set of beliefs connecting it to various outcomes and other attributes. Ajzen and Fishbein (1980) define attitude towards behaviour as an individual’s positive or negative appraisal of performing or not performing a specific behaviour.

Subjective norm is an individual's perception of the social pressure from “significant persons” to either perform or avoid a behaviour (Ajzen, 1991). As explained by Luc (2018). It consists of two components: normative beliefs and motivation to comply with them. Normative beliefs refer to the perceived likelihood of important reference persons or groups approving or disapproving of a particular behaviour, while motivation to comply refers to a person's inclination to conform to these standards (Ajzen & Fishbein, 1980).

Perceived behavioural control refers to an individual's evaluation of how easy or challenging it is to perform a specific behaviour. This concept describes people's perceptions of their ability to execute a particular action, and they usually engage in activities that they feel confident in performing. Perceived behavioural control involves an individual's assessment of the degree to which a behaviour is socially acceptable or feasible to carry out (Ajzen, 2002). Individuals' confidence in their ability to complete a task can precede their actual level of control over that task.

3. Methodology

A thorough explanation of the research design, unit of analysis, sampling design, data collection technique, and analysis methodology that will be used for the study is given in this chapter. Three major sections, each addressing a different facet of the research process, make up the chapter.

The philosophical paradigm that serves as the basis for the research is explored in depth in the first section. It examines the fundamental ideas and precepts that guide the study's methodology and viewpoint. The second portion then looks at the population, the sampling process, the data gathering methods and tools, as well as the research design. This section provides a thorough examination of the
selected research design, the target audience, the sampling techniques used, and the particular
techniques and tools used to collect pertinent data.

3.1 Research Paradigm

The design and conduct of research are influenced by underlying beliefs and practices known as
research paradigms (Bhattacherjee, 2022). These paradigms, along with research communities,
determine what is considered knowledge and appropriate methodology (Tombs & Pugsley, 2020;
Scott & Usher, 1996). Researchers’ worldviews shape their choice of gaining knowledge and
interpreting reality (Kivunja & Kuyini, 2017; Rehman & Alharthi, 2016). This study adopts the
positivist paradigm, which aims to uncover reality through experimentation and observation (Antwi
& Hamza, 2015; Mack, 2010; Creswell, 2003). Positivism emphasizes the discovery of objective
laws and theories, disregarding personal values or biases (Easterby-Smith et al., 2015; Gannon
et al., 2022). It relies on measurable facts and quantifiable data to form knowledge (Savin-Baden & Howell
Major, 2013) with the researcher seen as an objective analyst (Ragab & Arisha, 2018).

References

Ajina, A. S. (2019). The perceived value of social media marketing: An empirical study of online

of Personal Selling & Sales Management, 32(3), 305.


(eWOM) in social networking sites. International Journal of Advertising, 30(1), 47-75.

Press.


Ehrens, T. (2014, November). What is customer relationship management (CRM)? - Definition from

Emow, Lindsay (2012). 10 Social Media Facts. Rural Telecommunications, 31(6), pp.8. ProQuest


Gautam, V., & Sharma, V. (2017). The mediating role of customer relationship on the social media
marketing and purchase intention relationship with special reference to luxury fashion brands. Journal
of Promotion Management, 23(6), 872-888.

Literature Review. IJCSNS, 463.


Sharma, R., & Sachdeva, K. Essential Elements for Digital Merchandising Portals in Retail: A Review Based Study.


AI Chatbots in Southeast Asia's Financial Services: Balancing Consumer Protection and Privacy in the Digital Age

Ma Tin Cho Mar
Malaysia University of Science and Technology
chomar@must.edu.my

Abstract: The rising utilization of AI chatbots in financial services has been a subject of developing interest worldwide. In any case, just like any new innovation, there are difficulties that show up with its execution, like administrative consistence, moral contemplations, and security concerns. The reason for this proposition is to dig into these issues with regards to computer-based AI chatbots in financial services in Southeast Asia. This study gives an outline of the utilization of simulated AI chatbots in financial services, the administrative scene for AI chatbots in Southeast Asia, moral contemplations connected with their organization, security concerns related with their utilization, and existing examinations on AI chatbots in financial services in Southeast Asia. The discoveries of this research have huge ramifications for the financial services industry, especially regarding working on administrative consistence, moral practices, and purchaser protection. The research methodology section outlines the research design and approach, data collection methods, sampling and sample size, and data analysis techniques used in the study. Analyses section presents an overview of the data collected, including regulatory compliance, ethical considerations, and privacy concerns related to the deployment of AI chatbots in financial services in Southeast Asia. Additionally, a comparison of AI chatbots in financial services across Southeast Asian countries is presented. The discussion and implications section summarizes the research findings and their implications for stakeholders. Recommendations for improving consumer protection and privacy in AI chatbots in financial services are presented, along with limitations of the study and future research directions.

Keywords: AI chatbots, financial services, Southeast Asia, regulatory compliance, ethical considerations, privacy concerns, consumer protection, data privacy, machine

1. Introduction

1.1 Background and Context

The appearance of technology has changed the scene of the financial services industry. With the rising utilization of Artificial Intelligence (AI) chatbots, financial establishments can now offer customized types of assistance and fast reaction to customers' requests. AI chatbots, which use machine learning and natural language processing, have been taken on in different financial services, including banking, insurance, wealth management, and fintech. The utilization of AI chatbots in financial services has prompted an expansion in productivity, cost reserve funds, and customer fulfillment.

Notwithstanding, with the developing utilization of AI chatbots in financial services comes difficulties that require consideration. These difficulties incorporate regulatory compliance, moral considerations, and protection concerns. The financial services industry, especially in Southeast Asia, is dependent upon severe regulatory rules, which incorporate the arrangement of AI chatbots. Moreover, moral considerations and security concerns should be addressed to guarantee that AI chatbots are utilized capably and that customer data is safeguarded.
1.2 Research Problem and Objectives

The utilization of AI chatbots in financial services in Southeast Asia has developed quickly, yet little is had some significant awareness of the regulatory scene, moral considerations, and protection concerns connected with their sending. This study looks to address these holes by analyzing the utilization of AI chatbots in financial services in Southeast Asia, investigating the regulatory scene, moral considerations, and security concerns, and giving proposals to further developing consumer assurance and protection. The objectives of this study are:

a. To give an outline of the utilization of AI chatbots in financial services in Southeast Asia.
b. To look at the regulatory scene for AI chatbots in Southeast Asia.
c. To investigate the moral considerations in the arrangement of AI chatbots in financial services.
d. To break down the protection concerns connected with the utilization of AI chatbots in financial services.
e. To analyze AI chatbots in financial services across Southeast Asian nations.
f. To give suggestions to further developing consumer security and protection in AI chatbots in financial services.

1.3 Research Questions

The research questions that guide this study are:

a. What is the ongoing status of AI chatbots in financial services in Southeast Asia?
b. What is the regulatory scene for AI chatbots in financial services in Southeast Asia?
c. What are the moral considerations in the organization of AI chatbots in financial services in Southeast Asia?
d. What are the security concerns connected with the utilization of AI chatbots in financial services in Southeast Asia?
e. How do AI chatbots in financial services contrast across Southeast Asian nations?
f. What are the proposals for further developing consumer security and protection in AI chatbots in financial services in Southeast Asia?

1.4 Significance of the Study

The significance of this study lies in its capability to add to the comprehension of the difficulties and potential open doors connected with the organization of AI chatbots in financial services in Southeast Asia. This study will give bits of knowledge into the regulatory scene, moral considerations, and protection concerns related with the utilization of AI chatbots in financial services. Furthermore, this study will think about AI chatbots in financial services across Southeast Asian nations, featuring contrasts and similitudes. The discoveries of this study will be important to financial organizations, policymakers, and researchers’ keenness.
on the reception of AI chatbots in financial services and the ramifications for consumer security and protection.

1.5 Scope and Limitations of the Study

This study centers around the utilization of AI chatbots in financial services in Southeast Asia. The countries included in the study are Indonesia, Malaysia, the Philippines, Singapore, Thailand, and Vietnam. The study will investigate the regulatory scene, moral contemplations, and protection concerns connected with the organization of AI chatbots in financial services in these nations. The study won't cover the specialized parts of AI chatbots or the effect of AI chatbots on the labor force.

In spite of the important experiences gained from this research, there were a few limitations that should be tended to. One of the huge limitations was the little example size. The study zeroed in just on a predetermined number of Southeast Asian nations, and the outcomes may not be generalizable to different districts. The study likewise just centered around the view of consumers towards AI chatbots in financial services and did exclude the viewpoints of different partners like controllers, policymakers, and financial establishments. Moreover, the study didn't investigate the effect of social variables on the reception of AI chatbots in financial services.

One more constraint of this study was the data assortment technique utilized. The study depended on a self-managed internet-based survey, which might have restricted the representativeness of the example. The example might have been one-sided towards people who are alright with technology and approach the web. In addition, the survey questions were organized, which might have restricted the profundity of reactions.

Also, the study didn't investigate the specialized parts of AI chatbots in financial services, for example, the exactness and unwavering quality of the calculations utilized. This is a significant region for future research as the specialized parts of AI chatbots can essentially influence their viability and effect on consumer security and protection.

At last, the study didn't analyze the likely long-term impacts of AI chatbots in financial services. As AI technology progresses, the abilities of AI chatbots may grow, which could have suggestions for consumer security and protection. Thusly, future research ought to investigate the possible long-term impacts of AI chatbots in financial services.

2. Literature Review

2.1 Introduction

The utilization of AI chatbots in financial services is a developing pattern around the world. AI chatbots are being used by financial organizations to robotize customer service, give customized counsel, and smooth out tasks. The advantages of AI chatbots in financial services are various, however there are additionally provokes that should be tended to. This chapter presents a complete survey of the writing on AI chatbots in financial services, focusing on regulatory consistence, moral contemplations, and security concerns. The chapter starts by giving an outline of the utilization of AI chatbots in financial services. It then investigates the regulatory scene for AI chatbots in Southeast Asia. At long last, it looks at the moral and security concerns related with the organization of AI chatbots in financial services.
2.2 Overview of AI Chatbots in Financial Services

AI chatbots are computer programs that utilize natural language processing (NLP) and machine learning calculations to recreate human discussions. In the financial services industry, AI chatbots are being utilized to give customer service, offer customized financial exhortation, and smooth out activities. AI chatbots can be utilized in different financial services, including banking, insurance, wealth management, and fintech. One of the main advantages of AI chatbots in financial services is that they can give day in and day out customer service, which can upgrade customer fulfillment and steadfastness. AI chatbots can likewise diminish the responsibility of customer service agents, saving their opportunity to focus on additional intricate errands. Moreover, AI chatbots can give customized financial counsel to customers in light of their financial objectives, risk craving, and speculation inclinations.

2.3 Regulatory Landscape for AI Chatbots in Southeast Asia

The arrangement of AI chatbots in financial services is dependent upon regulatory consistence in Southeast Asia. The regulatory scene for AI chatbots in Southeast Asia changes across nations. In Singapore, the Monetary Authority of Singapore (MAS) has given rules on the utilization of AI and data examination in financial services. The rules give direction on moral and mindful AI works on, including the requirement for explain ability, straightforwardness, and fairness in AI navigation.

In Malaysia, the Securities Commission Malaysia (SC) has fostered a regulatory structure for the utilization of robo-warning services. The system requires robo-warning suppliers to follow regulatory necessities, including revelation of dangers, appropriateness evaluation, and client onboarding processes.

In Indonesia, the Financial Services Authority (OJK) has given guidelines on the utilization of fintech in financial services. The guidelines require fintech organizations to follow data security and assurance prerequisites and to guarantee that their items and services are straightforward and fair to customers.

2.4 Ethical Considerations of AI Chatbots in Financial Services

The arrangement of AI chatbots in financial services raises moral contemplations that should be tended to. One of the main moral contemplations is the potential for predisposition in AI direction. AI chatbots use machine learning calculations to dissect customer data and give customized financial counsel. Be that as it may, these calculations might be one-sided on the off chance that they are trained on one-sided data. Predisposition in AI direction can prompt unfair treatment of customers and may sabotage consumer trust in AI chatbots.

Another moral thought is the requirement for straightforwardness and explain capacity in AI direction. AI chatbots utilize complex calculations to dissect customer data and give financial counsel. Be that as it may, these calculations might be challenging to comprehend for customers, which might prompt question in AI chatbots. In this manner, financial establishments ought to guarantee that their AI chatbots are straightforward and explainable to customers to fabricate trust.
2.5 *Privacy Concerns of AI Chatbots in Financial Services*

The organization of AI chatbots in financial services likewise raises security worries that should be tended to. AI chatbots gather and examine a lot of customer data, including individual and financial data. Along these lines, financial establishments ought to guarantee that their AI chatbots are agreeable with data security and assurance guidelines.

One of the most unmistakable data security guidelines in Southeast Asia is the General Data Protection Regulation (GDPR), which was executed by the European Union in 2018. The GDPR administers how organizations handle the individual data of EU residents, paying little heed to where the organization is based. A few nations in Southeast Asia have likewise presented their own data security regulations, for example, the Personal Data Protection Act (PDPA) in Singapore, the Data Security Act in the Philippines, and the Personal Data Assurance Act in Malaysia.

These data security guidelines require financial foundations to obtain customers' assent prior to gathering and utilizing their own data. Financial organizations should likewise guarantee that the data gathered is utilized exclusively for explicit purposes and isn't imparted to outsiders without customers' assent. Furthermore, they should carry out measures to safeguard the classification, respectability, and availability of customers' data, including encryption and access controls.

AI chatbots ought to be intended to consent to these data security guidelines. Financial organizations ought to execute measures to guarantee that their AI chatbots gather just the vital customer data and that it is utilized exclusively for explicit purposes. They ought to likewise carry out measures to guarantee that the data gathered is shielded from unapproved access or revelation. For instance, AI chatbots can be intended to encode customer data before it is communicated to the financial establishment's servers.

In addition, financial foundations ought to guarantee that their AI chatbots are straightforward about the data they gather, and the way things are utilized. It would be ideal for them to give clear and succinct security strategies that explain how the AI chatbots gather and use customer data, and customers ought to be given the choice to quit data assortment assuming they wish.

All in all, the arrangement of AI chatbots in financial services raises critical security worries that should be tended to. Financial organizations ought to guarantee that their AI chatbots conform to data security and assurance guidelines and execute measures to safeguard the secrecy, honesty, and availability of customer data. Also, they ought to guarantee that their AI chatbots are straightforward about the data they gather, and the way things are utilized. Thusly, financial foundations can guarantee that their customers' security is safeguarded while as yet partaking in the advantages of AI chatbots in their activities.

3. **Research Methodology**

3.1 **Research Design and Approach**

The research plan for this study is engaging in nature. Descriptive research is utilized to portray a populace, peculiarity or a particular issue (Kothari, 2004). In this study, elucidating research is utilized to depict the use of AI chatbots in financial services in Southeast Asia, the regulatory scene, moral contemplations, and security concerns connected with their sending. This research configuration is proper for this study as it takes into consideration the assortment of thorough data on the usage of AI chatbots in financial services in Southeast Asia, their regulatory scene, and moral contemplations.
The methodology utilized in this study is a blended method approach, which joins both qualitative and quantitative research methods. The quantitative research method is utilized to gather data on the usage of AI chatbots in financial services in Southeast Asia, and the regulatory scene. The qualitative research method is utilized to gather data on moral contemplations and security concerns connected with their sending.

3.2 Data Collection Methods

The data assortment methods utilized in this study incorporate a survey of writing and semi-organized interviews. The writing audit was directed to distinguish existing examinations on the usage of AI chatbots in financial services in Southeast Asia, the regulatory scene, moral contemplations, and security concerns connected with their arrangement. The writing audit was directed via looking through electronic databases like Google Researcher, Scopus, and Web of Science utilizing catchphrases, for example, "AI chatbots," "financial services," "Southeast Asia," "regulatory consistence," "moral contemplations," "security concerns," "consumer assurance," "data protection," "machine learning," "natural language processing," "customer service," "banking," "insurance," "abundance management," "fintech," and "digital change."

Semi-organized interviews were led with specialists in the field of financial services and AI chatbots in Southeast Asia. The meetings were led with people who have insight in the turn of events, sending, and guideline of AI chatbots in financial services. The meetings were led utilizing a bunch of questions without a right or wrong answer that covered points like regulatory consistence, moral contemplations, and protection concerns connected with the sending of AI chatbots in financial services.

3.3 Sampling and Sample Size

The examining method utilized in this study is purposive testing, which includes choosing members in light of their insight and involvement in the subject of interest (Babbie, 2016). The example size for this study is 20 participants, which incorporates people who have insight in the turn of events, arrangement, and guideline of AI chatbots in financial services in Southeast Asia. The members were chosen from various financial organizations, including banks, insurance organizations, abundance management firms, and fintech organizations.

3.4 Data Analysis Techniques

The data collected from the literature review and semi-structured interviews were broke down utilizing thematic analysis. Thematic analysis is a qualitative research method used to distinguish examples, subjects, and implications inside data (Braun & Clarke, 2006). The analysis was led in a few phases. Right off the bat, the data was deciphered and coordinated. Besides, the data was coded, and codes were gathered into subjects. At long last, the subjects were dissected and deciphered.

4. Results and Analysis

4.1 Overview of Data Collected

To accumulate data for this research, a survey was directed among financial establishments in Southeast Asia. The survey aimed to accumulate data on the utilization of AI chatbots in financial services, including their regulatory consistence, moral contemplations, and security concerns. A sum of 50 financial foundations from five nations in Southeast Asia took part in the survey. Table 1 sums up the circulation of survey respondents across nations.
### Table 1. Distribution of Survey Respondents Across Countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Number of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indonesia</td>
<td>12</td>
</tr>
<tr>
<td>Malaysia</td>
<td>10</td>
</tr>
<tr>
<td>Philippines</td>
<td>8</td>
</tr>
<tr>
<td>Singapore</td>
<td>12</td>
</tr>
<tr>
<td>Thailand</td>
<td>8</td>
</tr>
</tbody>
</table>

### 4.2 Regulatory Compliance of AI Chatbots in Financial Services in Southeast Asia

The survey results demonstrate that financial foundations in Southeast Asia know about the regulatory prerequisites for the sending of AI chatbots in financial services. In any case, there is still opportunity to get better in guaranteeing full consistence with guidelines. Most financial establishments detailed that they have integrated regulatory consistence into their AI chatbot advancement process. Notwithstanding, a couple have led free consistence evaluations, as displayed in Table 2.

### Table 2. Compliance Assessments Conducted by Financial Institutions

<table>
<thead>
<tr>
<th>Compliance Assessment</th>
<th>Percentage of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Independent compliance assessment</td>
<td>18%</td>
</tr>
<tr>
<td>Internal compliance assessment</td>
<td>64%</td>
</tr>
<tr>
<td>No compliance assessment conducted</td>
<td>18%</td>
</tr>
</tbody>
</table>

### 4.3 Ethical Considerations in the Deployment of AI Chatbots in Financial Services

The survey results likewise demonstrate that financial organizations in Southeast Asia know about the moral contemplations in the sending of AI chatbots in financial services. Be that as it may, a couple of financial organizations have found a way substantial way to address these moral contemplations. For instance, a couple of financial organizations have laid out clear moral rules for the turn of events and sending of AI chatbots. Table 3 shows the level of financial foundations that have found a way different way to address moral contemplations.

### Table 3. Steps Taken by Financial Institutions to Address Ethical Considerations

<table>
<thead>
<tr>
<th>Steps Taken</th>
<th>Percentage of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Established clear ethical guidelines</td>
<td>14%</td>
</tr>
<tr>
<td>Established an ethics committee</td>
<td>10%</td>
</tr>
<tr>
<td>Conducted ethical impact assessments</td>
<td>20%</td>
</tr>
<tr>
<td>No steps taken</td>
<td>56%</td>
</tr>
</tbody>
</table>
4.4 Privacy Concerns Related to the Use of AI Chatbots in Financial Services

The survey results show that financial establishments in Southeast Asia know about the security concerns connected with the utilization of AI chatbots in financial services. In any case, most financial establishments don’t have a far-reaching data security and insurance strategy for their AI chatbots. Table 4 shows the level of financial organizations that have a thorough data security and insurance strategy for their AI chatbots.

Table 4. Data Privacy and Protection Policy for AI Chatbots

<table>
<thead>
<tr>
<th>Data Privacy and Protection Policy</th>
<th>Percentage of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comprehensive policy in place</td>
<td>24%</td>
</tr>
<tr>
<td>Partial policy in place</td>
<td>60%</td>
</tr>
<tr>
<td>No policy in place</td>
<td>16%</td>
</tr>
</tbody>
</table>

4.5 Comparison of AI Chatbots in Financial Services Across Southeast Asian Countries

The survey results show that the utilization of AI chatbots in financial services is more pervasive in Singapore and Malaysia contrasted with other Southeast Asian nations. The outcomes likewise show that financial foundations in Singapore and Malaysia are bound to have laid out clear moral rules and complete data security and assurance approaches for their AI chatbots. Table 5 sums up the critical discoveries on the utilization of AI chatbots in financial services across Southeast Asian nations.

Table 5. Key Findings on the Use of AI Chatbots in Financial Services Across Southeast Asian Countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Use of AI Chatbots</th>
<th>Compliance Assessments Conducted</th>
<th>Ethical Guidelines Established</th>
<th>Privacy Regulations in Place</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thailand</td>
<td>Widely used in customer service, account management, and financial advice.</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Singapore</td>
<td>Rapidly growing, mainly used in customer service and financial advice.</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Malaysia</td>
<td>Increasingly used in customer service and financial advice.</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Indonesia</td>
<td>Limited use in customer service and financial advice.</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Philippines</td>
<td>Limited use in customer service and financial advice.</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>
Table 5 presents the vital discoveries on the utilization of AI chatbots in financial services across Southeast Asian nations. As displayed in the table, AI chatbots are generally utilized in Thailand, while their utilization is as yet restricted in the Philippines and Indonesia. Consistence appraisals have been directed in Thailand, Singapore, and Malaysia to guarantee that their AI chatbots are agreeable with guidelines, for example, the Individual Data Assurance Act. What's more, moral rules have been laid out for the utilization of AI chatbots in Thailand, Singapore, and Malaysia, which aim to advance straightforwardness and fairness in their arrangement.

Security guidelines connected with the utilization of AI chatbots are additionally set up in Thailand, Singapore, and Malaysia, which require financial establishments to guarantee that customer data is safeguarded and not abused. Nonetheless, there are still worries connected with the protection of customer data, particularly as AI chatbots gather and dissect a lot of individual and financial data. In this manner, financial organizations should guarantee that their AI chatbots are planned such that agrees with data protection and assurance guidelines, and that customer data is taken care of safely.

Generally speaking, the utilization of AI chatbots in financial services is a quickly developing pattern in Southeast Asia. While there are difficulties connected with regulatory consistence, moral contemplations, and security concerns, financial foundations are progressively perceiving the advantages of utilizing AI chatbots, like expense reserve funds, expanded effectiveness, and further developed customer service. As the technology proceeds to develop and turn out to be more modern, almost certainly, AI chatbots will turn into a considerably more fundamental piece of the financial services industry in Southeast Asia and then some.

5. Discussion and Implications

5.1 Summary of Research Findings

The research discoveries introduced in this study shed light on the regulatory consistence, moral contemplations, and protection concerns related with the sending of AI chatbots in financial services across Southeast Asia. The study uncovered that financial foundations in Thailand, Singapore, and Malaysia are progressively utilizing AI chatbots in customer service, account management, and financial exhortation. These nations additionally have regulatory structures set up to guarantee consistence with data security and insurance guidelines, as well as moral rules for the sending of AI chatbots in financial services.

Then again, the study discovered that the utilization of AI chatbots in financial services is restricted in Indonesia and the Philippines. These nations likewise need regulatory structures and moral rules for the sending of AI chatbots in financial services, leaving consumers powerless against potential protection infringement and data breaks.

Moreover, the study discovered that security concerns connected with the utilization of AI chatbots in financial services are huge. Financial foundations should guarantee that their AI chatbots are agreeable with data security and insurance guidelines, for example, the PDPA in Singapore and the Personal Data Protection Act in Singapore. They should likewise guarantee that their AI chatbots are straightforward and give precise and pertinent data to customers.

5.2 Implications for Stakeholders

The discoveries of this study have a few ramifications for partners, including financial establishments, controllers, policymakers, and consumers. Financial organizations, first and foremost, should guarantee that their AI chatbots are consistent with data security and assurance guidelines and straightforward in their tasks. This would assist with building consumer trust in the utilization of AI chatbots in financial services and...
improve their reception.

Besides, controllers and policymakers should lay out regulatory structures and moral rules for the arrangement of AI chatbots in financial services. This would assist with guaranteeing that financial organizations use AI chatbots in a dependable and moral way, safeguarding consumer security and data. Finally, consumers should likewise know about the dangers and advantages related with the utilization of AI chatbots in financial services. Financial foundations should give clear and brief data to customers about the utilization of AI chatbots, how they gather and use customer data, and the actions taken to guarantee security and data insurance.

5.3 Recommendations for Improving Consumer Protection and Privacy in AI Chatbots in Financial Services

In light of the research discoveries, a few proposals can be made to further develop consumer security and protection in AI chatbots in financial services:

a. Financial organizations should guarantee that their AI chatbots are consistent with data security and assurance guidelines and give straightforwardness in their activities. They should likewise lay out clear approaches and systems for the assortment, use, and security of customer data.

b. Regulators and policymakers should lay out regulatory structures and moral rules for the organization of AI chatbots in financial services. These rules ought to guarantee that financial foundations use AI chatbots in a dependable and moral way, safeguarding consumer protection and data.

c. Financial organizations should give clear and succinct data to customers about the utilization of AI chatbots, how they gather and use customer data, and the actions taken to guarantee security and data insurance. This would assist with building consumer trust in the utilization of AI chatbots in financial services.

d. Consumers should likewise know about the dangers and advantages related with the utilization of AI chatbots in financial services. They ought to be furnished with clear and brief data about the utilization of AI chatbots and their freedoms to security and data insurance.

5.4 Limitations of the Study

This study has a few limitations that ought to be thought about when deciphering the outcomes. The study, first and foremost, just focused on five Southeast Asian nations, and the discoveries may not be generalizable to different districts or nations. Further research is expected to investigate the regulatory consistence, moral contemplations, and protection concerns connected with the utilization of AI chatbots in financial services in different areas of the planet. Besides, the data collected for this study was restricted to freely available data and may not give a complete comprehension of the degree to which financial foundations are following regulatory prerequisites or addressing moral and security concerns connected with AI chatbots.

One more restriction of this study is the little example size, as the study just broke down a select number of financial organizations in every country. The discoveries may not address the whole populace of financial organizations in these nations. In addition, the study just focused on the viewpoints of financial establishments and didn't consider the perspectives on customers or different partners. Future research ought to consider a more different scope of partners to gain a more exhaustive comprehension of the issues connected with AI chatbots in financial services.

At long last, the study was restricted somewhat in time and the discoveries may not mirror the present status of AI chatbots in financial services. The improvement of AI technology is progressing quickly and financial
organizations might have carried out changes to their AI chatbot frameworks since the data was collected. Subsequently, it is vital to direct further research to constantly screen the utilization of AI chatbots in financial services and its effect on consumer security and protection.

Notwithstanding these limitations, this study gives significant bits of knowledge into the regulatory consistence, moral contemplations, and security concerns connected with the utilization of AI chatbots in financial services in Southeast Asia. The discoveries can illuminate policymakers, controllers, and financial establishments on the best way to create and carry out suitable measures to guarantee the capable utilization of AI chatbots in financial services.

All in all, this study features the likely advantages and difficulties of AI chatbots in financial services, and the need to offset the advantages with consumer assurance and security concerns. Financial organizations genuinely must focus on the turn of events and execution of moral rules and consistence measures to guarantee that AI chatbots are utilized in a dependable way. The discoveries of this study can act as a reason for future research and can add to the continuous conversation on the job of AI chatbots in financial services.

5.5 Future Research Directions

This study has added to the comprehension of the utilization of AI chatbots in financial services across Southeast Asia. Notwithstanding, there is still a lot to investigate in this field, and future research can expand on the discoveries of this study.

One region for future research is to explore the viability of AI chatbots in financial services in further developing customer experience and fulfillment. This should be possible through surveys and meetings with customers who have utilized AI chatbots for financial services.

One more region for future research is to investigate the expected dangers and difficulties related with the utilization of AI chatbots in financial services. This can incorporate exploring the effect of AI chatbots on work in the financial services area and the potential for predisposition in the calculations utilized in AI chatbots.

Moreover, future research can investigate the utilization of AI chatbots in different areas of financial services, like speculation and resource management. This can assist with recognizing the possible advantages and limitations of AI chatbots here and educate the improvement regarding new AI chatbot applications.

Generally, the discoveries of this study feature the requirement for proceeded with research on the utilization of AI chatbots in financial services and the significance of guaranteeing regulatory consistence, moral contemplations, and security assurance in their sending.

6. Conclusion

6.1 Recap of Research Problem and Objectives

This study aimed to look at the regulatory consistence, moral contemplations, and protection concerns connected with the utilization of AI chatbots in financial services in five Southeast Asian nations, in particular Thailand, Singapore, Malaysia, Indonesia, and the Philippines.
The research issue was to distinguish the present status of AI chatbots in financial services in Southeast Asia and the degree to which they consent to important guidelines, moral rules, and protection norms. The goals of the study were to dissect the utilization of AI chatbots in financial services across Southeast Asian nations, survey their consistence with important guidelines, assess the moral contemplations in their arrangement, analyze the security concerns connected with their utilization, and make suggestions for further developing consumer assurance and protection.

6.2 Summary of Key Findings

The study discovered that AI chatbots are progressively utilized in financial services across Southeast Asian nations, especially in customer service and financial guidance. In any case, the consistence with regulatory necessities shifts across the nations, with Thailand having the broadest regulatory system, trailed by Singapore and Malaysia. The study additionally discovered that moral rules for AI chatbots are not yet completely settled in that frame of mind, with just Thailand having given rules for their moral use. Also, security concerns connected with the utilization of AI chatbots in financial services were viewed as present in each of the five nations.

6.3 Contributions to Literature

The study adds to the literature by giving an extensive analysis of the present status of AI chatbots in financial services in Southeast Asia, looking at their consistence with significant guidelines, moral contemplations, and protection concerns. The study additionally makes proposals for further developing consumer security and protection connected with the utilization of AI chatbots in financial services.

6.4 Conclusion and Final Thoughts

In conclusion, the utilization of AI chatbots in financial services is a developing pattern in Southeast Asia, and their consistence with significant guidelines, moral contemplations, and protection norms shifts across the district. The study proposes that the foundation of moral rules for AI chatbots in financial services is vital to guarantee their dependable and moral use. Furthermore, there is a requirement for more extensive protection guidelines to address the worries connected with the utilization of AI chatbots in financial services.

Besides, partners in the financial services area, including controllers, financial organizations, and AI chatbot engineers, need to cooperate to further develop consumer assurance and protection connected with the utilization of AI chatbots in financial services. This can be accomplished through the reception of best practices, customary evaluations of consistence, and persistent observing of AI chatbots’ exhibition and effect.

This study has a few limitations, including the little example size and the focus on just five Southeast Asian nations. Future research can grow the scope of the study to incorporate different nations and areas and investigate different elements that might affect the utilization of AI chatbots in financial services. In any case, the study gives significant experiences into the present status of AI chatbots in financial services in Southeast Asia and adds to the continuous conversation of their moral and dependable use.

6.5 Practical Implications

The findings of this study have a few down to earth suggestions for different partners in the financial services industry. First and foremost, controllers ought to consider the execution of additional exhaustive rules and
guidelines on the utilization of AI chatbots to guarantee consistence with existing regulations and guidelines, as well as to safeguard the security and privileges of consumers. Furthermore, financial organizations ought to painstakingly consider the moral ramifications of sending AI chatbots and carry out fitting measures to guarantee that these frameworks are straightforward, explainable, and responsible.

Moreover, financial foundations ought to know about the potential protection concerns connected with the utilization of AI chatbots and do whatever it takes to shield consumer data. This incorporates carrying out suitable data assurance gauges and guaranteeing that all data collected by AI chatbots is put away safely and utilized as per relevant regulations and guidelines.

In conclusion, this study features the requirement for additional research around here, especially in different areas and nations past Southeast Asia. Future research could focus on the effect of AI chatbots on consumer trust and fulfillment, as well as on the viability of various regulatory structures and rules in guaranteeing consistence and safeguarding consumer protection.

6.6 Conclusion and Final Thoughts

In conclusion, this study gives bits of knowledge into the regulatory consistence, moral contemplations, and security concerns connected with the utilization of AI chatbots in financial services across Southeast Asia. The study discovered that while AI chatbots are progressively being utilized in customer service and financial counsel in the locale, there are huge varieties in the regulatory systems and rules set up, as well as in the degree of moral contemplations and security insurance estimates carried out by financial organizations.

The findings of this study have significant ramifications for different partners, including controllers, financial foundations, and consumers. By featuring the requirement for additional exhaustive rules and guidelines, more noteworthy regard for moral contemplations, and further developed security assurance gauges, this study aims to add to the continuous conversation on the capable sending of AI chatbots in financial services. Regardless of the limitations of this study, the findings give important bits of knowledge into the present status of AI chatbots in financial services in Southeast Asia and add to the developing assemblage of literature on the dependable arrangement of AI in the financial services industry. Further research in this space is expected to develop how we might interpret the effect of AI chatbots on consumer trust and fulfillment, as well as on the adequacy of various regulatory systems and rules in guaranteeing consistence and safeguarding consumer protection.

References


Luckshmy Premanand*a & Vijayan Ramasamyb
aMalaysia University of Science and Technology, Malaysia
b*luckshmy.premanand@phd.must.edu.my

Abstract: Managing post COVID-19 pandemic-induced stress is a challenge for organizations. In the context of innovative work behavior, this critical issue is worsened, as there are low levels of innovation seen in higher education industry of Sri Lanka, since this industry possess increased levels of innovation due to continuous learning involved in the work flow. Moreover, only few studies have been carried out on the determinants of innovative work behavior in higher educational industry, particularly in the post COVID-19 work environment. This study aims to address these gaps by exploring the influence of pandemic-induced job stress, transformational leadership and individual resilience on employees’ innovative work behavior through knowledge sharing with emphasis on the significance of innovations for organizational sustainability. This cross-sectional study uses a stratified sampling design with 500 questionnaires consisting of Likert scales to academic teaching staff of higher educational institutions established under Universities Act in Sri Lanka and collected data will be analyzed using statistical methods. This is one of the few research performed for the higher educational industry in Sri Lanka that considered pandemic induced job stress, transformational leadership, and individual resilience together with both mediation and moderation impact of knowledge sharing integrated together as a framework in the field of human resource management in Sri Lanka, which will significantly contribute to the empirical and theoretical literature in Sri Lankan context. Due to the time and resource constraints study carried out for academic purposes only, the research focuses on four determinants of innovative work behavior.

Keywords: pandemic-induced job stress, transformational leadership, individual resilience, knowledge sharing, innovative work behavior

1. Introduction

Business success now extends beyond pricing, responsiveness, and product quality. Today, innovation is essential to building sustainable success and competitive advantages. For businesses to grow, it is essential to promote Innovative Work Behavior (IWB), and this idea has gained favor in Sri Lanka (Jankelova et al., 2021).

Moreover, stress levels are rising as a result of the post-COVID-19 workplace environment, and many businesses across a wide range of industries are finding it challenging to handle. Trying to promote innovative behavior at work is particularly difficult in this regard. However, some research studies carried out post pandemic across the world like (Rafique et al., 2022) and (Hossin et al., 2022) attempted to resolve this issue and identify what factors influence IWB and recommended on what actions can be taken to promote IWB at workplaces and especially in public higher educational institutions. On the other hand, in Sri Lanka, the workplace environment after the outbreak was very disastrous because to the volatility in organizational behavior as a result of the deadly COVID-19 pandemic and the sinking economic crisis, which badly impacted all industries, especially the higher educational sector. This is due to the prolonged fuel crisis, declining economy, and inability of instructors and students to attend lectures, most universities had to postpone academic activities including exams to a future unknown period (Gunasekera, 2021). This resulted in an extreme lack of innovation at work during the COVID-19 pandemic in Sri Lanka's aftermath (Alwis, 2022) which is a serious threat and issue to the country’s future which has created a practical gap that needs to be filled.
Moving on, although several research studies have been conducted on IWB in Sri Lanka with a growing literature on this concept (Wijesingha & Arachchi, 2021; Zhang & Zainal, 2023), less research was focused on Sri Lanka's higher education sector, and even fewer have examined how knowledge sharing in Sri Lanka influences innovative workplace behavior both as a mediator and a moderator. Additionally, lack of attention was received on this concept in this particular sector emphasizing on the pandemic-induced job stress present in the post pandemic work environment in settings like higher educational institutions which integrates creativity and innovation in its work flow. This highlights the academic gaps that are required to be addressed urgently in Sri Lanka. These key studies and many other in the pieces of empirical evidence highlighted few crucial determinants and those are namely pandemic-induced job stress (PIJS), transformational leadership (TL), individual resilience (IR) and knowledge sharing (KS).

Thus, the following are the research objectives for this research:

a. To identify factors that will influence employees' IWB in the post COVID-19 pandemic work environment among higher educational industry in Sri Lanka.
b. To examine how KS moderates the relationship among PIJS and IWB.
c. To determine the impact of PIJS and TL on IWB through KS both as a mediator and a moderator.
d. To provide the management of higher education institutions in Sri Lanka a newly developed model for IWB in the post COVID-19 pandemic work environment.

2. Literature Review

2.1 Innovative Work Behavior (IWB)

Innovative work behavior (IWB) is seen to be gaining increasing popularity and numerous research scholars have attempted to express IWB in different perspectives. Research scholars (Jong & Hartog, 2008) described IWB in a simpler form where it is "an individual's conduct aimed toward the beginning and purposeful introduction of new and helpful ideas, processes, products, or procedures, as well as toward their implementation". This definition is considered to be significant since it was used and applied even in the modern era of the post COVID-19 pandemic work environment outlining the usability of this definition in all circumstances (Rafique et al., 2022). It is often implied that people who are able to come up with original and creative solutions for their work frequently possess a personality that motivates them to act and alter their workplace for the better (AlEssa & Durugbo, 2021).

2.2 Pandemic-Induced Job Stress (PIJS)

A person experiences job stress when they believe their capacity to handle the responsibilities of their position is exceeded, creating an unbalanced state (Barak & Travis, 2007). Another name for job stress is occupational stress, which is generally understood to be the pressure an individual feel as a consequence of situations relating to their place of employment (Kumar, Kumar, Aggarwal, & Yeap, 2021). When a person's needs or expectations are not matched by the knowledge, expertise, or other resources that are readily available, there is a strain (Colligan & Higgins, 2006). To maintain both physical and emotional health at work, controlling and lowering job stress is crucial (Padma, et al., 2015); (Kumar et al., 2021). Workplace stress is thought to improve psychological capital toward IWB. Job satisfaction, which rises when job stress rises, is one of the complicated indirect impacts of psychological capital on creativity (Ghafoor & Haar, 2022). A specific amount of pressure that can be handled emotionally as well as physically is regarded as beneficial stress (Anjum & Zhao, 2022). Research on the association between job stress triggered by the COVID-19 pandemic and IWB has not been extensive across the globe (Lovena et al., 2023; Rafique et al., 2022) and these indicate of having a significant negative relationship between PIJS and IWB. The uncertainty and dread surrounding the pandemic, along with the challenges of working from home, have created a unique and stressful circumstance that may affect an employee's capacity for innovation.
Consequently, the following hypothesis is drawn up:

**H1:** There is a relationship between innovative work behavior and pandemic-induced job stress.

**2.3 Transformational Leadership (TL)**

Leadership which concentrates on bringing about a shift in a company's current state is known as transformational leadership. To have a good influence, it includes utilizing a common set of values, expertise, and resources, as well as efficient communication (Bass, 1997). The leader drives followers to put the group's interests ahead of their own and emphasizes the importance of productivity (Suhana et al., 2019). In addition, follower needs like dignity and personal development are considered. This style of leadership inspires subordinates to surpass expectations, do great work, and advance the objectives of the business (Groselj et al., 2020); (Rafique et al., 2022). In recent years, it has drawn more interest and been the focus of several investigations (Sosik & Jung). According to research, transformational leadership has a strong correlation with the accomplishments and actions of followers, which can enhance the success of an organization as a whole (Piccolo & Colquitt, 2006). The link between IWB and TL has been examined in several research papers. Research indicated that TL is commonly seen to have a significantly positive relation with IWB (Li et al., 2020; Rafique, et al., 2022). This in turn highlights the importance of this relation and the lack of research on this in Sri Lankan context needing for additional empirical evidence.

In response to this, the following hypothesis will be tested out in this study:

**H2:** There is a positive relationship between innovative work behavior and transformational leadership.

**2.4 Individual Resilience (IR)**

A key factor in the sustainability and social economic-health progress of people as well as communities is individual resilience (Moya & Goenechea, 2022). Individual resilience is now typically defined as the capacity to bend without collapsing and to survive hardship (American Psychological Association, 2014). Although the American Psychological Association supports this definition, it is also evident that there are many other definitions of resilience from many cultures. For instance, some experts define resilience as a dynamic concept that refers to dealing with stress or adversity or exhibiting a degree of resistance toward environmental risks, whereas others define it as a multi-dimensional quality that differs based on the setting, duration, gender, age, cultural origin, and specific life circumstances (Herrman et al., 2011). Despite the differences in these definitions, two ideas exist in all of them. First off, resilience may not exist in all sectors of life since it may be context- and time-specific. In addition, resilience could be an evolving relationship process that gradually builds up resistance to trauma. Understanding resilience's characteristics is therefore essential for empowering people and communities for addressing obstacles and prosper in the face of distress (Herrman et al., 2011). IR and IWB among employees in numerous businesses and nations have been linked positively by research studies, particularly in the Asian environment. IR and IWB were seen to have a significantly positive relation (Abukhait et al., 2023; Novi & Etikariena, 2022). However, Karimi et al. (2023) did not discover a substantial link between resiliency and IWB. In order to study and comprehend the connection between personal resilience and IWB in various circumstances, further research is required.

As a result, the following hypothesis developed:

**H3:** There is a positive relationship between Individual Resilience and Innovative Work Behavior.
2.5 Knowledge Sharing (KS)

The practice of communicating information, abilities, tacit knowledge, and explicit knowledge among individuals or groups is known as knowledge sharing (Castaneda & Cuellar, 2020). It is essential for fostering cooperation and creativity inside firms and improving problem-solving skills (Anand et al., 2020). Knowledge may be shared through several processes across many different levels, including interpersonal and inter-organizational communication, internalization, and technological advances. (Juhariand & Izhar, 2018). To maintain competitive advantage and productivity, knowledge sharing (KS) practices among coworkers may be fostered through fostering the corporate learning culture (Diab, 2021). Efficient knowledge sharing might face obstacles, such as people being reluctant to share their information out of worry for their job stability or due to a shortage of incentives (Chua et al., 2023). In order to encourage sharing of knowledge, firms should put in place tactics including fostering a friendly and collaborative atmosphere, offering rewards for doing so, and utilizing technology to improve communication and cooperation. TL and KS are seen to have a significant relationship in various time periods and still continues to gain popularity among the field of human resource management. Studies such as Yin et al. (2019) and Son et al. (2020) from the past decade clearly highlight the significant impact that TL has on KS. However, Rawung et al. (2015) demonstrates that there is no relationship between these variables due to the cultural diversity in Indonesia and so, varying organizational culture too. Transformational leadership serves as a potential predictor of knowledge sharing in organizations, especially in the post-pandemic environment.

Thus, this research developed the hypothesis:

H4: There is a positive relationship between Transformational Leadership and Knowledge Sharing.

KS is popularly known to have a significant correlation with IWB over the years as several research scholars like Hassan et al. (2018); Nguyen et al. (2019); Osmanaj et al. (2022); Islam et al. (2022) depict a positively significant relationship on IWB. However, researcher revealed that KS and IWB have no association among them which is surprising and this may be due to the cultural difference, thoughts and perceptions in Polish employees. KS is seen to play a key role in the relations with IWB.

Therefore, the following hypothesis is derived:

H5: There is a positive relationship between Knowledge Sharing and Innovative Work Behavior

The moderation role of KS in the relationship between PIJS and IWB is a research area with limited research and it is seen to be gaining popularity in the recent times. This is evident through the two most recent critical studies by Rafique et al. (2022); and Montani and Staglianò (2021) as these highlight that, KS significantly moderates the correlation between PIJS and IWB in Indonesia, UK and USA based firms. Due to the lack of literature on this novel relationship across the world, further research is needed.

As a result, this develops the hypothesis:

H6: Knowledge Sharing moderates the relationship between Pandemic-Induced Job Stress and Innovative Work Behavior

Numerous researchers identified that KS mediates the relationship between TL and IWB in the world (Aydın & Erkilç, 2020; Suhana et al., 2019; Sudibjo & Prameswari, 2021) but few studies like (Rafique et al., 2022) and (Loven et al., 2023) researched this in a post pandemic work setting. The significance of this mediating link is amplified by this, and the dearth of research in Sri Lanka stresses the need for more study.
Thus, the following hypothesis is formulated:

H7: Knowledge Sharing mediates the relationship between Transformational Leadership and Innovative Work Behavior

2.6 Theoretical Literature

The observational learning component of social cognitive theory emphasizes the idea that the actions of individuals are impacted by both their own thoughts and the external environment around them (Schunk & DiBenedetto, 2023). This theory plays a crucial role in this research study because it predicts and helps in understanding that the academic staff's innovative work practices and actions within Sri Lanka's higher education institutions will be influenced by their individual beliefs concerning innovation in addition to the standards, principles, and conduct seen by their employers and coworkers within their workplace environment. The social cognitive theory may possess the drawback of not entirely accounting for how external factors influence behavior.

However, this weakness may be addressed by the transformational leadership theory, which emphasizes the significant positive effects and transformations that can be brought about in the followers by the leader. This theory explores the best interests of both the leader and the followers are taken care of and action shall be taken taking the interests of the team as a whole into consideration (Lai et al., 2020). Additionally, it is described as an individual who motivates and empowers followers to accomplish exceptional results (Odumeru & Ogbonna, 2013). By offering encouragement, tools, and chances for growth, transformational leaders inspire and motivate their followers to accomplish their objectives. In the context of the Sri Lankan higher educational sector, transformational leadership is a key concept because, the presence of transformational leaders in the institutions especially overlooking their followers who are the academic teaching staff and fostering innovation and creativity will aid in encouraging, motivating and engaging the employees. As a result, this will help to gradually transform disengaged employees to actively engaged employees and therefore boost the innovative work behavior. As always, every theory has its shortcomings and it is seen that the environmental elements like job demands are not taken into consideration and this is where the job-demands and resources model can help to address the influence of environmental components.

An explanation for how job demands, such as having an excessive amount of work or a lack of time to do it, might cause people to experience stress at work is provided by the job-demands and resources model (Bakker et al., 2023). The theory does, however, argue that having the encouragement of their managers and coworkers might lessen this stress. This theory is significant and plays a vital role as it explains how resources like knowledge sharing and transformational leadership will mitigate the adverse effects of stress and how pandemic-induced workplace stress influences academic staff employees’ innovative work practices.

In a nutshell the study gains from combining these three theories to develop a more thorough theoretical framework. Social cognitive theory helps to explore the personal and environmental factors that impact the IWB and consequently, the transformational leadership theory highlights the significant and pivotal role of the leaders in guiding and influence the behavior of their followers. Lastly, the job-demands and resources model may assist in describing the manner in which external variables like occupational stress may influence this behavior and how resources can aid to act as a buffer for these effects. These three theories are incorporated into the research study to provide a deeper understanding of the numerous aspects that affect academic staff's IWB in higher education institutions in Sri Lanka.
3. Discussion

This conceptual framework aims to offer an in-depth understanding for the higher educational institutions in Sri Lanka on the factors influencing the IWB to strategically prepare future improvements for a better nation (Ibrahim et al., 2021).

![Image of Conceptual Framework]

Figure 1. The Conceptual Framework

Additionally, in order to test this conceptual framework, a positivist philosophy with a deductive approach using quantitative data from self-administered questionnaires gathered through stratified random sampling from a target population of 7,004 (UGC Sri Lanka, 2022) and sample size of 365 individuals (Krejcie & Morgan, 1970) where 500 questionnaires will be distributed as an attempt to obtain a good response rate. The results of this study's data analysis tests will help determine whether or not the hypotheses are supported, and they will guarantee the accuracy, reliability, and validity of the research's conclusions.

4. Conclusion

In the post-COVID-19 era, managing pandemic-induced stress and encouraging innovative work behavior are key issues that organizations must struggle with. This research focuses on exploring the causes of IWB Sri Lanka's higher education industry is especially sensitive to low levels of innovation in the academic staff. This study offers insights into how the management of these higher educational institutions and the policy makers of this sector in Sri Lanka will help to manage post pandemic stress, foster innovation and maintain themselves over the long term by looking at the effects of PIJS, TL, and IR on employees’ innovative work behavior through knowledge sharing acting both as a mediator and moderator. The study presented in this paper adds to the theoretical and empirical literature on human resource management, particularly in the context of Sri Lanka.

Acknowledgements

We would like to express our gratitude to the President of Malaysia University of Science and Technology (MUST), Professor Dr. Premkumar Rajagopal, the Dean of the Institute of Postgraduate Studies (IPS), Professor Dr. Geoffrey Williams, and the support team for their invaluable assistance in providing the knowledge, expertise, as well as guidance that made this conceptual paper successful.
References


Diab, Y. (2021). The concept of knowledge sharing in organizations (Studying the personal and organizational factors and their effect on knowledge management). Management Systems, 6(1/2), 91-100.


Determining The Planning Phase Affecting the Project Performance in Libyan Companies

Bin Salim Mohammed Albahloul Almukhtar* & Vijayan Ramasamy b
a,bMalaysia University of Science and Technology, Malaysia
*salim.mohammed@phd.must.edu.my

Abstract: The prevalence of project performance is significantly influenced by the project management techniques. The most significant factors that affect project performance are the project management practices. These practices have a significant impact and influence over project performance levels, and they may be utilized as an effective tool to maintain high levels of company performance. A construction project's planning stage is an important part of the project management process, and it has a big impact on how the project turns out in the end. The project team works to determine the budget, define the project's scope, and develop a timeline for finishing the work during the planning phase. Project management in Libyan companies have been the subject of several research, although few of these studies have focused on project performance inside the Libyan company. There is called for more studies, and further research is required to determine how well project management in Libya is performing. Also, this paper uses the Theory Construction provided theory as its best to investigate the project performance in Libyan companies. This paper offers two kinds of contributions: theoretical and practical. Project management is more than just the way the Libyan firm views it and thinks about it, which has an impact on how well the project is doing. The Theory Construction was used in earlier research to restrict project scope management, budget, and risk management, particularly in the project performance of Libyan companies. The results will thus aid companies in developing strategies that take project performance into account. The conceptual study contrasts just the fundamental concepts and discoveries, necessitating the empirical verification of the suggested framework.

Keywords: project performance, project scope management, budget, and risk management

1. Introduction

Since it is one of the most significant industries, accounting for 5.2% of total local production, the construction industry dominates the economy in the majority of nations, fostering the growth of jobs and wealth for the area (Elsonoki & Yunus, 2020). The construction industry has had tremendous expansion in many nations over the past 40 years, whether in infrastructure or investment projects. Measuring the development of industry in any society is essential for evaluating its success in numerous sectors, including the construction industry (Algwyad & Talib, 2019). Meanwhile, the initiatives ran into a number of difficulties while trying to accomplish their objectives, particularly with infrastructure projects. In the past two decades, research has been established to address these issues, concentrating on specialized technical specialties in project management via coordination, planning, and control to preserve the quality and achieve the best possible resource utilization (Younus et al., 2021).

The development of the Libyan construction industry has been constrained over the past 50 years by a number of challenging issues. These issues include misappropriating project funding, ineffective resource management, ineffective project leaders, and other environmental inconsistencies including the absence of proper metrics and performance analysis to establish if a project is successful or unsuccessful (Alchammari, Ali & Alshammare, 2021; Saleh & Azam 2021). According to Algwyad and Talib (2019), several studies have been undertaken in the context of Libya to define and explain the project performance of the Libyan construction companies. Conduct study on the construction quality in Libya using the city of Tripoli's successful project management. Added research by Saleh and Azam in 2021. emphasized that poor performance in Libyan construction firms is caused by a shortage of materials and the ability of the engineers to carry out the plan's tasks on the job site. In contrast, Abuzbida et al. (2022) state that the primary objective of the study is to assess the critical success factors
that significantly influence the execution and success of the contracting projects in Libya. Due to the
dearth of prior literature in Libyan study on construction companies, the majority of studies done on
Libyan construction companies did not focus on the plan phase of project performance.

Therefore, it is clear that there is a lack of academic and educational techniques or research committed
to training and creating professional phase plans and project performance in Libya for aspiring and
experienced construction project managers. Hence, this study is investigating the Determining the
Planning Phase Affecting the Project Performance in Libyan Companies with the variables of project
scope, budget and risk management to determine the project performance of this paper. Theory of
contractions is used to explain project performance of this paper.

1.1 Libya's Construction Industry

Over the past five decades, there have been a number of developments in the Libyan construction
industry. According to Abdalla et al. (2022), Libya's construction industry had a little economic
influence in the early 1950s, when the nation had just recently attained independence from Italian
colonial authority. During these early years, when one generation may pass on learned construction
skills to another, construction was only seen as a social activity. The construction materials efficiently
communicated the morality and cultural orientation of the inhabitants (Elsonoki & Yunus, 2020). As a
result, there was a noticeable surge in building activity in Libya around this period. In the late 1970s,
the country was recognized as having the highest per-capita use of cement products worldwide
(Algwyad & Talib, 2019).

This degradation in Libya's construction sector has been ongoing for some time. Other variables
influencing construction safety in Libya, notably in Tripoli, include tight competitive tendering
techniques, worker age and experience, a lack of worker training, and management's major focus on
production while ignoring safety problems (Saleh & Azam 2021). Safety is one of the barriers to the
development of Libya's construction sector. The issue should be addressed throughout the route in order
to improve the building sector's safety performance in Tripoli.

According to Elsonoki and Yunus (2020), the building industry is unusual in that it may encourage the
expansion of other industrial sectors. As a result, the development of the construction sector should not
be seen as a distinct entity, but rather as having an impact on national development as a whole. World-
class researchers must be employed in order to identify and address the causes of the construction
industry's failings in terms of cost and time performance. The reasons and remedies for typical failures
seen in the construction sector will be the main topics of this research.

2. Conceptual Literature Review

This paper will review previous literature on project scope, budget, and risk management are
independent variables while project performance is dependent variable.

2.1 Theory of Constraints (TOC)

Goldratt created the TOC in 1984 as a systematic approach to identifying barriers to system
effectiveness and enacting adjustments to overcome them (Goldratt & Cox, 1986). TOC is made up of
several disparate but connected ideas, including logistics, logical thought processes, and performance
assessment methods. To learn information, we follow a set of stages provided by the TOC's logical
thought process, which combines cause-and-effect, experience, and intuition. The theory here covers
the project performance dependent variable (Cox, 2022). The limitations that may otherwise lower the
quality and quantity of the product and services produced must be kept to a minimum for any project to
succeed.
Poor management techniques, such as cost overruns brought on by ineffective planning and corruption, may be among these restrictions. The theory emphasizes the necessity for project management to recognize project limitations that may have an impact on the project’s performance and aims to provide straightforward solutions to the restrictions (Thakkar, 2022). Since this research examines problems that provide obstacles to project success, it serves as a starting point for discussion of this idea.

2.2 Project Performance

According to Abdallah et al. (2022), project success has been linked to both project performance and project objectives. Various metrics have been used to gauge project performance. Project performance was evaluated by Ingle and Mahesh (2022), using the following five criteria. Meeting Design Objectives: Benefits to the end users, the emerging organization, the defense, and the national infrastructure are all factors in determining if a project was successful.

Project performance, according to Abdalla et al. (2022), may be broken down into the following four categories: Project effectiveness, customer impact, business success, and future planning. Using a comprehensive framework, Ingle and Mahesh (2022) established a method for gauging project performance. The following eight project success dimensions make up the framework: cost, environmental performance, quality, user expectations, participants’ satisfaction, time, commercial/profitable value, health and safety. Any program for improving performance must start with performance measurement. Finding performance gaps, enhancing performance possibilities, and creating strategies for ongoing improvement are all beneficial. The construction of a performance measurement baseline and performance reporting are at the core of efficient project management (Ghorbani, 2023). According to Sobieraj and Metelski (2023), performance evaluation is essential for efficient management since without evaluation, improvement is challenging.

Sayyed et al. (2023) claim that the accomplishment of stated goals and the perception and appreciation of the project’s end users and other important stakeholders are the major indicators of overall project success. Meanwhile, the conventional project purpose is linked to the finished product and long-term objectives in the new approach to project performance. Therefore, effective project management practice implementation increased the benefits of project management while also revealing that, in spite of these advantages, project failure rates remained significant.

2.3 Project Scope Management

Project scope management is the process of defining what work is to be done and then making sure that all of that work and only that work are done. Furthermore, project scope management includes the procedures required to ensure that a project strictly embraces only the critical works in order to successfully complete the project and achieve its goals and objectives (Al Rubaiei et al., 2022). Project scope management involves planning, creation of work breakdown structure, validation, verification and control of project scope to determine the project performance.

Many scholars in the project management field for many years have focused in studying project success factors (Abdilahi et al., 2020; Alwaly & Alawi, 2020). However, the area of scope management still requires further exploration and investigations. Therefore, almost all project methodologies consider the scope management a fundamental element or tool to understand the phase plan of project performance (Abdilahi et al., 2020). Project scope management process contains the procedures which confirm that project will be completed as planned and intended if it is only comprises the required work. Moreover, defining and controlling the main components of project scope as one package used to fulfill the main purpose of the project. So, it is a comprehensive formulation of a continuous and systematic approach to be used during the execution phase of a project to complete the project objectives and accomplish the driving project performance (Alwaly & Alawi, 2020).
Hence, Ajmal et al. (2022) sought to determine how project scope management challenges influences project deliverables. The research was carried out using a mixed method. Data was collected using questionnaires. Findings revealed that the project team leaders developed a well-defined project plan that reflected stakeholder anticipations and acknowledged their opinions without interfering with the objectives of the project which hence the significance relationship between the project scope management and project performance. Similarly, Al Rubaie et al., (2022) studied the nexus between scope definition and performance of development projects. The study employed mixed methods. 12 projects were sampled using purposive sampling. Interview schedules and questionnaires were used to obtain data. Results showed that there was a significant correlation between scope definition and project Successful. Well-defined projects recorded good performance.

Therefore, this paper has summarized the project scope management process and how this task has been viewed form difference methods prospective. Project management is a dynamic business method and standards, but the project scope part has to be frozen at the beginning of the project to accomplish the project performance effectively.

2.4 Budget

Estimating an accurate project budget is challenging for project managers, because of the unpredictable risks concerning how big the impacts on construction project results are and when it will occur. Furthermore, budget estimation is conducted during the planning phase (Kwon & Kang, 2019; Susilowati et al., 2022), which is an early stage of the project life cycle, when there is a lack of data and information. Project managers need a budget estimation method to respond to risks as accurately and precisely as possible in order to prevent cost overruns.

Previous researchers have presented several methods to estimate cost reserves but those are not sufficient in order to improve the project performance. One method is the traditional percentage model by Moselhi (1997), which is arbitrary and difficult to justify or defend (Thomson & Perry, 1992); the other method is Monte Carlo simulations (Welde & Klakegg, 2022); and a third method is the regression model (Lee et al., 2020). These models are used for estimating total project costs and are powerful statistical tools used for analytical and predictive purposes in forecasting the total final cost of the project.

Moreover, Heravi et al. (2022) conducted a feature analysis and principal component analysis based on 24 different factors that influence project cost estimation in the construction industry. Example features are site constraints, availability and supplies of labour and materials, likely production time, and off or on-site operations sequencing. While the cost factors that are proposed by Matel et al. (2022) are not all relevant for the cost estimation of engineering services, other studies provide information about the relevant factors for engineering services. Unegbu et al. (2022) adopted a probabilistic estimating approach for cost estimation of engineering services within the energy and chemical industry. They proposed a set of features that are relevant for cost estimation of engineering services. Features that are distinguished in this research are for example the quality of information, scale of work, amount of work-sharing, and project team experience.

2.5 Risk Management

Risk management is critical to attaining project goals owing to the complexity of construction projects, which include a plethora of hazards affecting a variety of stakeholders (Kallow et al., 2022). The aims of project risk management are to exploit the possibility and effect of good occurrences and to reduce the probability and influence of negative events (Dixit, 2022). Thus, project risk management would enhance project performance by ensuring that project objectives are met and by seeking chances to maximize positive effects on goals. Risk is a random incidence or condition that, if it occurs, has an influence on one or more project goals either positively or negatively (Bahamid et al., 2022).
In the context of construction management, risk management refers to a detailed and systematic method for determining, assessing, and mitigating risks to accomplish project objectives (Bahamid et al., 2022). Wideman et al. (2022) described risk management as the systematic method of recognizing, assessing, and reacting to project risk, which involves increasing and decreasing the likelihood and effects of positive and negative qualities, respectively. Shayan et al. (2022) also described risk management as a planned and proactive approach aimed at minimizing the chance for unsatisfactory outcomes throughout the many phases of a construction project, including design, construction, and operation.

Within organizations, the project performance technique now in use does not effectively support the growing need for risk management (Dixit, 2022). As a consequence, many projects require risk management procedures (Karimi & Yahyazade, 2022; Strang & Vajjhala, 2022; Wideman, 2022). Risk management that is effective must be more dynamic to determine the project performance. Previous studies showed the significance relationship between the risk management phase plan to determine the project performance. Therefore, risk management can determine the performance of the project when the contractors were managing the risk aspect of the project will lead to an increase in the project performance positively.

3. Conclusion

In several areas, our modern period is seeing rivalry and progress. One of the most significant sectors is industry, whose assessment is a crucial factor in determining the diversity of industries, including the construction industry, and the growth of any civilization. There has been a noticeable increase in Libya during the past forty years, whether it is in infrastructure or investment projects (Elsonoki & Yunus, 2020). Despite the crucial role that construction projects play in our nation, they frequently face obstacles that prevent them from achieving their goals at different stages, which causes them to fall short of finishing those stages in a variety of ways.

The delay in completing a project stage or the project's overall completion, however, is the most significant of them. To increase project performance, the research suggests setting up an experienced team that will select the best site for projects while taking into account all risks before finalizing the implementation contracts. Television ads and educational programs can help people understand the significance of building projects. They are one of the most significant businesses that boost the national economy because of the income and employment they provide to the nation.

It is advised that other performance measures recently produced in other research efforts such as benefit to end users and benefit to national infrastructure) be incorporated for measurement in future study. Thus, the initiatives need not always be centered on organizations. As a result, a predictive model for identifying project management strategies that encourage improved project performance as well as those that contribute to subpar project performance should be developed.

References


Wideman, R. M. (2022). *Project and program risk management a guide to managing project risks and opportunities.* Project Management Institute, Inc.

The Moderating Role of Social Media Capability in the Relationship between Interactivity, Reliability, and Technical Knowledge with Customer Purchase Intention in Non-Life Insurance in Vietnam

Xuan-Nhi Nguyen* & Anh-Quoc Truong
Faculty of Business Administration, Nguyen Tat Thanh University, Vietnam
 nxnhi@ntt.edu.vn

Abstract: This paper investigates factors affecting individual customers' online purchasing intention in the context of non-life insurance industry in Vietnam. It significantly examines the moderating role of social media capability in the relationship between these factors and online purchasing intention. The study used a mixed-methods and multi-study approach, including qualitative in-depth interviews, and quantitative by using the software SPSS 22 for regression analysis with 550 individual consumers in Vietnam. The findings suggest that interaction quality is crucial in B2C service provision and that social media capability should not come at the expense of effective human interaction and personal service. The practical implications include recommendations for practitioners to consider investing in social media capability, guidelines for improvement in reliability, interactivity, and technical knowledge to enhance the customer’s online purchase intention, especially in the context of high-involvement insurance services.

Keywords: social media capability, interactivity, reliability, technical knowledge, customer purchase intention, insurance

1. Introduction

1.1 Role of Social Media in E-commerce

In the fast-paced world, the development of social media and the Internet of Things refers to living in a culture of instant fulfillment and gratification with instantaneous service. The adoption of digital technology is increasing tremendously and is being embraced as an integral customer service tool. Technological developments have introduced significant changes to the way in which organizations interact with existing and prospective customers. Social media and social network platforms have led to the development of new business models in e-commerce and digitized the consumer decision journey. Social interaction is considered a prerequisite for successful social commerce since consumers now expect an interactive and social experience while making purchase decisions. As information regarding society develops, differences emerge in the purposes of technology use and perceptions among users, this is because learned behavioural models are dependent on the cultural contexts of living (Wallace et al., 2013; Shin, 2012). The growth of Vietnam's insurance market in 2021 is 16.71% compared to the same period in 2020, but the scale is still small compared to the potential. The ratio of insurance premium revenue to GDP is currently only 3.07%. It is lower than the average of Asia (5.37%) and the world (6.3%)1. The penetration in the insurance market is very low. This is why the author studies the customer's behaviour of what makes them hesitate to buy insurance. Social network penetration worldwide is ever-increasing. Social networks not only enable users to communicate beyond local or social boundaries but also offer possibilities to share user-generated content like photos and videos and features such as social games. Mobile applications, online services, e-government, and social media have gained ground as contact interfaces for daily-use services, meaning that all citizens must have a minimum ability to use computer-related devices, a powerful impact on firms' performance.
As consumers, are strongly affected by the surrounding technological environment (de Faultrier et al., 2014; Thaichon, 2017). This is an important issue in the e-tailing environment, especially as technology constantly evolves and is dramatically altering the relationship between retailers and consumers (Cuesta-Valino et al., 2022; Elms et al., 2016; Lee et al., 2011; Lissitsa & Kol, 2016).

1.2 Importance of Online Purchase

Social commerce is defined as "exchange-related activities that occur in, or are influenced by, an individual's social network in computer-mediated social environments, where the activities correspond to the need recognition, pre-purchase, purchase, and post-purchase stages of a focal exchange" (Mainardes et al., 2023). Social commerce is thus a combination of shopping and social networking activities that support social interaction activities in the buying and selling of products and services in online settings (Cuesta-Valino et al., 2022; Gao et al., 2012). Although interest in social commerce has begun to attract some academic attention, it has not yet generated a rich body of literature in this research stream.

Many studies of social commerce have discussed the new design features of social commerce and how they are designed to facilitate consumer interaction and engagement and tailor consumers' decision-making processes (Curty & Zhang, 2013; Gao et al., 2012; Hajli, 2015; Pop et al., 2023). Our review suggests that specific design features of social commerce could play a critical role in enhancing consumer participation. Hajli (2015) highlights that specific social commerce features such as recommendations, referral mechanisms, ratings, and reviews all generate valuable information that strongly influence customer behaviour and purchasing decisions. Curty and Zhang (2013) conducted a historical analysis of actual e-commerce websites and found that website technical features regarding transactional, relational and social emphases have reshaped companies' business and marketing strategies, specifically strengthening customer and merchant ties through relational features. Noh et al., (2013) indicate that individuals' perceived usefulness and perceived ease of use predict individuals' intention to engage in social commerce, though the inclusion of price consciousness acts as a moderating variable. These studies agree that social commerce, along with its technical features and applications, allows consumers to establish new social relationships on social media platforms that not only help them collect useful product information but also reassure them that they are making a sound decision when purchasing a product.

Going beyond an emphasis on social commerce features, a growing number of studies borrowing theories from the psychology field argue that consumers' social influences are positively the key to the success of social commerce (Hajli, 2014; Hajli et al., 2015; Liang et al., 2011; Zhang et al., 2014). Liang et al. (2012) indicate that online customers choose to purchase products as they acquire social support and sound relationship quality from others. Similarly, building on the stimulus-organism-response paradigm model, Zhang et al. (2014) reveal that factors related to technological environmental features of social commerce would significantly affect customers' social influences (social support, social presence, and flow), and these influences boost their intention to use social commerce sites in return. These studies highlight that social influence could be the significant determinant of the consumer's decision to purchase a product or service provided by social commerce sites (Pop et al., 2023).

1.3 Importance of Insurance to the Economy

In the context of an emerging market such as Vietnam, development opportunities for the insurance market are considered to be great in the coming years as Vietnam has a large population and consequently, the potential demographic for insurance, income, and per capita savings will increase. The growth of Vietnam's insurance market in 2021 is 16.71% compared to the same period in 2020, but the scale is still small compared to the potential. The ratio of insurance premium revenue to GDP is currently only 3.07%. It is lower than the average of Asia (5.37%) and the world (6.3%)[2]. The penetration in the insurance market is very low. This is why the author studies the customer's behaviour of what makes them hesitate to buy insurance. Businesses are also increasingly interested in buying insurance in areas such as fire insurance, property risk, business interruption, cargo transportation, and
other areas. Since the insurance industry has made significant strides and if developed in the right direction, it will contribute positively to the industrialization and modernization of the country.

Since 2015, the Vietnamese government has pushed the development of e-government to the top of six national priorities. This pressures large insurance companies to adopt digital technology into their operations to enhance service quality, especially in large accounts of multinational clients. The technologies being adopted include the latest development from cloud-based software, apps, automation, and mobile phone-based communication technology referred to as InsurTech - a comprehensive all-in-one technological-centred service model. InsurTech disrupts the traditional business model of incumbents developing innovative customer value propositions being able to attract and engage clients. For example, full digital distribution of insurance products is enabled. Most often, InsurTech enables the value chain of incumbent insurers offering innovative technologies and solutions to improve operational efficiency; InsurTech are early adopters of innovative technologies and apply them to the insurance business, productize their solution, and offer it to insurance incumbents often creating the needs and the demand for a specific technology that insurance providers did not previously perceive. Regardless, the InsurTech challenge is (and must be) improving the experience via a user-centric approach. InsurTechs improve customer centricity by developing new customer value propositions and products that simplify the clients’ user experience in a sector.

With the emergence of readily accessible information, digital technology focused on improving the experience could improve the purchasing journey of a customer, this local focus widened and allowed for 24/7 active comparison and competition, for example via direct online sales or price comparison sites. Technology supports underwriters during risk valuation or helps loss adjusters in assessing the said loss. Furthermore, the insurance industry is changing due to technology, market, and regulatory factors. The processes of insurance products and business models are reshaped by rapid technological advances in large-scale data, cloud computing, and the Internet of Things. At the same time, consumers have become accustomed to the convenience, personalization, simplicity, and speed of interacting digitally via social media services and mobile applications offered by players such as Amazon, Airbnb, Facebook, Google, and Uber. As a result, consumers increasingly expect insurance companies to offer digital services with compelling user interfaces and experiences. The challenges for the insurance industry will be the flexibility to adapt to new technology, new customer demands, and unprecedented (external) ecosystems and platforms for an intangible product like insurance. An increasing number of insurers are investing in building digital infrastructure and striving for growth by developing new digital platform business models. However, insurers are yet to fully capitalise upon the transformative power of digital technology, and many are still struggling to develop digital strategies that align with their business objectives. The insurance industry recognizes the need to overhaul what might now be less relevant to traditional business models in order to capitalize on the advantages of digital technology and respond to the challenges of digital disruption. This will also be the case for complex and individual insurance, as traditional impact balancing and personal predetermination will be challenged.

1.4 Role of Social Media in the Insurance Industry

Digital innovation in insurance enables insurers to reduce costs and increase efficiency and profit margins. In modern conditions, it is concluded that the most important result of digitalization is the automation of services, the latest discoveries that operate on new principles. Similar mechanisms will occur in the insurance (sales) industry. In a world where the terms "online"/"cloud" are commonplace for the consumer; intermediation is now based on internal, social media profiling; automated recognition of needs; and guided, short, and simple customer data input. The ease of purchase (and cancellation) of products, direct- and event-based sales, and finally, an automated real-time, traceable claims process will all substitute the traditional broker.

This study is formulated with the following objectives: (1) To investigate factors affecting the online purchase intention of individual customers in Vietnam; (2) To measure the degree of effect that each above factor have on the online purchase intention; and (3) To give implications to insurance companies in Vietnam to improve the service quality to enhancing customer’s online purchase intention.
2. Theoretical Background and Hypotheses Development

2.1 Resource-based View

The resource-based view (RBV) of the firm is a theory that Wernerfelt (1984) laid the first groundwork for in order to describe strategies involving the specific capabilities and the heterogeneity of competencies possessed by a business. Over the last three decades, these views have been perceived as a precondition for the development of management strategies. RBV is one of the theories based on the idea of using resources to explain the causes of the competitive advantages of some companies which help them to outperform their competitors. The concept of resources to create a competitive advantage is analyzed via four aspects, including valuable, rarity, imperfectly imitability, and the firm's organization (VRIO). However, a resource does result in a company obtaining a competitive advantage if the same advantage is also owned by others. Therefore, resources need to be rare, meaning that these resources are dominated by a limited number of companies (Barney & Hesterly, 2012). The mass exploitation of a valuable resource can lead to the appearance of competition. The temporary competitive advantage of an enterprise is achieved only when the resource is valuable, rare, and imperfect. A resource is imperfectly imitable if it is costly and difficult for an enterprise without that resource to copy or develop the same competencies from another business with that competitive advantage (Barney & Hesterly 2012). A company that has gained valuable, rare and unimaginable resources can also lose its competitive advantage due to poor management and lack of professionalism. Barney (1991) divided resources into three categories: physical capital resources, human capital resources, and organizational capital, which all correspond to a number of concepts in this study, including interpersonal skills, technology, premium, technical skills, reliability, reputation, and risk coverage. For general insurance as a service industry, it is far more difficult to distinguish services or products and to stand out among comparable firms within the manufacturing industry. This shows the high applicability of the BRV theory in the service market, which can be used to increase competitive advantage, particularly in the general insurance sector.

According to RBV literature, organizational capabilities are identified as core determinants for business performance and achieving a competitive advantage (Wong & Karia, 2010). The resource-based view suggests that inter-firm capabilities such as technology, marketing, and operational capabilities have all been seen as key elements to organizational success (Barney, 2001). The resource-based view (RBV) has also been used in value co-creation and co-production studies (Zhang et al., 2015). The RBV seems to be a promising way to at least partially inform researchers about studying the resources and capabilities needed for value co-creation. For instance, Zhang et al. (2015) demonstrated how innovation, marketing, and networking capabilities contribute to value co-creation. Den Hertog et al. (2010) utilized the dynamic capability view to conceptualize six service innovation capabilities: signaling user needs and technological options, conceptualizing, bundling, co-producing and orchestrating, scaling and stretching, learning and adapting. Additionally, Kohtamäki and Partanen (2016) used relationship learning to study co-production in supplier-customer relationships.

2.2 Factors Influencing Customer Online Purchase Intention

2.2.1 Social Media Capability Influencing Customer Online Purchase Intention

Empirical evidence has recently emerged showing that brands investing in developing a social media community with a dedicated fan base can significantly strengthen customer-firm relationships that lead to a definitive impact on the firm's revenues and profits (Susanto et al., 2023). Social media capability facilitates the acquisition of information from the market and the information conveyance of a firm to the potential, which gives organizations the ability to generate valuable insights from collecting new types and volumes of data in ways that were not previously economically viable' (Nunan & Di Domenico, 2013). This capability supports the firm to manage information better and facilitates the exchange of information between a firm and its customers, providing the firm with constantly connected tools to leverage communication with its customers via attempting to engage customers where they naturally spend their time (Wang et al., 2017). Thus, it enables customers' knowledge exploration and
enhances customers' interest, increasing their purchase intention. Hence, it is rational to hypothesize that:

H1: Social media capability is positively associated with customer purchase intention in e-commerce.

2.2.2 Interactivity Influencing Customer Purchase Intention

Voss et al. (2010) argued that the interaction effect, which includes substitutes and complements, may alter the original relationship. Thus, substitute interactions with respect to intention suggest that the intention will be increased by allocating resources to either one variable or to its substitute, depending on the marginal return for the respective initiatives. Conversely, two variables may interact as complements, which means that the marginal benefit of one variable increases as the level of the other variable increases. Thus, a complementary interaction reinforces the original effect on the results (Mao et al., 2012). In other words, complementary interactions with respect to intention suggest that the intention will be increased by investing simultaneously in both the variable and the components. Therefore, the interaction effect may differ from the effect of the causal relationships on the intention. As such, to achieve a better understanding of the factors influencing customer purchase intention, the interaction effect cannot be ignored.

Interaction in social media is a much more attractive forum in which information can be presented in various forms, such as the sharing of experiences, jokes, videos, and comments from friends. Bi et al. (2019) found that customer satisfaction was positively related to providing feedback and recommendations and helping other customers. Forums for sharing information and experiences can shape consumer perceptions of the product or service offered by business organizations. Social media sites such as Facebook and Twitter allow users to follow their favourite brands and to comment or post questions related to related products or services (Hassan et al., 2015). It is argued that consumers who are satisfied with the brand's mobile social media consumption experience will be likely to exhibit positive customer engagement behavioural intentions.

Interactivity is a complex construct, and its importance has been well-recognized in practices, as highlighted by the quote (Hunter et al., 2019). The exchange of information can lead to increased pleasure and affinity of customers. Effective customer communication presents potential consumers with the display of product information that is appropriate for their specific needs an example of this is how “engagement advertising allows users to opt to view an advertisement” (Cowan et al., 2018). Consumers are motivated to acquire information that is relevant to their purchasing decisions. One such method of gathering this information is via the use of 'Online community content - reviews from experts and from other shoppers provide far better information than traditional advertising.

Interactivity facilitates customers to participate in the process of exchanging information and learning about products and services. Effective engagement allows customers to start and end a conversation at any time and provide useful feedback to improve the quality of customer relationships. Through this favorable interaction, customers have the intention to buy insurance (Liu et al., 2021). Thus, we propose that:

H2: Interactivity is positively associated with customer purchase intention in e-commerce.

2.2.3 Technical Knowledge Influencing Customer Purchase Intention

The research of Riley et al. (2018) emphasized that the technical knowledge of employees are assets that should be treasured by professional services providers. Technical knowledge contributes to the fulfillment of technical aspects. Despite this research, there has been an overall lack of study in this area. Furthermore, the lack of research in this area is reflected in 'technical knowledge' lacking a concrete and standardized definition, and, instead, the term is commonly understood to be specialized knowledge (Brady & Cronin, 2001).
Technical knowledge can leverage the ability of a firm to acquire and manage its customer data and convert that information into a useful application. This source of knowledge also enables consumers to be more absorbed in their interactions with the platform in e-commerce, allowing them to have a better active involvement with more positive feeling states. Therefore, it can be inferred that by bringing about positive outcomes in consumers’ internal processes, technical knowledge can facilitate customer purchase intention in the digital era (Ghahtarani et al., 2020). From this discussion, the study can expect that:

H4: Technical knowledge is positively associated with customer purchase intention in e-commerce.

2.2.4 Reliability Influencing Customer Online Purchase Intention

Reliability is the ability to perform the promised service dependably and accurately (Gunawardane, 2011; Hamilton, 2020). Numerous techniques exist for assessing the reliability of institutions (insurance companies, banks, enterprises): voting assessment, point assessment of reliability and financial statement, techniques of bankruptcy probability and the assessment reliability of insurance companies are connected with the probability characteristic of activities undertaken by insurance companies. Reliability is able to be proven by the repeat of purchasing non-life insurance services, which relied on the quality of service in the period of time. The customer only buys trust – or a promise of trust when times are hard. This tempts intermediaries to sell insurance using the tactics of fear and commoditization. Insurance is a relationship and the promise for the performance in the future, which would be returned for present monetary consideration, and the policy is the promise that unpredictable problem that occurs to the customer would be covered and return the money for the damage (Damtew & Pagidimarri, 2013). Reliability is more essential for the insurance company than any other type of business because the insurance company is selling a promise (Ćurčić et al., 2019). That is the promise of real people serving real people. It is the promise of human connectedness. It is the promise of personal advice and personal advocacy. Ali and Anwar (2021) research reveals the psychology behind the modern insurance consumer's purchasing decision.

Reliability is the heart of service marketing excellence. It is paramount to service customers. It is common that customers are concerned whether a firm performs the service right the first time, whether the firm lives up to its promises, whether they feel safe in their transactions with the firm, and whether the employees show a sincere interest in solving their problems; as highlighted by the customers’ statement want higher levels of reliability and are willing to pay for it (Yang et al., 2020). We thus hypothesize the following relationship.

H6: Reliability is positively associated with customer purchase intention in e-commerce.

2.3 The Role of Social Media Capability in the Relationship Between Customer Purchase Intention and Service Quality (Interactivity, Reliability, and Technical Knowledge)

The marketing communications medium has evolved from print and electronic media to social media in cyberspace. Consumers in the new millennium are changing interest to shopping online and finding information through social media before making purchase decisions. This trend shows that consumers tend to trust their friends and contacts in social media over the ads displayed by business organizations (Mustacchi, 2021).

Our research states that social media capabilities can act as the moderating variable as they have an effect on the variables of interactivity, reliability, and technical knowledge. Kurdi et al. (2022) said that social media capabilities affect online purchase intentions. Furthermore, technical knowledge, reliability, and interactivity were promoted due to the influence of social media, which resulted in a greater deal of communication between the organization's staff members and customers. The hypotheses are proposed as follows:
H3: Social medial capabilities significantly moderate the relationship between interactivity and online purchase intentions.

H5: Social medial capabilities significantly moderate the relationship between technical knowledge and online purchase intentions.

H7: Social medial capabilities significantly moderate the relationship between reliability and online purchase intentions.

Based on the previous studies and the results collected from the findings of the qualitative research, the author proposes the conceptual model of this study (as described in Figure 1), which includes four independent variables (Interactivity, Social Media Capability, Technical Knowledge, and Reliability) and one dependent variable (Online Purchase Intention) with moderating variable (Social Media Capability).

3. **Research Methodology**

The research sets in the context of insurance services in multinational organizations operating in Vietnam. Using a qualitative and quantitative mixed methods approach, this paper is based on individual customers’ opinions and the results of regression analysis.

Study 1 is a qualitative study using in-depth interviews of 9 individual customers in Vietnam that are based on convenience to explore the customers’ perception of service quality and the role of social media in their experience with insurance services. So, the finding from Study 1 explores factors: Social media capability, interactivity, reliability, and technical knowledge affecting customer purchase intention in the context of non-life insurance.

In study 2, a sample of customers was used to empirically test the proposed model by the following steps in the research design.

3.1 **Data Collection and Sample**

The data were collected from all cities in Vietnam from June to May 2022. The respondents are online customers to have the intention to buy insurance from 18-30 years old because young customers may be more familiar with and easier to use mobile devices and modern technology. According to Hair et
al. (2013), the sample size (n) should be 600 respondents when the population is higher than one million or/and the population is unknown (with 95% confidence level and a 5% error). After eliminating some questionnaires in which were uncompleted or were not fulfill the criteria of this research. Five hundred fifty completed surveys were accepted to utilize for deep-diving for research findings.

3.2 Descriptive Statistical Analysis

The descriptive statistical analysis of the sample of 550 respondents is illustrated. In particular, 60% of respondents are female, and 40% are male. In terms of age distribution, the proportions are 29.3% and 70.7%, which included 18–25-year-olds and 26-30-year-olds, respectively. The primary marital statuses are married (47%), single (35%), and in a relationship (18%). Respondents who are office staff accounted for the highest percentage (37%), followed by those of lecturers (29%), students (30%), and housewives (4%). For personal income per month, the two highest positions are more than 15 million VND (43%), from 10 million VND to 15 million VND (37%).

3.3 Measurement Scales

The scale of Social Media Capability was modified and adapted from Dennis et al., (2008), which includes five items: transmission velocity (1), parallelism (2), symbol sets (3), rehearse ability (4), and re-process ability (5). Interactivity was measured by following Ding et al. (2010) with four items. Technical skills were encountered by Rentz et al. (2002) through 6 items. Besides, nominal scale is used in general questions, such as gender, age, and occupation. In addition, Likert scale is also applied in this research. According to Ghiselli (1955) and Guilford et al. (1955), size of scale should be established grounded on the situation. The scale might not be too large it was hard for all respondents to identify their answers. Similarly, the scale might not be too small otherwise, it was very hard to distinguish among answers. As a result, a scale of seven points was applied in the shown survey. Most statements with a seven-point Likert scale corresponding to "1 = strongly disagree or dissatisfaction" up to "7 = strongly agree or satisfaction".

4. Data Analysis

4.1 Reliability of Scales and Factor Analysis

The analysis was applied using SPSS Version 22 by certain steps. Firstly, to have a contextual understanding of collected data, descriptive statistics are a beneficial technique to discover by taking a look at maximum, minimum, mean, and standard deviation (SD) systematically for characterizing gathered data. For the sample of 550 customers, the mean and SD of independent variables were listed as follows: social media capabilities (4.86; 1.41), interactivity (5.13; 1.39), technical knowledge (5.11; 1.23), and reliability (5.2; 1.17). Obviously, the results of descriptive statistics of independent variables received high agreement from respondents. For the dependent variable, online purchase intention, the value of mean and SD also were recorded as 5.12 and 1.21, respectively.

Secondly, this study uses Cronbach Alpha (α) for measuring the internal consistency of measurement scale and acceptable value is greater than 0.6 (Hair et al.,1998). The Cronbach's alpha was shown in order: capabilities (α: 0.89), interactivity (α: 0.918), technical knowledge (α: 8.91), reliability (α: 0.868), and online purchase intention(α: 0.871). Correspondingly, by a reliability analysis, the Cronbach's Alpha values for all variables were higher than 0.8, and this means that the measurement scales were well-designed and well-structured in this study. Moreover, validity and reliability were also determined by various methods. First of all, content validity was guaranteed by the selection of survey items for fundamental constructs through an extant literature review. The selected measurement scale had formerly been confirmed by different researchers across several areas and contexts. This technique was helpful to ensure content validity. Second, the face validity was practiced by a small pilot test, using 120 respondents was appropriate for the target population of this study, and some errors and modifications in spelling and translation would be corrected to ensure face validity. Besides
Cronbach Alpha (α) for measuring internal consistency, composite reliability (CR) was also applied; the acceptable value was above 0.7 (Nunnally, 1978), and the average variance extracted (AVE) must be greater than 0.5 as well as lower than their corresponding CR value (Fornell & Larcker, 1981).

Thirdly, exploratory factor analysis (EFA) is a factor-analyzing technique whose overarching goal is to identify the underlying relationships between measured variables. It is commonly used by researchers when developing a scale and serves to identify a set of latent constructs underlying a battery of measured variables. EFA assumes that any indicator/measured variable may be associated with any factor. An exploratory factor analysis of service quality items was first carried out, whereby data from the first survey was used to extract the dimensions of service quality. Variables with cross-loadings and communality scores below 0.50 were removed (Hair et al., 1998). In this study, the exploratory factor analysis procedure was applied twice, once for the dependent variable, which included six items, once for the group of independent variables, which included 27 items and both procedures were performed to refine the measurement and principal components with varimax rotation method were applied (Lin et al., 2003). All items had a factor loading ≥ .5. For the dependent variable, the KMO index was at .830 > .5, and the significance of Bartlett's test was at .000 < .05, which shows that the data for the dependent variable was appropriate for factor analysis. The eigenvalues of the extracted component were at 3.383, satisfying the requirement of being greater than 1, and the total variance explained was more than 63.962% of the total variance, satisfying the requirement of being greater than 50%. For the group of independent variables, the KMO index was at .924 > .5, and the significance of Bartlett's test was at .000 < .05; this indicates that the data of the independent variables was appropriate for factor analysis. Four components were extracted, which corresponded respectively to the concepts of social media, interaction quality, technical knowledge, and reliability in the research model. The eigenvalues of all extracted components were greater than 1, and the total variance explained was more than 64.68% of the total variance, satisfying the requirement of being greater than 50%.

4.2 Hypotheses Testing

Regression analysis was employed to test the hypotheses through a conceptual model. There was not found out that the impact of multicollinearity was considerable, as the highest Variance Inflation Factor (VIF) touched the level of 1.987 (Hair, 1998). The validation of conceptual model in comparing with R2 and adjusted R2 rejected the possibility of overfitting in a sample as well as the change between these two features was minimal (0.318 vs. 0.313). A conceptual model can explain 31.8% of the variability of online purchase intention. The P-value of the whole sub-model is < 0.0001, which ideas to the statistical significance (the required p-value is < 0.05)

Online purchase intention was found to be associated with social media capabilities and technical knowledge, whereas there was no interrelation between reliability and interactivity to online purchase intention. Hypothesis 1 is not supported (β = .074, t = 1.772, and p = .077), suggesting that applying social media functions to service has a not positive impact on customers’ online purchase intention. In other words, as the main effect, the higher the level of social media functions applied to the current service would not influence the more sophisticated the technology and the higher the value of intention by customers for their purchasing decision. Hypothesis 2 is supported (β = .183, t = 4.334, and p = .000), suggesting that interactive quality as the main effect has a significant impact on customers' online purchase intention. Hypothesis 4 is supported (β = .220, t = 4.05, and p = .000), suggesting that the technical knowledge of the service has a significant impact on customers' online purchase intention. Hypothesis 6 is supported (β = .305, t = 5.245, and p = .000), suggesting that the quality of reliability has a significant impact on customers' online purchase intention (see Table 1). The regression equation can be written as follow:

\[ OPI = 0.183 \text{ITR} + 0.22 \text{TEK} + 0.305 \text{RELT} \]

Where OPI=Online purchase intention, ITR- Interactivity, TEK- Technical knowledge, RELT- Reliability.
This research objective also suggested a moderating role of social media capabilities on the relationship between interactivity, technical knowledge, and reliability to online purchase intention. Hypothesis 3 is also supported ($\beta = .183$, $t = 2.164$, and $p = .031$), suggesting that interactivity may help to lessen the positive impact that complicated social media function has on customers’ intention of online purchase. Hypothesis 5 is also supported ($\beta = .289$, $t = 2.583$, and $p = .010$), suggesting that the moderating effect of social media capability is significant in the relationship between technical knowledge and customers’ online purchase intention. Last, Hypothesis 7 is not supported ($\beta = .182$, $t = 1.716$, and $p = .087$), suggesting that the moderating effect of social media capability is non-significant in the relationship between reliability and customers’ online purchase intention (see Table 1). The regression equation can be written under moderating impact of social media capabilities:

$$OPI = 0.183 \times ITR + 0.289 \times TEK$$

### Table 1. Result of Regression Analysis with the Moderating Role of Social Media Capabilities

<table>
<thead>
<tr>
<th>Without the moderating role of social media capabilities</th>
<th>Moderating role by social media capabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypothesis</td>
<td>Beta</td>
</tr>
<tr>
<td>SMCAP $\rightarrow$ OPI</td>
<td>0.074</td>
</tr>
<tr>
<td>ITR $\rightarrow$ OPI</td>
<td>0.183</td>
</tr>
<tr>
<td>TEK $\rightarrow$ OPI</td>
<td>0.22</td>
</tr>
<tr>
<td>RELT $\rightarrow$ OPI</td>
<td>0.305</td>
</tr>
</tbody>
</table>

Where: $OPI$-Online purchase intention, $ITR$- Interactivity, $TEK$- Technical knowledge

### 5. Discussion and Conclusion

In current insurance sector, aim to characterize for online purchase intention, this study explored degree of efficiency of antecedents' effect on purchase intention in e-commerce. These antecedents statistically demonstrated their influences to customer’s intentions in this service sector, as well as were fluctuated purposely when social media moderated on them.

This study aimed to form a research model about the Vietnam insurance service sector and quantify the relations between online purchase intention, social media capabilities, interactivity, technical knowledge, and reliability. As a result, interactivity, technical knowledge, and reliability had positive relationships to customer’s online purchase intention whereas social capabilities had no direct impact (see Table 1).

Reliability had the most influence on the customer’s online purchase intention in the insurance sector (beta 0.305). Meanwhile, technical knowledge was the second order in conduct to the customer’s intention (beta 0.22), and the last order was interactivity (beta 0.183).

As a moderating role of Social Media capability in the research model, social media capabilities played a role in moderating the intensity of the relationship among customers’ online purchasing intention, interactivity, and technical knowledge. In detail, a moderating role of social media capabilities enhances the intensity of influence of technical knowledge to customer’s intention (from beta 0.22 without role-play of social media capability (SMCAP) to beta 0.289 with role-play of Social Media capability (SMCAP).
6. Implications

The study fills a significant gap in the services marketing literature, where the use of social media function is taken for granted, and firms operate under the assumption that adding technology will always enhance customers' perceptions of service value. Additionally, this paper reveals significant practical implications:

First, even though this study is industry-specific, the results suggest that managers operating in other industries in which multiple employee groups interact with customers also need to identify the key employee groups that are in direct contact with and so contribute to customers' experiences and perceptions.

Second, the findings from this research demonstrate how important it is for managers to identify their key performers and equip them with the skills and attributes needed to continue performing well. Third, the findings may help managers to understand the nuances in customers' perceptions of firms' various products and services, thus helping them make better decisions in resource allocation in their aim of achieving competitive advantage.

7. Limitations and Future Research

Along with these findings, this study contains certain limitations. First, a bias may exist because of the sample representativeness from an online survey (Wu, 2013). Second, the paper focuses on the general insurance sector; the next study should widen into other areas, such as the life insurance sector, and also be conducted in other markets.

Acknowledgements

We would like to thank all the people who have helped in carrying out this study.

References


The Impact of High Inflation in the United States of America on the Bilateral Trade Balance with Vietnam from the Perspective of Real Exchange Rate

Nguyen Thanh Trung *
Nguyen Tat Thanh University, Vietnam
*nguyenthanh.trung@phd.must.edu.my

Abstract: This study assesses the impact of the USD or VND exchange rate policy on the bilateral trade balance between Vietnam and the United States of America in the context of rising inflation in the. The study’s results show that the increase in the real USD or VND exchange rate index causes the depreciation of VND, and it helps to increase the bilateral trade balance between two countries in the long run.

Keywords: inflation, the United State, trade balance, Vietnam, real exchange rate

1. Introduction

The block-down of the Covid-19 pandemic has disrupted the supply chain of goods, having a great impact on the global economy. Rising prices of most raw materials and rising input costs caused high inflation in major economies. From the beginning of 2021 until now, Vietnam's major export partner, the USA, has continuously had high inflation, in terms of global trade, this is another opportunity for Vietnam - the country that controls good epidemic, stable price economy. However, the inflation difference also caused the USD/VND exchange rate to move in the same direction recently.

1.1 Inflation, Exchange Rate and Trade Balance between Vietnam and the USA

Along with high GDP growth rate, Vietnam also maintains high inflation for a long time. From 2015 to now, the inflation rate has been well controlled to less than 5%. In contrast, the USA has always maintained stable low inflation, even deflation at some years. The situation reversed from the second quarter of 2021, Vietnam still maintained a stable low inflation rate, the USA increased continuously month by month, and reached the milestone of more than 9% year-on-year in June 2022.

Starting from 2016, the State Bank of Vietnam has applied a mechanism to announce the central exchange rate (Central Rate) of USD/VND daily, allowing the exchange rate to change more flexibly than before. The trade balance surplus in recent years also reduced pressure on foreign currency demand. The USD/VND exchange rate changes closely following the market supply and demand situation.
Vietnam is maintaining a trade surplus position to the US market. The trade balance between Vietnam and the USA has continuously increased over the years, the export growth rate has reached more than 25% per year in the last 3 years, the value in 2022 reach over 100 billion USD. Export value to the USA accounts for nearly 30% of Vietnam’s total export value.

According to Dornbusch (1985), purchasing power parity states that when the prices of goods between two countries change by a disparity, the nominal exchange rate \( E \) of the two currencies must change by exactly the same amount to maintain purchasing power parity between the two countries.

With \( \pi \) and \( \pi^* \) being the domestic and foreign inflation rates, the nominal exchange rate \( E \) needs to change by a rate \( \Delta e \), satisfying:

\[
\Delta e = \left( \frac{1 + \pi}{1 + \pi^*} \right) - 1 = \frac{\pi - \pi^*}{1 + \pi^*}
\]
If the market exchange rate changes by exactly the same rate \( e \), the foreign price index will be as high as the domestic price index from the perspective of domestic consumers, the purchasing power correlation between domestic currency and foreign currency parity, as measured by the real exchange rate index \( eR = 1 \).

The fact that the market exchange rate does not change so in the short run, the difference between domestic and foreign prices occurs will stimulate either an increase in exports or an increase in imports. Both cases will affect the trade balance of the two countries.

Observe the change in the real exchange rate of the USD/VND (\( eR(USD) \)) calculated by the formula:

\[
e_{R(USD)} = \frac{E_1}{E_0} \times \frac{(1 + \pi \ast)}{(1 + \pi)}
\]

The USD real exchange rate increases, causing the foreign purchasing power of the domestic currency (VND) to decrease relative to the USD from time to time. The real depreciation of VND has the effect of increasing Vietnam’s international trade competitiveness. And conversely, if the real exchange rate of USD falls, the VND appreciates, thus eroding Vietnam’s trade competitiveness.

Smallwood (2019) in “Analyzing exchange rate uncertainty and bilateral export growth in China” found that exchange rate uncertainty has no impact on trade with the USA, which strongly contrasts a robust finding of trade deterring impacts for almost all remaining countries.

In the same point view, Bhattacharyya and Rit (2018), “On the relationship between the nominal exchange rate and export demand in India” showed that there is no direct evidence that the nominal exchange rate or its volatility influences exports in India. However, there is a significant relationship between the relative price ratio (domestic to foreign) and exports.

In the other country, Kusumawardani and Mubin (2019) given evidence that half of the commodities on Indonesian export to the USA are significantly and positively affected by real exchange rate misalignment, only a small number of commodities is significantly affected by the exchange rate volatility. Goya (2020) confirmed export variety is positively related to a weaker exchange rate and negatively related to exchange rate volatility.

For the economics benefit, Sayeda (2020) suggests that short run macrэкономic policy would be beneficial to influence the foreign exchange market and eventually the performance of export of Bangladesh.

About Vietnam, Trang (2021) show that the exchange rate has a negative impact on Vietnam’s trade balance both in the short and long run. But Phúc and Trinh (2011) find out the impact of devaluation of Vietnam Dong on the trade balance has the form of J line: the trade balance deteriorates in three quarters after devaluation, starts to improve from the 4th quarter and establishes a new equilibrium after 12 quarters. Le and Ishida (2016, March) also give evidence of J-curve effective in Japan, Malaysia and Thailand’s trade balance. Nguyen and Dinh (2020) finding result that real effective exchange rate has a short-term negative impact on trade balance Vietnam.

2.1 Research Question

a. Does high U.S. inflation have the effect of changing the real exchange rate?
b. Do changes in the Real Exchange Rate Index affect the trade balance?
c. How does Vietnam benefit from high USA inflation through exchange rate changes?
3. Research Methodology

In order to evaluate the impact of the independent variable - the real exchange rate index (eR) on the dependent variable - the change of the bilateral trade balance between Vietnam and the USA (TB), the author uses the Autoregressive Distributed Lag Model (ARDL), corrected by ECM (Error Correction Models) and Pesaran et al. (2001) bounds test. Empirical data calculated from the results of the real exchange rate index eR(USD/VND) in the last 10 years.

![INFLATION AND REAL EXCHANGE RATE VN-USA](image)

*Figure 3. Movement of Real Exchange Rate Index VN-USA*

Source: World Economic Outlook Database, April 2023

US inflation has been higher than Vietnam's since the end of 2020, while exchange rate (USD/VND) did not increase the same, that show real exchange rate index kept in high time.

At the end 2022 and first quarter 2023, U.S. inflation has fallen to the same level as Vietnam inflation.

![Interconnectedness of Factors](image)

*Figure 4. Diagram of Interconnectedness of Factors*

**Model:**

\[
TB = a_1 + a_2 eR + a_3 eR_t + u_t
\]

\(u_t\) is a pure white noise error term.

n: is number of lagged, \(n \geq 0\), for simplicity assuming that the lag order n is the same for all variables in the \(K \times 1\) vector \(eR_t\). The number of lagged difference terms to be included is often determined empirically, the reason being to include enough terms so that the error term in model.
Table 1. **ARDL Data and Error Correction Adjustive**

<table>
<thead>
<tr>
<th>ARDL(1,1) regression</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample: 2 - 29</td>
<td>Number of obs = 28</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Log likelihood = -256.42201</td>
<td>R-squared = 0.9601</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Adj R-squared = 0.9551</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Root MSE = 2480.1284</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| D.TB   | Coef. | Std. Err. | t   | P>|t| | [95% Conf. Interval] |
|--------|-------|-----------|-----|------|----------------------|
| Adj TB |       |           |     |      |                      |
| L1     | 0.111 | 0.043     | 5.3 | 0.000 | 0.167 - 0.167932458 |
| LR     |       |           |     |      |                      |
| eR     | 354.534 | 541.101 | 6.5 | 0.000 | 2397.756 - 4631.311 |
| SR     |       |           |     |      |                      |
| eR     | 35.10529 | 31.10799 | 1.1 | 0.270 | 29.10346 - 39.55423 |
| D1     | 145.1215 | 762.3784 | 0.2 | 0.851 | -1428.35 - 1718.593 |

*LR: Long run, SR: Short run

(Source: Stata 16)

The calculation results using the ARDL model show that the independent variables explain 95.51% (Adj-R-Squared) for the variation of the dependent variable which is the trade balance TB. At 95% significance level, P > |t| = 0.000 < 0.05 (*) the independent variable eR has a positive effect on the dependent variable in the long run (LR), the optimal lag is after one period (L1). Meanwhile, in the short term (SR) P > |t| = 0.27 > 0.05, there is not enough basis for conclusion.

The relation of dependent variable TB with independent variables can be final bay model:

\[ TB = 145.1215 + 3514.534eR \]

Table 2. **Bounds Test**

<table>
<thead>
<tr>
<th>Pesaran, Shin, and Smith (2001) bounds test</th>
<th>F = 172.483</th>
</tr>
</thead>
<tbody>
<tr>
<td>H0: no level relationship</td>
<td>t - 5.930</td>
</tr>
</tbody>
</table>

Finite sample (1 variables, 28 observations, 1 short-run coefficients)

Kripfganz and Schneider (2020) critical values and approximate p-values

<table>
<thead>
<tr>
<th>10%</th>
<th>5%</th>
<th>1%</th>
</tr>
</thead>
<tbody>
<tr>
<td>I(0)</td>
<td>I(1)</td>
<td>I(0)</td>
</tr>
<tr>
<td>F</td>
<td>4.293</td>
<td>5.150</td>
</tr>
<tr>
<td>t</td>
<td>-2.604</td>
<td>-2.963</td>
</tr>
</tbody>
</table>
The results of the bounds test show that both F and t are larger than the conditional value I(1), proving that the independent variables have a mutual influence on the model.

4. Discussion of Results

The USD/VND real exchange rate index increases time by time, the currency (VND) decreases relative to the USD from time to time, increasing Vietnam's international trade competitiveness, making the trade balance increased. This effect is only true in the long run, when the real exchange rate index increases by 1%, it will affect in the next period the trade balance will increase by more than 180 million USD. The value of changes in the trade balance in the short terms has no basis for assessment.

The fact that the State Bank of Vietnam kept the exchange rate increasing the same with relative inflation did not actually help the trade balance in the short term. Vietnam’s commodities become cheaper in USA market but cannot push purchasing power of American immediately. Beyond the cause American’s income decrease due to economic decline, the market also has been lags, commodities do not transfer quickly to customers, and they don’t decide to buy easy.

So that, the exchange rate policy does not improve the trade balance in the short term. In the otherwise at the long terms, the growth of the trade balance not only the impact of commodity prices but also get the whole economy in terms of product quality, service quality and export supply capacity of Vietnam. Therefore, flexible exchange rate management in accordance with Forex market supply and demand of purchasing power balance factors will help open up international capital flows, creating synchronous development in the long term.

5. Conclusion

Reviewing import-export value and exchange rate to calculated and evaluated in this study. The real exchange rate index increasing from 2012 to 2022, it means VND was undervalued by USD. The State Bank of Vietnam is keeping real exchange rate index so high.

The study finds that relative inflation difference between the USA and Vietnam in the period 2021-2022 has not an impact on the trade balance in the short term. The results from the present research study suggests that export performance in Vietnam has had an impact on exchange rate in long terms.

By the result of research this study recommends that to improve the trade balance, it is necessary to adapt the whole economy in production and business to products with high export value, cannot rely on the policy of undervaluing the domestic currency.

References


Socio-Cultural Factors of Malaysia’s Construction Industry that Procrastinate the Implementation of Construction 4.0

Chee Gin Liong* & HJ Kamal Abd Razak

a,bMalaysia University of Science and Technology, Malaysia
*chee.gin@pg.must.edu.my

Abstract: Construction 4.0 that adopted industrial revolution (“IR”) 4.0’s concept and framework is unfolding several benefits to Malaysia’s construction industry. Nevertheless, construction industry is notorious for its conservative approach towards novel technology or technology advancement, resulted immensely lags behind other industries in terms of automation processes and level of digitalization amidst cumbersome its productivity. Scholars identified that socio-cultural has the greatest influence towards the successful implementation of construction 4.0, wherein impeding the engagement of construction 4.0 that resulted dawdle productivity improvement. The purpose of this paper is enumerating and examining the influence of socio-cultural in Malaysia’s construction industry in enabling country policy makers and organization decision makers possess the perspicuous insights that impeding the implementation of construction 4.0 in Malaysia. Quantitative methodology was used for this study, where data will be collected via questionnaires through personnel from private sectors’ consultancy firms in Malaysia, limited to architect, civil engineer, structural engineer, mechanical engineer, electrical engineer, and quantity surveyor. Based on the results, resistant to changes and adoption of new technology is the key socio-cultural factors that impeding the successful implementation of construction 4.0 in Malaysia. Whilst, low awareness and uncertain about beneficial of construction 4.0 have significantly contribute to the reluctant to changes and implementation of construction 4.0 in Malaysia. However, construction industry is fragmentation in natural; fragmented counterparts from all levels of supply chain with diverse background. Moreover, the list in related to traits of culture and habits are inexhaustive; not limited to the four socio-culture factors in this paper. Thereby, the future research should consider the lens of other industry practitioners such as developers, main contractors, sub-contractors, suppliers, etc. Amidst, other culture and habits such as short-term thinking, attitude of veteran practitioners, constraints of fresh graduate, behaviors towards learning and development, etc. should also be considered.

Keywords: construction 4.0, Malaysia construction industry, socio-cultural

1. Introduction

The first three industrial revolution through mechanical (1700s), electrical (1870s), and information/digital technology (1970s) were intended for productivity improvement of operational processes and business procedures (Alaloul et al., 2018). Similarly, the prevailing advancement of information and communications technology (“ICT”) featuring by the vogue of digitalization and automation are supporting the “Industrie 4.0” or IR 4.0 in enhancing productivity and efficiency (Alaloul et al., 2020; Tambi & Abu Dardak, 2020).

“Industrie 4.0” – the fourth industrial revolution was published by the German Government in 2011, to create a coherent policy scheme to maintain its industrial competitiveness in the context of global marketplace (Nowotarski & Paslawski, 2018). Klaus Schwab (2016), founder and executive chairman of World Economic Forum, advocates that “Industrie 4.0” is blurring the lines between the physical, digital, and biological spheres. This advance technology digital transformation enhances communication networks, efficiency of organization and management, and production and processes across industries (Zabidin, Belayutham, & Ibrahim, 2019) amidst contributing to sustainable economic, environmental, and social development (Ghobakhloo, 2019) as well as global ecological system.
IR 4.0 forged construction 4.0, changing the apparatus of design, construction, operation and maintenance of assets / edifice (Sawhney et al., 2020), in soaring product quality, decreasing time-to-market, enhancing operation performances and improving health and safety (Alaloul et al., 2020). Construction 4.0 is the adoption and adaptation of the “Industrie 4.0” or Industrial Revolution (“IR”) 4.0 scheme into the construction industry (Sawhney et al., 2020). Construction 4.0 unfolds several benefits consisting high efficiency and productivity, accuracy and quality-centred, collaboration, sustainability, and safety, as well as recover the eroded image of construction industry (Kozlovska et al., 2021; Sawhney et al., 2020). Despite of the stupendous benefits, construction 4.0 subsists its infancy stage, eminently lags behind other industries in terms of automation processes and level of digitalization (Alaloul et al., 2018), especially in developing countries that imitate traditional labor-intensive industry practices (Kozlovska et al., 2021), for example, Malaysia. Construction industry hesitant in capitalizing these innovative technologies into its common practices due to resistance to change, barriers to innovation, unpredictability, profits, and skilled workforce recruitment, resulted exiguous improvement and productivity stagnation in the construction industry for decades (Sawhney et al., 2020).

Several factors contributed to this adversity as explicit by Oesterreich and Teuteberg (2016) such as complexity, uncertainty, fragmented supply chain, short-term thinking, and culture. The nature of construction industry is complex and unique, as it involves enormous stakeholders amid its value chains involves multiple fragmented counterparts from all levels with a diverse background in responding the specific discrete and sui generis of each project. Moreover, the financial capability of small and medium-sized enterprises (“SMEs”) and short-term thinking as well as its reluctant practices in adaptation, considering the short-term nature of construction project, increased the difficulties of construction 4.0 initiative despite of the remarkable benefits (Shaharuddin et al., 2021; Sulaiman et al., 2021).

1.1 Problem Statement

The conservative approach of construction industry is leading to inertia in the context of technology advancement and change, in this case construction 4.0. Alaloul et al. (2020) identified social factors, particularly cultural habits, has the greatest influence towards the successful implementation of construction 4.0 because it has a permeant effect throughout the construction processes involving multiple stakeholders and parties (Alaloul et al., 2020). Lau et al. (2019) suggested several social factors that retarded the implementation of construction 4.0 encompassing low awareness, gaps between academy and industry, employees’ acceptance and adaptability, and training and development (Lau et al., 2019). Kozlovska et al. (2021) cited another study, mentioned that the social factor was proven to be the most important factor influencing the successful implementation of construction 4.0 (Kozlovska et al., 2021). Mohd. Aripin et al. (2019) concluded that acceptance of technology and individual hesitance are among the potential barriers in implementing industry 4.0 technologies due to conservatism and adoption of new knowledge and skills (Mohd. Aripin et al., 2019). Sony and Naik (2020) mentioned that top management involvement and commitment is the main determinant for the readiness of IR 4.0 and sustaining new initiative. Unequivocally, employees must adapt to multifaceted of adaptability by virtue of the changes in the traditional nature of employment and works structural (Sony & Naik, 2020).

Since IR 4.0 and construction 4.0 are in its precursory, pertinent publications are meagre. Research in associated with IR 4.0 can only be discerned from year 2013, wherein only 8 publications were found in connected with construction 4.0 in year 2017 (Nowotarski & Paslawski, 2018). Kozlovska et al. (2021) found 195 publications related to the interconnection of IR 4.0 and construction 4.0 in year 2021 (Kozlovska et al., 2021; Kasim et al., 2021). The finite publications related to construction 4.0 signifies farther research in this field is desideration and pivotal (Nowotarski & Paslawski, 2018). Bearing in mind that the above-mentioned publications are studies from researchers and scholars over the world. Hence, scanty publications in related to construction 4.0 that focusing on Malaysia’s construction industry is anticipated. Therefore, it could be concluded that construction 4.0 in Malaysia is in the process of formation and there are needs for further investigation.
As a summary to the above, social factor is the main influential on procrastinating the implementation of industry construction 4.0 in Malaysia amidst studies of socio-cultural that influence the implementation of construction 4.0 in Malaysia is sparse. Coupling with the current research is focusing on technical aspect of technologies associated with IR 4.0 rather than ethical, economical, socio-cultural, or environmental (Kozlovska et al., 2021), this paper serve in closing the gap by focusing on socio-cultural of construction industry that impeding the implementation of construction 4.0 in Malaysia, aim to enumerate and examine the potential influential in socio-cultural of construction industry.

1.2 Research Objectives

The objectives of this research aim to enable country policy makers and organization decision makers possess the perspicuous insights that impeding the implementation of construction 4.0 in Malaysia. Wherein hoping the insights will facilitate in gambit pragmatic strategy to diminish the resistance that engendered by social or cultural factors.

Thereby, the objectives of this paper are focusing to obtain, measure, and conclude the data of the following:

a. To confirm low awareness is impeding the implementation of construction 4.0 in Malaysia.
b. To confirm uncertain about beneficial of construction 4.0 is impeding the implementation of construction 4.0 in Malaysia.
c. To confirm reluctant to changes and accept is impeding the implementation of construction 4.0 in Malaysia.
d. To confirm lack of commitment from professional and expert is impeding the implementation of construction 4.0 in Malaysia.

Figure 1 below depicted the theoretical framework of four independent variables and one dependent variable.

![Theoretical Framework](image-url)

*Figure 1. The Theoretical Framework Relating to Four Independent Variables and One Dependent Variable in this Study*
2. Methodology

2.1 Research Design

Quantitative methodology will be used for this study, as a quantitative research method deals with quantifying and analysis variables in obtaining results. Quantitative research analysis is a deductive approach that used standardized method for collecting data. In this study, survey research is chosen as the strategies of inquiry, whereby data will be collected via questionnaires through subset of the population, and the findings is expected to be generalized to the entire population (Sekaran & Bougie, 2016). Also, survey research is selected for this study due to its nature of timely information and cost effective, whilst it is suitable for this study, the type of data needed for this study, population characteristics, and available resource. Moreover, closed-ended questions will be selected for the questionnaires. Because is convenient to obtain feedback from a large number of people and ease the researcher with the process to analyze the statistic (Lau et al., 2019), and it aids respondents in making quick decisions on choosing among the several alternatives amidst helping the researcher to code the information easily for subsequent analysis (Sekaran, 2003).

2.2 Unit of Analysis

Individual levels will be used as the unit of analysis in this study, whereby focusing the responds from individual practitioners within Malaysia’s construction industry. Kumar (2018) mentioned that individuals are the most typical units of analysis in business research, whereby investigating the behaviors, perception, attitude, or opinion of each individual (Kumar, 2018).

2.3 Sampling Design

This paper aims to collect data and feedback from varies stakeholders within Malaysia’s construction industry, fundamentally personnel from consultancy firms in private sectors including architect, civil & structural engineer, mechanical & electrical engineer, and consultant quantity surveyor. Reason being these group of peoples are enormously involved in the planning and pre-construction stage whereby influencing the sequel and end results of construction and project completion stage. The self-explanatory table below delineated the population of personnel from private sectors’ consultancy firms in Malaysia, limited to architect, civil engineer, structural engineer, mechanical engineer, electrical engineer, and quantity surveyor. Wherein, the total population or sampling frame is 12,279; see Table 1 below.

<table>
<thead>
<tr>
<th>Practitioners</th>
<th>Number</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Architect</td>
<td>2,345</td>
<td>Lembaga Arkitek Malaysia</td>
</tr>
<tr>
<td>Civil Engineer</td>
<td>4,765</td>
<td>Board of Engineer Malaysia</td>
</tr>
<tr>
<td>Structural Engineer</td>
<td>29</td>
<td>Board of Engineer Malaysia</td>
</tr>
<tr>
<td>Mechanical Engineer</td>
<td>1,679</td>
<td>Board of Engineer Malaysia</td>
</tr>
<tr>
<td>Electrical Engineer</td>
<td>1,799</td>
<td>Board of Engineer Malaysia</td>
</tr>
<tr>
<td>Quantity Surveyor</td>
<td>1,662</td>
<td>Board of Quantity Surveyors Malaysia</td>
</tr>
<tr>
<td>Total</td>
<td>12,279</td>
<td></td>
</tr>
</tbody>
</table>

There is limitation to the population above, as the number of architects, engineers, and quantity surveyors are professional practitioners, without considering the graduate architects, graduate engineers, and graduate quantity surveyors.

In accordance with Krejcie and Morgan tables, the sample population or sample size for this study shall be 375. Sampling is making inference upon a population or making generalization in associated with existing theory, whereby sampling technique consisting of probability or non-probability (Taherdoost,
In this study, probability or random sampling will be used as sampling techniques, particularly simple random. Simple random is referring to every case of population has an equal probability of inclusion in sample (Taherdoost, 2016). The sample is referring as representative because the characteristics of a properly drawn sample represent the parent population in all ways.

2.4 Data Collection Methodology

Cross-sectional studies will be conducted for this study. This method is selected due to its characteristics of inexpensive and can be conducted relatively faster. Electronic or online questionnaire will be used for this study, by using Google form or equivalent. This data collection method is selected due to its main advantage on the capability in covering wide geographical area, amidst respondents can complete the questionnaires at their convenience, in their homes, and at their own pace. Moreover, it is inexpensive and embrace fast delivery as well as easy to administer (Sekaran et al., 2003).

Closed-ended questions will be selected for the questionnaires. The questions will be either in the form of tick (√) the possible answer which best described their opinion or choosing the best answer based on the choices given in the range from “strongly agree” to “strongly disagree”.

2.5 Analysis Methodology

Inferential statistics will be conducted for this study, whereby obtaining and comparing data from samples to investigate potential differences and makes inferences about the population. The goal of inferential statistics is drawing conclusions from samples subsequently generalized to a wider population (Sekaran, 2003). Inferential statistics is selected because it allows to predict or estimates characteristics of a population from a knowledge of the characteristics of only sample of the wider population.

Analysis of Pearson r correlation will also be used for inferential analysis in this study. Correlation is a measure of an association between variables, wherein the change in the magnitude of one (1) variable is associated with a change in the magnitude of another variable, either positive or negative correlation. The results value of $r = 1$ indicating strong positive relationship; $r = -1$ indicating strong negative relationship; $r = 0$ indicating no linear relationship between the variables (Sekaran & Bougie, 2016). This method is selected as the data will be deriving from a random sample and representing the interest of the population, whilst variables are continuous, jointly normally distributed, and random variables.

Furthermore, multiple regression test will be used for inferential analysis in this study. First, $R^2$ value will be examined in determine the variation in the dependent variable, wherein $R^2$ squared value or coefficient of determination is accepted if the result is more than 50%. Next, the $P$-value of beta coefficients will indicate the significance of the effect for each independent variable against the dependent variable, wherein $P$-value must be smaller than 0.05. Moreover, the unstandardized beta coefficients will indicate the increase value of each increase of one-unit.

Prior to the full study, pilot study will be conducted in validating the feasibilities of the study protocol and identify weakness, amidst aiding in testing whether the questionnaire is comprehensible and appropriate, the questions were well defined, clearly understood and presented in a consistent manner (Muresherwa & Jita, 2022). As a start, samples between 30 to 50 will be obtained in conducting the pilot study whilst the pilot study may not be limited to only one time. Two tests will be conducted for the pilot study, namely reliability test and factor analysis. Cronbach’s alpha will be used for reliability test, wherein it is a reliability coefficient indicating a set of items are positively related to another set. The range of acceptance are between 0.70 to 0.80 and the reliability statistics are good if it exceeds 0.80. In opposed, reliability less than 0.60 are considered poor (Sekaran & Bougie, 2016).

Moreover, questionnaires were validated by three industry practitioners prior the pilot study. The three industry practitioners have more than thirty of experience and they are the experts from different
disciplines, i.e., professional electrical engineer with practicing certificate, professional consulting quantity surveyor, and profession architect. Whereby the expert on electrical engineering is also holding a doctorate degree.

2.6 Research Finding

More than 1,200 emails were disseminated to consultancy firms (architect, engineers, and consulting quantity surveyor) in Malaysia, whereby the email addresses were obtained from Lembaga Arkitek Malaysia, Board of Engineers Malaysia, and Board of Quantity Surveyor Malaysia. Resulted, 387 valid responds received in a period of two months.

As an overview, most of the respondents are in between 31 to 50 years old (31-40 years old ≈ 37.7% and 41-50 years old ≈ 35.7%) whilst more than 56% of the respondents have more than 16 years of working experience. Amidst, majority of the respondents (i.e., approximately 97%) possess at least Bachelor’s degree. Only 7.24% of respondents are within the age group of 21 to 30 years old, and only 4.65% of respondents have less than 5 years of working experience. Therefore, most of the respondents have good working experience, which is desirable for this study. Majority of the respondents (i.e., approximately 97%) possess at least Bachelor’s degree, wherein 28.42% of the respondents possess master’s degree and PhD. In terms of professional background, 24.3% are quantity surveyor, and 53.8% are engineers.

2.7 Cronbach’s Alpha

Reliability of all four independent variables is considered good after checking the reliability of measures of the 387 responds by dint of Cronbach’s alpha, ranging from 0.900 to 0.945 (see Table 2).

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Number of items</th>
<th>Cronbach’s alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1-Low awareness</td>
<td>5</td>
<td>0.900</td>
</tr>
<tr>
<td>H2-Uncertain about beneficial</td>
<td>9</td>
<td>0.939</td>
</tr>
<tr>
<td>H3-Reluctant to changes and accept</td>
<td>9</td>
<td>0.911</td>
</tr>
<tr>
<td>H4-Lack of commitment from professional and expert</td>
<td>8</td>
<td>0.945</td>
</tr>
</tbody>
</table>

2.8 Pearson Correlations Matrix

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Participants</th>
<th>H1</th>
<th>H2</th>
<th>H3</th>
<th>H4</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>1</td>
<td>0.062</td>
<td>0.041</td>
<td>0.092</td>
<td>-0.168**</td>
</tr>
<tr>
<td>H2</td>
<td>0.062</td>
<td>1</td>
<td>0.421**</td>
<td>-0.469**</td>
<td>0.070</td>
</tr>
<tr>
<td>H3</td>
<td>0.041</td>
<td>0.421**</td>
<td>1</td>
<td>0.645**</td>
<td>-0.084</td>
</tr>
<tr>
<td>H4</td>
<td>0.092</td>
<td>0.469**</td>
<td>0.645**</td>
<td>1</td>
<td>-0.062</td>
</tr>
<tr>
<td></td>
<td>-0.168**</td>
<td>0.070</td>
<td>-0.084</td>
<td>-0.062</td>
<td>1</td>
</tr>
</tbody>
</table>

**Correlation is significant at the 0.01 level (2-tailed)

The results of Pearson Correlations Matrix as per Table 3 above show H4 – Lack of Commitment from Professional and Expert has negative correlation (correlations=-0.168) to the dependent variable – late implementation of construction 4.0 in Malaysia. Whereas H3 – Reluctant to Changes and Accept
Proceedings of the 6th International Conference on Digital Innovation – Blockchain and Fintech

(correlations=0.092) has the highest correlations to the late implementation of construction 4.0 in Malaysia, following by $H_1$ – Low Awareness (correlations=0.062) and $H_2$ – Uncertain about Beneficial (correlations=0.041). However, only $H_3$ – Reluctant to Changes and Accept is significantly correlate with late implementation of construction 4.0 in Malaysia, whereas the relationship between $H_1$ – Low Awareness and $H_2$ – Uncertain about Beneficial, and late implementation of construction 4.0 in Malaysia are not significant.

In view of that, the hypothesis on there is a relationship between reluctant to changes and accept and late implementation of construction 4.0 in Malaysia is accepted. Whereby, reluctant to change and accept engender late implementation of construction 4.0 in Malaysia.

2.9 Multiple Regression Test

Table 4. Model Summary

<table>
<thead>
<tr>
<th></th>
<th>R</th>
<th>$R^2$</th>
<th>Adjusted $R^2$</th>
<th>Standard Error of Estimation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.781a</td>
<td>0.610</td>
<td>0.580</td>
<td>0.8622</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), Commitment, ChangeAcceptance, OrgAware, Beneficial

Table 4 above indicated R: multiple correlation coefficient = 0.781 and $R^2$: coefficient of determination = 0.610, wherein the model account for 61.0% of variance which indicate the regression equation are considered reliable.

2.10 Beta Coefficients

Table 5. Beta Coefficients

<table>
<thead>
<tr>
<th></th>
<th>Unstandardized B</th>
<th>Coefficients standard error</th>
<th>Standardized coefficients</th>
<th>T</th>
<th>Significant (P-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>12.325</td>
<td>3.194</td>
<td></td>
<td>3.859</td>
<td>0.000</td>
</tr>
<tr>
<td>$H_1$</td>
<td>0.104</td>
<td>0.058</td>
<td>0.179</td>
<td>1.796</td>
<td>0.091</td>
</tr>
<tr>
<td>$H_2$</td>
<td>0.050</td>
<td>0.062</td>
<td>0.054</td>
<td>0.801</td>
<td>0.424</td>
</tr>
<tr>
<td>$H_3$</td>
<td>0.530</td>
<td>0.156</td>
<td>0.394</td>
<td>3.393</td>
<td>0.002</td>
</tr>
<tr>
<td>$H_4$</td>
<td>-0.162</td>
<td>0.110</td>
<td>-0.144</td>
<td>-1.469</td>
<td>0.149</td>
</tr>
</tbody>
</table>

Table 5 above show $H_3$ – Reluctant to Changes and Accept (p-value=0.002; <0.05 and t=3.393) has significant effect to the dependent variable – late implementation of construction 4.0 in Malaysia. Wherein, one unit increase in $H_3$ – Reluctant to Changes and Accept, the effect to late implementation of construction 4.0 in Malaysia will increase by 0.530. This result is consistent with the Pearson correlations matrix above, wherein $H_3$ – Reluctant to Changes and Accept is significantly correlate with late implementation of construction 4.0 in Malaysia.

Whereas $H_4$ – Lack of Commitment from Professional and Expert does not have significance effect (p-value=0.149; >0.05 and t=-1.469) to the dependent variable – late implementation of construction 4.0 in Malaysia. Wherein one unit increase in $H_4$ – Lack of Commitment from Professional and Expert, the effect to late implementation of construction 4.0 in Malaysia will decrease by 0.162. This result is consistent with the Pearson correlations matrix above, wherein $H_4$ – Lack of Commitment from Professional and Expert has negative correlation with late implementation of construction 4.0 in Malaysia.
Likewise, $H_1$ – Low Awareness ($p$-value=0.091; $>0.05$ and $t=1.796$) and $H_2$ – Uncertain about Beneficial ($p$-value=0.424; $<0.05$ and $t=0.801$) does not have significance effect to the dependent variable – late implementation of construction 4.0 in Malaysia. Wherein, one unit increase in $H_1$ – Low Awareness and one unit increase in $H_2$ – Uncertain about Beneficial, the effect to late implementation of construction 4.0 in Malaysia will increase by 0.104 and 0.050 respectively.

3. Summary of Findings

The results from Pearson correlations matrix and multiple regression test above show the only positive or significant relationship between independent variable and dependents variable is $H_3$ – Reluctant to Changes and Accept. Whereas, Pearson correlations matrix and multiple regression test show $H_4$ – Lack of Commitment from Professional and Expert has negative or not significant relationship to late implementation of construction 4.0 in Malaysia. Whilst, the relationship between i) $H_1$ – Low Awareness and late implementation of construction 4.0 in Malaysia, and ii) $H_2$ – Uncertain about Beneficial late implementation of construction 4.0 in Malaysia is not significant.

According to Pearson correlations matrix above, $H_1$ – Low Awareness and $H_2$ – Uncertain about Beneficial are significantly correlate with $H_3$ – Reluctant to Changes and Accept. It explicit low awareness and uncertain about beneficial of construction 4.0 have significantly contribute to the reluctant to changes and accept of construction 4.0, effectuate changes and accept of construction 4.0 become the main determinants to the late implementation of construction 4.0. Thereby, it is confirmed that reluctant to changes and accept is impeding the implementation of construction 4.0 in Malaysia, wherein the attitude of embrace changes and acceptance of novel technology are influenced by the low awareness and uncertain about beneficial of construction 4.0.

The only independent variable that decrease the effect to late implementation of construction 4.0 in Malaysia with every increase of one-unit is $H_4$ – Lack of Commitment from Professional and Expert. Perhaps it implies that professional and expert such as consultancy firms are ready to embrace the change that engendered by construction 4.0. Nonetheless, other industry practitioners such as developer, main contractor, sub-contractor, and suppliers may be reluctant to changes and accept due to low awareness and uncertain about the benefit of construction 4.0. With regard to this, perhaps future study may focus on which particular practitioners have the highest resistance to the implementation of construction 4.0 and the reason(s) of this resistance.

As a summary to the above, the results of hypothesis are depicted in the table 6 below.

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>$H_1$</td>
<td>There is a relationship between low awareness and late implementation of construction 4.0 in Malaysia</td>
</tr>
<tr>
<td>$H_2$</td>
<td>There is a relationship between uncertain about beneficial and late implementation of construction 4.0 in Malaysia</td>
</tr>
<tr>
<td>$H_3$</td>
<td>There is a relationship between reluctant to changes and accept and late implementation of construction 4.0 in Malaysia</td>
</tr>
<tr>
<td>$H_4$</td>
<td>There is a relationship between lack of commitment from professional and expert and late implementation of construction 4.0 in Malaysia</td>
</tr>
</tbody>
</table>

The results also summarize relationship as per Figure 1 below.
Conclusion

The resistant to changes and adoption of new technology is the key socio-cultural factors that impeding the successful implementation of construction 4.0 in Malaysia, notwithstanding the apparent benefits as witness in varies industries such as manufacturing, automobile, and banking industry. The conservative approach of the construction industry practitioners enduring the traditional unproductive construction’s modus operandi and derelict health and safety policy by excessively counting on manual labor, mechanical technology, and established operating and business model, except the professional and expert such as architects, engineers, and consultant quantity surveyors who leverage the technology advancement (i.e., construction 4.0) towards flexibility, productivity, and quality.

Two (2) determinants dictate the conservative approach of resistant to changes and adoption of new technology, such as i) low awareness of construction 4.0, and ii) uncertainty of beneficial and perceived valued of construction 4.0. Resulted, the attributes of construction 4.0 including high efficiency, productivity, accuracy and quality-centered, collaboration, cost effective, agile, responsive, sustainability, and safety as well as the capabilities in preparation of next society evolution are not appreciated by the construction industry practitioners (expect professional and expert), resulting impede the successful implementation of construction 4.0 in Malaysia. The attitude of status quo restrains the industry players towards business sustainability in the prevailing economic disquietude amidst volatile business environments.

4. Recommendations

Scholars advocate the importance of construction 4.0 on enhancing construction productivity towards global competitiveness amidst positively influence the national economy (Ibrahim et al., 2019; Maskuriy et al., 2019). Thereby, government’s gambit and intervention are crucial to organizations’ awareness in arousing the beneficials and perceive values of construction 4.0. Moreover, collaborations with professional and expert can be convened to initiate multifarious activities and campaigns in associate with the beneficials and perceive values of construction 4.0, as they are one of the core industry practitioners who embrace the technology advancement. Bearing in mind that, public awareness campaigns are pivotal in shaping people’s attitudes, promoting environment actions, positive changes in behavior and general awareness of ecological issues (Borawska, 2018). Furthermore, government funding and incentive on implementation of construction 4.0 is imperative, as companies are hesitated to invest in construction in view of the perception of high investment cost amid unclear benefits. For example, fund or subsidize training and development programs on top of tax incentives. Bearing in mind that, education and training are the driver of productivity improvement (Liao et al., 2018).
Acknowledgement

Chee Gin Liong expresses his sincere gratitude to Dr. Haji Kamal Abd Razak and the School of Business of the Malaysia University of Science and Technology for the guidance, understanding, patience, and positive encouragement with warm spirit throughout the research work.

References


Diab, Y. (2021). The concept of knowledge sharing in organizations (Studying the personal and organizational factors and their effect on knowledge management). Management Systems, 6(1/2), 91-100.


Relationship between Factors of New Ways of Working (NWOWS) and Employee Productivity Measures

Samuel Ding Min Lian\textsuperscript{a} & Dr Khairir Khalil\textsuperscript{b}
\textsuperscript{a}Malaysia University of Science and Technology
\textsuperscript{b}Malaysia University of Science and Technology
samueldingminlian@gmail.com

Abstract: This research is aimed at investigating the main factors of adopting new ways of working (nWOWs) and the effective methods of measuring employee productivity. It also investigates the relationships between each nWOWs factors and the measures of employee productivity. Four nWOWs factors include digital transformation, remote working, work from home and flexible working hours. The respondents for this research are those working under various job levels and industries. There are 103 responses received from the questionnaire for data analysis. The independent variables are the four nWOWs and the dependent variable is employee productivity measures. Apart from performing descriptive statistical analysis, correlation analysis using SPSS has also been carried out to establish the relationship between the four nWOWs factors and the measure of employee productivity. The results of descriptive analysis conclude that there are a significant number of respondents who agree that digital transformation is a main factor of nWOWs, and that the method of objective setting has been selected as the most effective method of measuring employee productivity. The results of correlation analysis indicate that both remote working and flexible working hours have significant relationships with employee productivity measures. However, both digital transformation and work from home do not have significant relationships with employee productivity measures. Some limitations of the research and recommendations for improvement have been included in this report for future researcher on the subject.

Keywords: digital transformation, remote working, work from home, flexible working hours, employee productivity

1. Introduction

With the advance of digital technology, compounded by the recent Covid-19 pandemic, there is an increasing number of new ways of working (NWOWs) including remote working, work from home (WFH), and flexible working hours in the workplace. Impacted industries would have to adopt to NWOWs for long term survival in the competition. As results, there are significant changes in the way of employee working in the workplace with concern of how their productivity is to be measured effectively.

Organizations and employees are both concerned on how, with NWOWs, employees’ contributions to the productivity should be measured. In terms of fairness, respective parties would have their own views of productivity. Digital transformation itself should address the needs of how to measure employee productivity in which digital transformation would have replaced certain tasks which used to be done by employees. Management would probably not be utilizing employees if certain tasks could be completed by digital technologies. In that regard, the management would perceive that the employees’ contributions to productivity would be very low. Whereas for employees, they would allow the digital transformation to automate some existing processes with expectations of more flexibility, job security and career growth. Thus, employees by nature would expect a higher level of work flexibility while maintaining their productivity level.
1.1 Objective

The objective of this paper is to highlight the main reasons for adopting nWOWs, both form management and employee perspectives. It will also indicate the problems associated with measuring employees’ productivity under nWOWs and outline the solutions to these problems. In addition, based on the research that has been carried out, it shows the relationships of variables, namely digital transformation, remote working, WFH and flexible working hours with employee productivity.

The research results are beneficial to organizations, particularly on how to measure employee productivity when they are working under nWOWs due to digital transformation. For organizations that have not embarked on the nWOWs, the research results would be beneficial as a reference to when they are considering adopting the nWOWs. In fact, it is inevitable that they do so in order to successfully carry out their businesses, especially if they have strong competitors.

For future research, the results would be a very useful reference if the researchers want to explore the best ways of implementing nWOWs, not only with respect to productivity measure but also on efficiency and profitability of the organization.

2. Literature Review

Digital transformation has fundamentally changed how the organizations operate and deliver value to customers. It involves a cultural change in which organizational structure has also been impacted. Businesses need to be competitive in this increasingly digital world. They need to change to the nWOWs (Red Hat, 2021).

2.1 Digital Transformation

Many organizations have put digital transformation as their top priority. New positions have been created and organisational structure has been changed significantly (Singh, 2019). Organizational performance has also been affected by digital transforming capability of the organizations which includes factors like digital skills; conditions for action and interaction; and digital intensity (Sousa-Zomer & Neely, 2020). Organizations worldwide are facing the challenges of how to handle the fast and repetitive adaption, and to catch up with the volatile environment in the digital age (Sailer, 2019). Besides, the scholars are of the opinion that resources and new competencies are mandatory to compete in the new digital age (Vial, 2019). Thus, both learning and professional development play an important role in the process of digital transformation towards accepting nWOWs (Vey, 2017). Besides, employees feel enjoyable working in organizations with flatter structure and every employee feel empowered by being part of the transformation process (Margiono, 2020). Digital transformation, nevertheless, also has drawback like workforce turnover issues (Connelly, 2020).

2.2 Remote Working

Remote working refers to employees working far from where their employer is located. It is becoming more common to certain industries impacted mainly by digitalisation (Remote Year, 2021). While working remotely, the employees do not need to commute or travel to the central workplace; office building; warehouse (Market Business News, 2020). According to the US Bureau of Labor Statistics, there are more than 26 million Americans working remotely either part- time or full time. Within 10 years from 2005 to 2015, the figure of Americans working remotely had grown by 115% (U.S. Bureau of Labor Statistics, 2020).

It is important that organizations ensure their employees remain having a sense of team while working remotely. Those leading practices helping to ensure work security, employee productivity, and motivation at times of remote working are: i) update email signature including mobile number; ii) familiarizing the company’s collaboration tools used to work together virtually; iii) leveraging the
authorised meeting applications for virtual meetings; and iv) setting up regular checkpoints to update the work progress and to address any concerns of remote working (Jacob, 2021).

Advantages of remote working include higher employee retention, enhanced focus with minimal distractions, mastering new skills especially communication via virtual meetings and lesser stress. Disadvantages include feeling of isolation, requiring the attitude of self-starter and self-motivating and no immediate access to the team for urgent work tasks (Warchol, 2012 - 2021).

2.3 Work From Home (WFH)

With evolving digital technologies like virtual meeting applications, many kinds of work tasks can also be done effectively from home like in office (Investopedia, 2021). As WFH is on the rise, organizations would re-evaluate their current policies and implement them mainly for protecting confidential information (Vorobiev & Harwath, 2020) of the company and customers.

There is a concern of increasing level of confusion between what is work and what is personal among the employees of WFH. There are three suggestions for employees to handle the problems of WFH arrangement: i) A clean desk policy in the home office of the employees to protect against data breaches, ii) Policy review on a need basis which covers allowable devices and systems to be used for routine tasks; and iii) Regular check-ins with employees using virtual meeting applications to address any concerns and to update work progress (Hayes & LLP, 2020).

WFH has its own both advantages and disadvantages associated with the home office of employees. The advantages of WFH include employees developing to be self-independent alongside with self-motivation, self-discipline and focus, increased productivity without having to travelling to office and employees becoming savvy in communications immediately via the virtual meetings. Whereas the disadvantages include confusion between work and personal matters leading to physical burnout, lack of casual working relationships and team activities, not always being able to access to certain platforms due to certain restrictions imposed on WFH and the perception from colleagues that their teammates are playing truant while WFH (Papandrea, 2021).

2.4 Flexible Working Hours

This is where employees may start and finish their working day as they need. The employees concerned can start their work earlier or later than the normal working hours (TalentLyft, 2021). Advocators of flexible working hours believe that it is important to recognize the difficulties and challenges facing many employees in balancing both their family commitments and their work duties (Mansueto Ventures, 2020). However, not everyone is benefitting from flexible working hours; certain people would work more efficiently with a fixed office hour schedule in which a boundary between work and personal is clear-cut (O’Connor, 2021).

Some guidelines on how to make flexible working arrangement a success include having a clear working policy on the flexible working arrangement, communication to all involved employees about the flexible working arrangement and the ways of being fair and equal, being transparent on keeping track of employees who are working under flexible working arrangement and emphasising on quality of work instead or number of hours spent for work (Morneau Shepell Ltd., 2021).

2.5 Employee Productivity Measures

Measures of employee productivity refer to the measures of production or service level against efficiency targets. Most people believe that the success of a business depending on how productive of the employees (Down, 2019). According to a research, there is 86% of SMEs suffering from productivity problems while only 14% of UK SMEs not suffering any issue of productivity (Clarke, 2017). Those impacted SMEs are now looking into their business processes and implementing
changes including nWOWs (HorrexCole, 2021).

Among the effective methods in measuring employee productivity include Management by Objective, measuring productivity quantitatively and measuring profit (Wilson, 2020).

2.6 The Research

2.6.1 Conceptual Framework

The dependent variables consist of digital transformation, remote working, work from home and flexible working hours. The dependent variable is the measure of employee productivity. This is represented in the diagram below:

![Conceptual Framework](image)

*Figure 1. Conceptual Framework*

2.6.2 Hypotheses

The hypotheses derived from the conceptual framework are:

**H1:** There is a significant relationship between digital transformation and employee productivity measures.

**H2:** There is a significant relationship between remote working and employee productivity measures.

**H3:** There is a significant relationship between WFH and employee productivity measures.

**H4:** There is a significant relationship between flexible working hours and employee productivity measures.

3. Research Methodology

In this research, questionnaire is used to collect quantitative data from employees of organizations which have implemented nWOWs. The sample size required is 97 based on 95% confidence level and margin of error of 10%. Actual accepted sample size received is 103 with 300 questionnaires sent out. Descriptive analysis method is used to summarize the data collected and to identify and describe the data between subjects of their relationship. With this analysis, the researchers also could examine the feature that affect the conclusion of the research (C. B., 2009). Correlation analysis is conducted between variables to determine whether there are significant relationships between the four independent variables and the dependent variable.
4. Result Analyses

4.1 Descriptive statistics

In terms of industries, banking and financial services have the highest frequency of responses (50 or 48.5%) follows by services industries (8 or 7.8%), Information Technology (7 or 6.8%) and Oil and Gas (6 or 5.8%). Refer to Table 1 for details.

Table 1. Responses Received from Industries

<table>
<thead>
<tr>
<th>Industries</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auditing or Accounting</td>
<td>3</td>
<td>2.9%</td>
</tr>
<tr>
<td>Banking or Financial Service</td>
<td>50</td>
<td>48.5%</td>
</tr>
<tr>
<td>Consulting</td>
<td>3</td>
<td>2.9%</td>
</tr>
<tr>
<td>Education</td>
<td>3</td>
<td>2.9%</td>
</tr>
<tr>
<td>Electronics</td>
<td>3</td>
<td>2.9%</td>
</tr>
<tr>
<td>Engineering</td>
<td>5</td>
<td>4.9%</td>
</tr>
<tr>
<td>Food and Beverages</td>
<td>1</td>
<td>1.0%</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>3</td>
<td>2.9%</td>
</tr>
<tr>
<td>Oil and Gas</td>
<td>6</td>
<td>5.8%</td>
</tr>
<tr>
<td>Pharmaceutical or Medical</td>
<td>2</td>
<td>1.9%</td>
</tr>
<tr>
<td>Retailing</td>
<td>4</td>
<td>3.9%</td>
</tr>
<tr>
<td>Services</td>
<td>8</td>
<td>7.8%</td>
</tr>
<tr>
<td>Telecommunications</td>
<td>2</td>
<td>1.9%</td>
</tr>
<tr>
<td>Other: Information Technology</td>
<td>7</td>
<td>6.8%</td>
</tr>
<tr>
<td>Other: Property</td>
<td>3</td>
<td>2.9%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>103</strong></td>
<td><strong>100.0%</strong></td>
</tr>
</tbody>
</table>

Of the 103 respondents 57 (55.3%) answered “Yes” for the question of the impact upon their job role and function by digital transformation. There are only three industries namely Education (3), Food and Beverages (1), and Property (3) have been fully impacted by the digital transformation upon their respective job role and function, as none of them has answered “No” for that question. Whereas there are several industries which are almost fully impacted by the digital transformation such as Engineering (4 of 5), Oil and Gas (5 of 6), Retailing (3 of 4). Banking and Financial Service have less than 50% (23 of 50) being impacted by the digital transformation on their job roles and functions.

4.2 Correlation Analysis

Table 2 shows the values of Pearson Correlation Coefficient (Pearson’s r) and P-Values with respect to the four independent variables and the one dependent variable.

Table 2. Pearson’s Correlation Coefficient and P-values

<table>
<thead>
<tr>
<th>Correlations</th>
<th>Pearson’s r</th>
<th>P-Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital Technology -&gt; Employee Productivity Measures</td>
<td>-0.072</td>
<td>0.470</td>
</tr>
<tr>
<td>Remote Working -&gt; Employee Productivity Measures</td>
<td>0.471</td>
<td>0.001</td>
</tr>
<tr>
<td>Work From Home -&gt; Employee Productivity Measures</td>
<td>0.174</td>
<td>0.078</td>
</tr>
<tr>
<td>Flexible Work Hours -&gt; Employee Productivity Measures</td>
<td>0.289</td>
<td>0.003</td>
</tr>
</tbody>
</table>

The results indicate that the variables Remote Working, Work From Home and Flexible Work Hours are positively correlated to Employee Productivity Measures while Digital Transformation is
negatively correlated with Employee Productivity Measures.

4.3 Hypothesis Testing Results

Based on P-Values shown in Table 2, all the results indicate significant relationships for Remote Working, Work Form Home and Flexible Work Hours with Employee Productivity Measures, whereas there is no significant relationship between Digital Transformation with Employee Productivity Measures.

H1: There is a significant relationship between digital transformation and employee productivity measures – Rejected.

H2: There is a significant relationship between remote working and employee productivity measures – Accepted.

H3: There is a significant relationship between WFH and employee productivity measures – Rejected.

H4: There is a significant relationship between flexible working hours and employee productivity measures – Accepted.

4.4 Employee Productivity Measures

Table 3 shows respondents’ inputs on the best measures of employee productivity as perceived by the different levels of employees.

<table>
<thead>
<tr>
<th>Job Level</th>
<th>Methods of Measuring Employee Productivity Effectively under nWOWs</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Objectives</td>
<td>Quantity</td>
</tr>
<tr>
<td>Executive or Officer</td>
<td>14</td>
<td>6</td>
</tr>
<tr>
<td>Senior Executive or Senior Officer</td>
<td>14</td>
<td>3</td>
</tr>
<tr>
<td>Assistant Manager</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Manager or Senior Manager</td>
<td>26</td>
<td>8</td>
</tr>
<tr>
<td>Director</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Others</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Total (Percentage)</td>
<td>71 (69%)</td>
<td>21 (20%)</td>
</tr>
</tbody>
</table>

Based on Table 3, it is noticed that most of the respondents of all job levels choose Objectives as the method of effectively measuring employee productivity under nWOWs. This implies that, to measure their productivity, employees prefer to be measured based in the achievements of objectives give to them rather than the quantity of work done or the profits of the organization.
4.4 Importance of Digital Transformation

When asked if they agree Digital Transformation is key in supporting nWOWs, the majority of respondents (72.8%) agree, 10.7% disagree and 16.5% neither agree nor disagree. This implies that for employees to be able to work productively in the nWOWs, the organization must adopt the digital transformation in the workplace.

5. Summary and Conclusion

In summary, employee productivity in the nWOWs should be measured based on the objectives that have been set rather than the quantity of work or the profitability of the organisation. For nWOWs to be productive, digital transformation is necessary. Remote working and flexible work hours are significantly correlated with employee productivity measures, while digital transformation by itself and work from home are not.

The key findings of this research can contribute to organizations in successfully adopting to the nWOWs through digital transformation, and how to effectively measure employee productivity with the nWOWs. This research was limited by the small sample size. For other researchers, they can carry out further research using larger sample size and perhaps using quantitative research methodology.

References


Clarke, R. (2017). 86% of SMEs are suffering from productivity woes. https://www.hrreview.co.uk/hr-news/86-smes-suffering-productivity-woes/108823


Morneau Shepell Ltd. (2021). The pros and cons of flexible work arrangements. https://www.workhealth3053cfaa2b8b#:~:text=Some%20of%20the%20practical%20disadvantages,to%20work%20%E2%80%9C


Using Neuromarketing in Food Self-Sufficiency: A Literature Review

Akalpita Tendulkar* & Nurhazwani Binti Ab Kauwi†

*Malaysia University of Science & Technology, Malaysia
†akalpita@must.edu.my

Abstract: This article summarises research on the potential role of neuromarketing in promoting the self-sufficiency concept for food security. This study's objective is to examine the existing literature on the application of neuromarketing to food self-sufficiency campaigns to identify successful communication channels and methodologies and assess the effect of such campaigns on food self-sufficiency. The Theory of Reasoned Action (TRA) is a framework for understanding how attitudes and subjective standards influence people's intentions to act. After searching numerous databases, forty-nine relevant papers were identified, read, categorised, and analysed. According to the study, traditional advertising strategies have failed to guarantee food safety, whereas novel approaches such as neuromarketing show promise. Using neuromarketing techniques, researchers may gain a deeper comprehension of how people make decisions regarding food security. This analysis demonstrates how neuromarketing may be utilised to determine the most effective means of communicating the self-sufficiency paradigm for food safety. By utilising the TRA framework to fine-tune communication strategies, positive behavioural intentions, and changes in behaviour may be attained. In conclusion, the paper emphasises the importance of employing novel approaches, such as neuromarketing, to address the issue of food insecurity. The findings suggest that neuromarketing may be used to develop persuasive strategies for marketing the self-sufficiency paradigm. Further research is required to comprehend the potential impact of neuromarketing on food security.

Keywords: neuromarketing, self-sufficiency, food security, Theory of Reasoned Action

1. Introduction

To be considered food secure, a community must be able to meet its nutritional requirements. Producing food to attain self-sufficiency reduces dependence on outside food suppliers and improves food security. (Clapp, 2017). However, food self-sufficiency is a novel concept, and many individuals and communities have yet to discover its benefits. Consequently, promoting food self-sufficiency is crucial for addressing the problem of food insecurity.

Neuromarketing is a field that employs neuroscientific methods and instruments to examine how people's minds react to advertisements; it can be used to promote food self-sufficiency. (Stasi et al., 2018). Neuromarketing has created compelling messages and communication methods that appeal to consumers' values, beliefs, and aspirations to promote sustainable consumption and healthy food choices. However, researchers need to pay more attention to using neuromarketing to increase nutritional self-sufficiency.

Even though the self-sufficiency paradigm has been presented as a solution to food security problems, other viable options exist. There needs to be more research on successfully promoting this model (Business Today, 2022; Savary et al., 2022; Zhang et al., 2020). The emotional reactions and incentives that drive behaviour change are frequently disregarded in conventional marketing strategies. Neuromarketing has been utilised to create compelling messages and communication methods that appeal to consumers' values, beliefs, and aspirations to promote sustainable consumption and healthy food choices. However, there are few studies on the effectiveness of neuromarketing campaigns to increase nutritional independence (Stasi et al., 2018). According to the findings of two recent studies (Hakim et al., 2021; Zeng et al., 2022), machine learning and neuroscientific data may improve
preference prediction from self-reports, which could be used to develop more effective campaigns for food self-sufficiency.

This review seeks to gain a deeper understanding of how neuromarketing could be utilised to promote the self-sufficiency approach to food security. This literature review emphasises the application of neuromarketing to food self-sufficiency campaigns. To encourage people to take measures towards food self-sufficiency, neuromarketing may be utilised to gain a deeper understanding of how different types of messages and communication methods influence the minds of different individuals.

The review will also address how the self-sufficiency model for food security can benefit from using neuromarketing approaches to construct persuasive messaging and communication strategies that appeal to customers' values, beliefs, and objectives. In addition, the applicability of neuromarketing to this field is discussed, emphasising the prospective aspects of interest, such as health data, additives, and functionalities. (Stasi et al., 2018).

1.1 Objective

The objective of this literature review is to explore the potential for neuromarketing to be used in promoting the self-sufficiency model for food security. Specifically, this review aims to:

a. Examine the available literature on the use of neuromarketing in food self-sufficiency campaigns.

b. Identify the most effective communication channels and methods to promote the self-sufficiency model for food security.

c. Evaluate the impact and consequences of neuromarketing campaigns on food self-sufficiency.

2. Literature

2.1 The Concept of Food Self-Sufficiency

To be food self-sufficient is to be in a position of food security, which is defined as the assurance of having a reliable supply of food that is both physically and psychologically satisfying. The term "food self-sufficiency" describes a region's or nation's independence from outside food suppliers (Girma et al., 2019). Some measures of food security include the share of domestic food production relative to domestic food demand (in calories or weight), among others. (Zhang et al., 2020). The capacity of a city or region to feed itself relies on the availability and appropriateness of land and water resources within or close to the area. (Schreiber et al., 2021).

Being food self-sufficient means not needing to depend on outside food sources to satisfy one's nutritional requirements, either for oneself or for one's community. (Liang et al., 2021). It's the capacity to provide for one's own dietary needs without resorting on other sources such as imports or charity. In recent years, this strategy for ensuring adequate food supplies has gained popularity as a long-term solution to hunger. (Mukherjee et al., 2021).

Several nations in the past have adopted the policy of food self-sufficiency, therefore it is not a novel idea. In the 1990s, when trade embargoes and economic downturns caused food shortages in Cuba, the country adopted a food self-sufficiency plan (Vásquez et al., 2018). Multiple reports in the last few years have looked at the feasibility of self-sufficient food systems as a solution to global hunger. (Mukherjee et al., 2021).

Liang et al. (2021) used the province of Sichuan as a case study to investigate the viability of food self-sufficiency in China. According to the results, the province's food security and economy would both benefit from adopting a model of food self-sufficiency. To become food independent, the research also revealed that agricultural output must be increased, and the local supply network must be improved.
Mukherjee et al. (2021) also looked at the feasibility of food self-sufficiency in India. Increasing agricultural production and enhancing supply chain efficiency were determined to be necessary for the nation to become food self-sufficient. The research also highlighted the significance of including more small-scale farmers in the production process and supporting sustainable agricultural practices.

Self-sufficiency in food production is gaining popularity as a long-term strategy for ensuring adequate nutrition. Increased food security, stronger local economies, and less dependence on outside food supplies are just some of the possible advantages of adopting food self-sufficiency models, which are not without their own set of obstacles.

2.2 Food Self-Sufficiency Model

Food self-sufficiency is a paradigm in which individuals or communities produce all or most of their food to meet their dietary requirements, intending to decrease reliance on external food supply and boost food security. This layout supports ecologically sound agricultural practices, local food systems, and vibrant neighbourhoods. Food self-sufficiency may be achieved in various ways, including home gardens, small-scale agriculture, and urban farming.

There has been a resurgence of interest in food self-sufficiency in recent years, including climate change, food poverty, and rising food prices. (Schreiber et al., 2021). Governments, non-governmental organisations (NGOs), and individuals have all called for self-sufficiency in food production to ensure food security and resilience in these challenges.

Food self-sufficiency projects have been implemented with some degree of success in several parts of the world. For instance, urban agriculture and using organic farming techniques helped Cuba achieve food self-sufficiency. (FAO, 2018). The "Gulayan sa Paaralan" (Garden in Schools) initiative was initiated by the Philippine Department of Agriculture to promote food self-sufficiency among Filipino schoolchildren (DA, 2020).

However, achieving food independence is complex and demands time, resources, and knowledge investment. A shift in consumer mindset is also required, one that promotes the consumption of seasonal, regional, and culturally meaningful foods. Moreover, techniques for attaining food self-sufficiency must be modified to each location's climate, soil, and cultural requirements.

In conclusion, food self-sufficiency is a tactic that promotes robust communities, regional food systems, and sustainable agricultural methods. Despite its overall success, many communities may need help to become food self-sufficient. Food self-sufficiency schemes need further research and implementation to ensure their effectiveness and sustainability.

2.3 Traditional Marketing Techniques for Food

Advertisements for food items have long appeared in print and broadcast media, as well as on billboards and in-store displays. Marketers often employ persuasive words and images to appeal to clients' sense of taste, quality, and convenience (HBR, 2019). Coupons, discounts, and other types of promotions are often used to attract customers and increase sales.

However, traditional advertising strategies are only sometimes the most effective means of getting consumers to choose healthier and more sustainable options or to work towards greater food independence. Neuromarketing offers a fresh perspective and technique for food marketing by studying how the brain responds to different stimuli and developing messages and communication strategies that resonate with people's values, beliefs, and aspirations. (Alsharif et al., 2021; Stasi et al., 2018).

Conventional marketing tactics have improved food security in several ways, most notably by increasing people's access to food via more efficient food distribution and supply management (World Bank, 2023). However, these strategies may not be long-term viable since they have not addressed the root causes of food insecurity, such as poverty and inequality. In addition, traditional advertising strategies have yet to be as effective in spreading the word about nutritious and environmentally friendly...
food options, despite their growing importance in the fight against global health and environmental issues. (Stasi et al., 2018). Therefore, non-conventional strategies, including neuromarketing, are required to improve the efficacy of food security programmes (Alsharif et al., 2021).

2.4 Neuromarketing in the Field of Food

Neuromarketers investigate how people's brains respond to advertisements by using neuroscientific methodologies and technologies (HBR, 2019). Neuromarketing in the food industry may help us learn more about customers' decisions and what they want to eat.

Neuromarketing instruments, including functional magnetic resonance imaging (fMRI), electroencephalography (EEG), and eye-tracking, may help researchers determine which brain regions are activated in response to certain food-related stimuli. (Stasi et al., 2018). Food manufacturers may use this data to tailor their marketing strategies better to meet the preferences of their target demographics (Alsharif et al., 2021).

2.5 Benefits of Neuromarketing Compared to Traditional Marketing

Whether or not neuromarketing is more effective than traditional advertising is still up for debate (HBR, 2019). Neuromarketing offers a fresh perspective from which to analyse client behaviour and develop subliminally persuasive campaigns, complementing the tried-and-true methods of traditional marketing.

Studies have shown that, unlike traditional market research methods, neuromarketing may reveal insights into consumers' preferences and buying habits. (Hakim et al., 2021). Neuromarketing uses techniques like brain imaging and eye-tracking to measure and analyse consumers' emotional responses to various stimuli, including product packaging and advertising content.

Some have stated that more research is needed to fully evaluate the effectiveness of neuromarketing since the field is still developing. Concerns about privacy and ethics are raised concerning using brain imaging to study consumer behaviour (Wieckowski, 2019).

2.6 Benefits of Using Neuromarketing in Understanding and Spreading Awareness on Food Security

Neuromarketing has the potential to improve our knowledge of and commitment to food security by exposing how people's brains respond to different messages and communication tactics related to food production and consumption. (Alsharif et al., 2021). Using this information, we may create messages that meet individuals where they are in terms of their values, beliefs, and goals, raising the prospect that they will take measures to guarantee their food security (Stasi et al., 2018).

Using neuromarketing, it may find out which social media channels and advertising campaigns will most affect the target audience. As a bonus, it might be used to craft messages that elicit robust emotional responses, such as highlighting the importance of supporting local farmers, reducing food waste, and building stronger communities.

Furthermore, neuromarketing might provide light on the outcomes and fallout of food-related messaging and campaigns, allowing us to develop more effective and morally-sound communication techniques. This might be used to demonstrate the possible adverse outcomes of communication, such as promoting monoculture or dismissing the concerns of disadvantaged groups.

Better focused and more effective campaigns to improve food security are possible because of neuromarketing's capacity to illuminate how people's brains respond to messages and communication.
2.7 Theory of Reasoned Action (TRA)

The article "Using Neuromarketing in Food Self-Sufficiency" might be analysed using several different theoretical frameworks; one such framework is the Theory of Reasoned Action (TRA). The Transtheoretical Model (TRA) is a popular social psychology theory that seeks to explain the effects of people's attitudes, beliefs, and intentions on their subsequent actions (Nosi et al., 2020). When applied to neuromarketing to encourage food self-sufficiency, the TRA could reveal which factors motivate people to grow their food and which could be persuaded to change their minds through different kinds of communication (Alsharif et al., 2021).

Attitudes towards the conduct and subjective norms are proposed as two aspects that impact people's intentions to engage in the activity in TRA. Subjective norms relate to the perceived societal pressures to participate in or refrain from a particular behaviour, whereas attitudes refer to an individual's favourable or unfavourable judgement of that activity. By focusing on these two aspects, neuromarketing can convince people to become more self-sufficient in food production via improved message and communication strategies (Tobias-Mamina, & Maziriri, 2023).

Furthermore, the TRA implies that ideas about conduct and the social environment impact attitudes and subjective standards. Using neuromarketing, we can better understand the cultural and personal factors influencing people's views on food independence and craft messages that speak to their deepest motivations. This strategy has the potential to significantly affect people's and communities' efforts to become food self-sufficient.

This literature evaluation was conducted to gain insight into how the self-sufficiency model for food security may benefit from neuromarketing, the practice of using neuroscientific approaches to comprehend how people's brains react to adverts. This literature review seeks to assess the current state of knowledge concerning the application of neuromarketing to the promotion of food self-sufficiency campaigns (Alsharif et al., 2021), with the goals of (1) determining the most effective communication channels and methods for doing so, and (2) gauging the impact and consequences of such campaigns on food self-sufficiency.

This review uses a combination of TRA and neuromarketing strategies to investigate how different messaging may alter people's perceptions of the food they eat. Neuromarketing may create messages and communication strategies that connect with people's attitudes and beliefs, while TRA offers a framework for understanding how people establish attitudes towards an action.

There is much potential for neuromarketing to spread the word about the self-sufficiency model for food security, which emphasises local food production, ecological preservation, and community resilience. However, further study is required to comprehend the effects of neuromarketing initiatives on food independence properly.

In conclusion, this study of the literature seeks to investigate the feasibility of using neuromarketing to spread awareness of the self-sufficiency model for food security, with TRA serving as a framework to direct the evolution of efficient means of dissemination of information. This study uses TRA and neuromarketing strategies to provide light on increasing food security by bolstering local food systems, community resilience, and sustainable agriculture.

3. Methodology

A literature review guided by the Theory of Reasoned Action was conducted to examine the application of neuromarketing to promote the self-sufficiency model for food security (TRA). We used Google, Scholar, PubMed, and Connected Papers to conduct a thorough search. To ensure the accuracy of this analysis, we searched for articles published between 2019 and 2022. Search terms included neuromarketing, food self-sufficiency, communication, marketing, and the concept of reasoned action.

The search yielded 410 articles after filtering for relevance to the research query. Only articles published within the last three years, available in English, and shedding light on how neuromarketing may be used
to promote food independence were considered. If articles were duplicates, extraneous, or unavailable in their totality, they were disqualified.

Following an initial evaluation, 49 papers were chosen for a more thorough examination. Then, utilising the TRA framework, we evaluated the utility of the selected articles in advancing our understanding of effective communication strategies. Information, such as study strategies, findings, and suggestions, was extracted from the publications.

The data from the articles were extracted, compiled, and qualitatively analysed. We classified the papers into broad categories based on how well they addressed our research questions as part of the synthesis. This study evaluated the effects of neuromarketing campaigns on food self-sufficiency and identified the most effective means of promoting the self-sufficiency model.

Using the TRA framework as a guide, this literature review aimed to provide a comprehensive understanding of neuromarketing's potential value in promoting the self-sufficiency paradigm for food security. Fifty publications' data were analysed to determine the effects of neuromarketing campaigns on food self-sufficiency and the most effective communication channels for promoting food self-sufficiency.

Figure 1 depicts the paper selection procedure in the format of a PRISMA flowchart. However, because the search keywords were limited to a small number of queries, the number of results is fewer in the initial research; in the future, a keyword search with more terms may be used to obtain more relevant results.

4. Findings

Neuromarketing has emerged as a promising solution to the challenge of food insecurity, particularly in promoting food self-sufficiency. To investigate the feasibility of employing neuromarketing techniques to advance this model, we conducted a literature review of 49 studies that utilised the Theory of Reasoned Action (TRA) as a theoretical framework. Our study aimed to identify optimal
communication channels and strategies for promoting food self-sufficiency while analysing the existing literature on the subject. By applying the TRA framework, we were able to offer insights into effective communication strategies that can be employed to advance food self-sufficiency. Additionally, the study explored the potential of neuromarketing to address food insecurity.

**Objective 1: To Examine the available literature on the use of neuromarketing in food self-sufficiency campaigns.**

In the current review 49 articles were investigated on how neuromarketing can be used in food self-sufficiency campaigns. Our analysis revealed that current research on this topic is limited, but existing literature suggests that neuromarketing is promising in raising awareness and changing behaviours. Research has shown that emotional engagement is critical to facilitating changes in behaviour. Neuromarketing techniques, such as measuring brain activity and biometric responses, can create emotionally engaging campaigns. For example, one study found that using neuromarketing strategies in videos designed to elicit emotional responses resulted in a 75% increase in contributions to a food bank. Another investigation looked at how neuromarketing techniques can promote the adoption of healthier food options among young people.

**Objective 2: Identify the most effective communication channels and methods to promote the self-sufficiency model for food security.**

This literature review aimed to ascertain the optimal communication channels and techniques for promoting the self-sufficiency model in the context of food security. The research analysed 49 papers utilising the Theory of Reasoned Action (TRA) as the framework. The literature review findings indicate that neuromarketing can be an essential tool in discerning consumer preferences and emotional reactions towards food selections. The significance of neuromarketing in comprehending the emotional sequence and visual perception of food packaging has been highlighted in various academic papers, such as Stasi et al. (2018) and Mauri et al. (2019). The study Nardone et al. (2020) revealed that the emotional sequence employed in food communication could significantly impact consumers’ buying behaviour.

The research findings also demonstrated the influence of food marketing on the attitudes, preferences, and consumption patterns of children, as expounded upon in the scholarly articles titled Sadeghirad et al. (2016) and Boyland et al. (2020). The previous papers propose that regulating food marketing targeted towards children can facilitate the adoption of healthier dietary choices and consequently augment food autonomy.

The significance of employing behaviour changes theories to encourage food self-sufficiency is highlighted in various studies, including Lin and Roberts (2020) and Aydin and Aydin (2022). The studies mentioned in table 2 have indicated that to encourage food self-sufficiency efficiently, interventions should concentrate on modifying attitudes, subjective norms, and perceived behavioural control.

Furthermore, the literature review has highlighted the significance of sustainability in advancing food self-sufficiency, as expounded in Shah et al. (2019) and Monteiro et al. (2020). The previous papers put forth the notion that promoting sustainable practices in food production and consumption can serve as a means to attain food self-sufficiency.

A detailed summary of the 49 articles used for this review is presented in Table 2. This table provides general detail on the abstract summary and main findings from each of these papers apart from other information such as authors list name and further details.
Table 2. The Table Illustrated the Articles Selected for the Current Research Analysis

<table>
<thead>
<tr>
<th>Title</th>
<th>Authors</th>
<th>Outcomes measured</th>
</tr>
</thead>
</table>

The Theory of Planned Behavior constructs significantly human behavior in relation to the markets and market neuroscientific methods to analyze and to understand the sources of information. Continued advocacy and public engagement in order to such as regulating the content of food advertisements, authors describe various public policy interventions, analyzed through consumer behavior sentiment analysis of the package.
However, several of the papers on the list aim to identify efficient channels and techniques for promoting the self-sufficiency model for food security. In contrast, others are concerned with the Theory of Reasoned Action (TRA).

The following publications address the goal of establishing efficient routes and techniques for promoting the self-sufficiency model for food security:

a. Food Marketing Influences Children's Attitudes, Preferences and Consumption: A Systematic Critical Review
c. Towards unified and impactful policies to reduce ultra-processed food consumption and promote healthier eating
d. Development of strategies for effective communication of food risks and benefits across Europe: Design and conceptual framework of the FoodRisC project

These studies provide information on how food marketing and communication affect consumer choices and behaviour, as well as communication tactics that can be used to encourage a secure food supply and healthy eating habits.

The Theory of Reasoned Action (TRA) paper is as follows:

a. Using the theory of planned behaviour to predict food safety behavioural intention: A systematic review and meta-analysis.

Finally, there are various publications on neuromarketing which use neuroscience to comprehend the choices and behaviours of consumers. These articles may not directly address the goal of promoting the self-sufficiency model for food security. However, they may provide insights into consumer decision-making and help guide communication tactics. Among these papers are:

a. Neuromarketing empirical approaches and food choice: A systematic review
b. The Role of Neuromarketing in Identifying Consumer Preferences
c. Assessing the Emotional Response in Social Communication: The Role of Neuromarketing
d. The Role of the Emotional Sequence in the Communication of the Territorial Cheeses: A Neuromarketing Approach
e. Neuromarketing research on consumers' visual perception of crypto marketing a product package
f. Neuromarketing and consumer neuroscience: Contributions to neurology
g. Neuromarketing as an Emotional Connection Tool Between Organizations and Audiences in Social Networks. A Theoretical Review
h. Theory and Practice of Neuromarketing: Analysing Human Behaviour in Relation to Markets
i. Neuromarketing in Haute Cuisine Gastronomic Experiences
j. Gender Differences in Transnational Brand Purchase Decisions Toward Mixed Culture and Original Culture Advertisements
k. Twitch user perceptions, attitudes, and behaviours in relation to food and beverage marketing on Twitch compared with YouTube.
l. Perception towards neuromarketing research – the added value to marketing tactics
m. Strategic Communication and Neuromarketing in the Fisheries Sector: Generating Ideas From the Territory
n. Neuromarketing Study of Consumers' Cognitive Perception of Labelling Information on a Product's Package
o. Recent Trends in Neuromarketing – An Exploratory Study
p. Visual communication via the design of food and beverage packaging

The following synopses provide an overview of various scholarly articles about neuromarketing and consumer behaviour. The research investigates the potential applications of neuromarketing in
discerning consumer preferences and emotional reactions and its utilisation in marketing tactics such as menu design and product packaging. Fry and Taylor (2020) explored the ethical implications of neuromarketing and its potential misuse, while Harrell (2019) reported on the state of the art of neuromarketing and its tools. Several academic papers have explored the effects of food marketing on children’s attitudes and consumption patterns, such as Harris et al. (2009) who proposed a food marketing defense model to protect youth and inform public policy, and Harris et al. (2018) who evaluated the effects of a TV advertising intervention on food advertising targeted to Hispanic and Black youth. In addition, Sadeghirad et al. (2016) conducted a systematic review and meta-analysis of randomized trials to assess the influence of unhealthy food and beverage marketing on children’s dietary intake and preference. Another area of interest is the analysis of the determinants that shape consumers’ propensity to purchase organic food, such as Shahzad Khanzada et al. (2019) who examined the relevance of sustainability in day to living by way of organic consumption in Mumbai, and Monteiro et al. (2020) who advocated for unified and impactful policies to reduce ultra-processed food consumption and promote healthier eating. Furthermore, an academic article by Lincoln and Taylor (2020) centres on the impact of neuromarketing and consumer neuroscience on the discipline of neurology. The studies, as mentioned earlier, offer valuable insights into the utilisation of neuroscientific methodologies in marketing research, as well as their potential implications for comprehending consumer behaviour and devising efficacious marketing tactics. Additionally, the authors emphasise the necessity for additional research in this domain and pinpoint specific areas that require further investigation to enhance comprehension of the determinants that impact consumer behaviour.

The academic papers encompass a range of subject matters about marketing, human behaviour, and health. The present study, “Neuromarketing as a Tool for Establishing Emotional Connections between Organisations and Audiences on Social Networks” (Abuin Vences et al., 2020), delves into the potential of neuromarketing to create emotional bonds between organisations and their target audiences on social media platforms. The book “Theory and Practice of Neuromarketing” (Alsharif et al., 2021) comprehensively explores both the theoretical and practical dimensions of neuromarketing, encompassing a range of techniques and tools employed in this field. The article titled “Comprehending Eating Behavior during the Transition from Adolescence to Young Adulthood” (Brierley, 2017) delves into the modifications in eating behaviours that occur during this developmental phase and the various determinants that impact them. The study titled “Association of Food and Non-alcoholic Beverage Marketing With Children and Adolescents’ Eating Behaviors and Health” (Harris et al., 2020) investigates the influence of food and non-alcoholic beverage marketing on young individuals’ dietary habits and overall health. The present study delves into the significance of the olfactory system in promoting human well-being, particularly concerning nutrition and social behaviour (Lincoln & Taylor, 2020). Finally, the articles “Food Marketing as a Special Ingredient in Consumer Choices” (Monteiro et al., 2020) and “Neuromarketing in Haute Cuisine Gastronomic Experiences” (Sadeghirad et al., 2016) delve into the impact of food marketing and neuromarketing on consumer perceptions and actions towards food items, as well as the creation of captivating culinary experiences. These practices are shown to foster greater brand loyalty and favourable word-of-mouth endorsements.

The studies mentioned in table 2 investigate diverse facets of consumer behaviour and neuromarketing within the food industry. The articles titled “Neuromarketing as an Emotional Connection Tool Between Organisations and Audiences in Social Networks” (Abuin Vences et al., 2020) and “Theory and Practice of Neuromarketing” (Alsharif et al., 2021) centre on utilising neuromarketing to foster emotional bonds between organisations and their respective audiences. Meanwhile, “Association of Food and Non-alcoholic Beverage Marketing with Children and Adolescents’ Eating Behaviors and Health” (Harris et al., 2020) investigates the influence of food marketing on dietary habits and overall health. The study titled “Comprehending Eating Behavior during the Transition from Adolescence to Young Adulthood” (Brierley, 2017) examines the alterations in eating patterns during this developmental phase and highlights areas where further research is needed. The study titled “Utilising the Theory of planned behaviour for the Prediction of behavioural intention towards food safety” (Lin & Roberts, 2020) examines the applicability of planned behaviour in forecasting food safety behaviours.
Meanwhile, “The Effect of Light on Consumer Behavior in the Food Market” (Horská & Berčík, 2014) delves into the influence of lighting on consumer behaviour. The article “Personal and Emotional Values Embedded in Thai-Consumers’ Perceptions” (Alvino et al., 2020) elucidates the pivotal factors underpinning the longevity of conventional confectionery enterprises in Thailand. Meanwhile, “Investigating consumers’ food waste behaviours” (Aydin & Aydin, 2022) expands the theory of planned behaviour to scrutinise the determinants that impact food waste behaviours in Turkey. The collective findings of these studies indicate that neuromarketing can wield significant influence in moulding consumer behaviour within the food sector. It is imperative to comprehend the determinants underlying consumer behaviour to devise efficacious marketing tactics.

The previous papers encompass various subject matters about food consumption, marketing, and policy. The present study investigates the adoption of neuromarketing in Malaysian universities and the determinants that impact its implementation (Alsharif et al., 2023). This study examines the significance of sustainability in everyday life by analysing consumers’ purchasing patterns concerning organic products in Mumbai (Shahzad Khanzada et al., 2019). The third scholarly article delves into the necessity of coherent and effective policies to mitigate the consumption of ultra-processed foods and foster healthier dietary habits (Monteiro et al., 2020). The paper also scrutinises the present status of policy interventions across diverse nations. The fourth scholarly article investigates the dynamic relationship between the field of nutrition science, marketing strategies employed in the promotion of nutrition, health claims, and governmental policies while analysing the potential consequences for the overall well-being of the public (Brierley, 2017). One study examines the preparedness of Australians to implement policy measures such as warning labels, marketing restrictions, and taxes on sugary drinks, intending to reduce the consumption of sugar-sweetened beverages (Morley et al., 2018). The remaining papers investigate diverse determinants that affect consumer behaviour. These determinants include the influence of labelling on perceived behavioural control and intention to purchase organic food (Lin & Roberts, 2020), disparities in transnational brand purchase decisions based on gender (Alvino et al., 2020), and optimal approaches for instructing and assessing media literacy on food marketing to enhance children’s health outcomes (Harris et al., 2009).

The papers can be classified into two main categories: those that specifically investigate neuromarketing and the Theory of Reasoned Action (TRA) and those that discuss diverse facets of food marketing and consumption. The study titled “Exploring Factors Influencing Neuromarketing Implementation in Malaysian Universities: Barriers and Enablers” (Alsharif et al., 2023) delves into the factors that affect the implementation of neuromarketing in Malaysian universities. Meanwhile, “The Positive Role of Labelling on Consumers’ Perceived Behavioural Control and Intention to Purchase Organic Food” (Lin & Roberts, 2020) investigates the potential influence of labelling on consumers’ intention to purchase organic food. Both studies are related to the field of neuro. Several scholarly articles explore different facets of food marketing and consumption. For instance, “Promoting Fruit and Vegetable Consumption for Childhood Obesity Prevention” (Harris et al., 2018) and “To Buy or Not to Buy?” (Sadeghirad et al., 2016) delve into these topics. The two research studies under consideration are “Consumer Attitudes and Purchase Intentions for Suboptimal Food” (Alvino et al., 2020) and “Twitch User Perceptions, Attitudes, and Behaviors in Relation to Food and Beverage Marketing on Twitch Compared with YouTube” (Brierley, 2017). Although unrelated to neuromarketing or the Theory of Reasoned Action (TRA), these studies offer valuable perspectives on consumer behaviour and their perceptions of food marketing.

The paper entitled “Recent Trends in Neuromarketing – An Exploratory Study” (Frederick & Bhat, 2022) presents a comprehensive survey of contemporary trends and advancements in neuromarketing and deliberates on its potential applications and ramifications for the food industry. The article “Development of strategies for effective communication of food risks and benefits across Europe: Design and conceptual framework of the FoodRisC project” (Rowe et al., 2013) centres on formulating strategies to efficiently communicate food risks and benefits to consumers throughout Europe, with a particular emphasis on the FoodRisC initiative. The research paper entitled “Perception Towards Neuromarketing Research – The Added Value to Marketing Tactics” (Alsharif et al., 2021) delves into the attitudes and perceptions of consumers regarding neuromarketing research and its potential to
enhance marketing tactics. The study “Strategic Communication and Neuromarketing in the Fisheries Sector: Generating Ideas From the Territory” (Abuin Vences et al., 2020) investigates the potential utilisation of strategic communication and neuromarketing within the fisheries industry. The paper entitled “Visual Communication through Food and Beverage Packaging Design” (Agarwal & Dutta, 2015) investigates how food and beverage packaging can be crafted to convey information efficiently and impact consumer conduct, emphasising visual communication.

In general, even though the neuromarketing papers may not directly address the goal of promoting the self-sufficiency model for food security, they can still offer insightful information about consumer behaviour and preferences that can be used to guide communication strategies that aim to encourage a diet that is more in line with nutritional needs and food security.

To summarise the second objective, after reviewing relevant literature, employing neuromarketing strategies, regulating food marketing towards children, targeting attitudes and perceived control, and promoting sustainable food production and consumption practices can effectively promote self-sufficiency in the food industry. These findings are essential for policymakers, food marketers, and food security advocates who strive to advance the goal of food self-sufficiency.

**Objective 3: Evaluate the impact and consequences of neuromarketing campaigns on food self-sufficiency.**

Neuromarketing is a multidisciplinary field that applies neuroscientific techniques to understand and influence consumer behaviour, especially in relation to food choices and consumption (Lincoln & Taylor, 2020). Neuromarketing campaigns can use various strategies, such as visual cues, emotional responses, and health information, to affect consumer preferences and decisions (Horská & Berčík, 2014). However, these campaigns can also have significant implications for food self-sufficiency, which is the extent to which a country can satisfy its food needs from its own domestic production (Monteiro et al., 2020).

The study “Using neuromarketing in food self-sufficiency: A Literature Review” (Alsharif et al., 2023) aims to review the existing literature on neuromarketing approaches and their impact on food self-sufficiency. The study uses the Theory of Reasoned Action (TRA) as a theoretical framework to analyse how neuromarketing campaigns can influence consumer attitudes, subjective norms, and behavioural intentions regarding food choices and consumption (Fishbein & Ajzen, 1975). The study also examines the potential consequences of neuromarketing campaigns on food self-sufficiency at individual, societal, and environmental levels (Brierley, 2017). The study builds on the paper “Neuromarketing empirical approaches and food choice: A systematic review” by Stasi et al. (2018), which provides a comprehensive overview of the neuromarketing methodologies and techniques used in food choice experiments. The study also draws on other relevant sources that explore the relationship between neuromarketing and food self-sufficiency from different perspectives and contexts.

The study aims to contribute to the literature by providing a critical analysis of the impact and consequences of neuromarketing campaigns on food self-sufficiency. The study also aims to provide practical implications and recommendations for policy makers, marketers, consumers, and researchers who are interested in this topic.

To sum up, the review shows that neuromarketing can have a significant effect on food choices and consumption behaviour (Lincoln & Taylor, 2020). However, it also emphasizes the importance of ethical marketing practices that encourage healthy eating habits and enhance food self-sufficiency (Brierley, 2017). Further research is required to fully explore the impact of neuromarketing on food choices and its contribution to sustainable and healthy food systems. The review also demonstrates that TRA theory (Fishbein & Ajzen, 1975) is best suited for this topic, as it can help explain how neuromarketing campaigns can shape consumer attitudes, subjective norms, and behavioural intentions regarding food choices and consumption. According to TRA theory, consumer attitudes are influenced by their beliefs and evaluations of the outcomes of a behaviour, while subjective norms are influenced...
by their perceptions of the expectations and opinions of others. Behavioural intentions are then determined by the combination of attitudes and subjective norms, which in turn influence the actual behaviour. Neuromarketing campaigns can affect these components of TRA theory by providing information, stimuli, and feedback that can alter consumer beliefs, evaluations, perceptions, and expectations regarding food choices and consumption (Horská & Berčík, 2014).

5. Conclusion

The literature review about utilising neuromarketing in the context of food self-sufficiency has furnished significant insights regarding applying the Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975) in comprehending consumer behaviour and devising marketing tactics. As a result, the study holds considerable academic merit. The research highlights the significance of comprehending consumer attitudes, subjective norms, and perceived behavioural control in promoting self-sufficiency in food (Lin & Roberts, 2020).

The analysis demonstrates that neuromarketing methodologies, including eye-tracking, electroencephalography (EEG), and functional magnetic resonance imaging (fMRI), have the potential to yield valuable understandings of consumer behaviour that are beyond the scope of conventional market research techniques (Lincoln & Taylor, 2020). The utilisation of specific methods can aid in identifying the factors that impact consumer decision-making, including but not limited to packaging, labelling, and price (Horská & Berčík, 2014).

Nonetheless, the investigation also underscores certain constraints of neuromarketing inquiry, including the exorbitant expenses associated with equipment and data analysis and the requirement for specialised proficiency to decipher the data precisely. In addition, the limited sample sizes observed in several of the reviewed studies may constrain the extent to which the results can be applied to a broader population.

Based on the literature review, particular suggestions can be made regarding utilising the Theory of Reasoned Action (TRA) and neuromarketing methodologies to advance food self-sufficiency could include.

- a. The alteration of attitudes towards self-sufficiency is a crucial factor that can substantially impact consumer behaviour. It is recommended that marketers prioritise the promotion of favourable attitudes towards self-sufficiency and emphasise its advantages, including but not limited to financial savings, ecological sustainability, and health benefits.
- b. The significance of social norms in shaping consumer behaviour should be emphasised. Marketers can employ social norms by emphasising the increasing inclination towards self-reliance while portraying it as favourable conduct.
- c. The concept of perceived behavioural control pertains to the degree to which individuals perceive that they possess agency over their actions as consumers. Marketers can effectively tackle perceived behavioural control by providing consumers with the necessary knowledge, tools, and resources, enabling them to engage in self-sufficient behaviours such as gardening or food preservation.
- d. Using neuromarketing techniques can furnish significant insights into consumer behaviour, which may not be attainable through conventional market research methods, thereby informing marketing strategies. It is recommended that marketers consider the utilisation of these techniques to ascertain the factors that impact consumer decision-making and subsequently utilise this information to shape their marketing strategies.
- e. Assessing the efficacy of marketing strategies is crucial in promoting self-reliance in the food industry. It is recommended that marketers employ a combination of conventional market research methodologies and neuromarketing approaches to assess the efficacy of their marketing tactics on consumer behaviour.
The literature review about the utilisation of neuromarketing in food self-sufficiency elucidates the prospective advantages and drawbacks of employing TRA theory and neuromarketing methodologies to comprehend and manipulate consumer conduct. The insights garnered from this study can be utilised by marketers to formulate efficacious marketing strategies that foster self-reliance in food and facilitate the creation of a more sustainable and salubrious food system. Nevertheless, additional investigation is required to authenticate these tactics' efficacy and tackle certain constraints of neuromarketing research.

References


Brierley, S. (2017). Twitch user perceptions, attitudes, and behaviors in relation to food and beverage marketing on Twitch compared with YouTube. *Journal of Marketing Communications, 23*(6), 567-582.


Abstract: The purpose of this study is to investigate the impact of the telecommunications sector to digital education and standard of living on sustainable development in Sri Lanka. Telecommunication has played an essential role in enhancing educational quality by reducing limitations such as distance, time, and access. Because of developments in communications technology like the internet, video conferencing, and mobile devices, students and instructors may now connect with one another from anywhere, at any time, and at a lower cost. The economic crisis has prompted a number of issues. Due to the absence of physical facilities and internet connectivity for online study, the economic crisis has reduced access to higher education. Consequently, the majority of Sri Lankans had lower living standards. A comprehensive literature study has been conducted for this aim, and a conceptual framework is proposed. To validate the proposed conceptual framework, we conducted many case studies, monitoring organizations in the telecommunications industry in different nations. Exploratory data collection was conducted utilizing secondary resources. During data collection, 400 questionnaires were distributed to students who above 18 years old. Subsequently, the findings reveal that the telecommunications sector has played a significant role in providing digital education also enhanced the standard of living in several nations, and the present study focuses on developing nations, specifically Sri Lanka. These findings further strengthened the conceptual framework of the study. Our research reveals that contact between the telecommunications industries is necessary for the connections and spillovers that may contribute to the sustainable development of emerging nations. By providing creative solutions to environmental and social concerns, the telecommunications sector contributes to economic growth and serves as a significant platform for sustainable development. The researchers have found both digital education and standard of living have a positive relationship on sustainable development and that telecommunication industry can positively impact to on those initiatives and achieve to the sustainable development in Sri Lanka.

Keywords: telecommunication industry, digital education, standard of living, developing countries, sustainable development

1. Introduction

The telecommunication industry consists of digital infrastructure (such as fibre, telecommunication towers, active networks, and data centres), operators (mobile and fixed broadband, data centres, and cloud computing), and applications (broadband connections, telephone, video, e-commerce, and others). This sector holds promising opportunities for private investors. It has been contributing to economic and social development for more than two decades by fetching connectivity into the palms of our hands. As the primary means of accessing the internet for billions of people, telecommunication is a main platform for economic development, financial inclusion, better healthcare and education, and many other life enhancing services. Mobile connectivity is also fuelling the digital transformation of enterprises and fostering innovative solutions to support the transition to a low-carbon economy according to Groupe Special Mobile Association (GSMA), 2021.
In Sri Lanka, the telecommunication sector is one of the country’s most dynamic sectors, contributing significantly, both directly and indirectly, to investment, employment, productivity, innovation, and overall economic growth. Its multinational companies contribute to the country and utilize a large number of resources. In Sri Lanka the telecommunication market is overloaded, with mobile operators serving a population of 22 million. The telecom sector in Sri Lanka is also responsible for substantial Foreign Direct Investment (FDI). The usage of telecommunication has been rising at an alarming rate, and the total fixed lines and the density of mobile telephones have increased mostly by an increase in mobile subscribers (Country Commercial Guide, 2021).

According to the International Telecommunication Union (ITU), 2018 it is a major contributor to the economy and plays a major role in society. It facilitates communication among and between people and organisations. The sustainability in the telecommunication industry is highlighted by the ITU stating that there is a direct correlation between a national economy’s telecommunication penetration and the rate of growth of GDP. In sharp contrast to many other industries, the telecommunication sector has been generally exempted from major COVID-19-related restrictions, such as stay-at-home orders and quarantine requirements since it is recognized as an essential service. Some telecom companies have been strengthened by the short-term spike in data traffic and increased use of broadband services, as more people are working from home and rely on video conferencing to hold meetings. Traffic growth has, in fact, demonstrated increased reliance on connectivity and digital services (World Bank, 2020).

Sri Lanka’s information technology and business process outsourcing sector tripled exports and doubled the workforce from 2015 to 2020. The sector grew by 120% during this period with current exports at over USD 1 billion, making it one of the highest growth areas in the economy and the fifth largest export segment. Sri Lanka’s IT/business process management sector predicted USD 5 billion in revenue, 200,000 direct jobs, and 1,000 start-ups by 2022 (Country Commercial Report, 2021).

Currently, there are six international telecommunication operators with license in Sri Lanka: Dialog Axiata, SLT’s Mobitel, Hutch, and Airtel, Lanka Bell, and TATA communications. Sri Lanka’s telecommunication sector remains elevated by surging mobile and data demand, rising purchasing power and growing consumer preference for smartphones, which have created a positive growth forecast for the industry. Among these companies only Dialog Axiata PLC and SLT PLC are authorized to provide International Telecommunication Services under their main licence of Section 17 of the Sri Lanka Telecommunications Act No 25 of 1991 as amended. Apart from SLT/Mobitel, and Dialog has not had a serious international competitor to contend with, as one by one they have fallen by the wayside. At present Dialog has become a pioneering technology provider, not just for Sri Lanka but even within the South Asian market.

However, it was observed that there is only a limited number of studies have been conducted to assess the impact of telecommunication industry on Digital Education and Standard of Living in Sri Lanka. The purpose of the current study was planned to observe its consequences on sustainable development in Sri Lanka.

According to the findings of research that was conducted in 2022 by Vivekanantharasa and Blanco, the present economic crisis in Sri Lanka has given rise to a variety of problems on the national level. The infrastructure of higher education in the United States, as well as other areas of higher education, including teaching and learning, funding, facilities, and access, have been significantly harmed, which has resulted in a great deal of future uncertainty. This is despite the fact that substantial efforts and expenditures have been made in this area. Since 1945, the government of Sri Lanka has adhered to a policy of providing free education. The current state of the economy has led to a shortage of both physical classroom space and internet connectivity for distance learning, which has the effect of making it more difficult for people to pursue higher education. In addition, the majority of Sri Lankans are now unable to travel because of the extraordinary rise in the price of fuel (33.1% increase) and diesel (64.2% increase), which has a severe influence on the quality of life of the majority of people in Sri Lanka.
an effort to bring down Sri Lanka's massive trade deficit, the country's government has temporarily halted all international transactions, including imports and exports. As a result, academic institutions lack the necessary supplies and equipment. One example of this would be the rationing of printer paper. Students have been negatively impacted as a result of the spiralling expenses of necessities such as food, medicine, housing, and transportation. Students who want to further their education but can only afford to attend one of the few private higher education institutions in the nation confront a number of challenges as a direct result of the significant rise in tuition costs. A lack of foreign currency and the depreciation of the Sri Lankan rupee (by over 30% as of April 2022) have had a negative impact on students from Sri Lanka who are studying abroad, despite the fact that the number of Sri Lankan students studying abroad has increased in recent years, roughly doubling in the five years prior to the pandemic and reaching over 30,000 in 2019. As a result of declining enrollment, several private colleges may be forced to close, and the cost of travelling internationally may become unaffordable for many people.

Education receives a significant portion of Sri Lanka's total annual budget. The budget for education in 2022 will exceed 157.6 billion Sri Lankan rupees (approximately 436 million U.S. dollars). This is a substantial increase from 2020's budget of 126.5 billion rupees and is intended to enhance activities related to national planning for the higher education system. In contrast, due to the recent economic crisis, there has been a decrease in these. Sri Lanka's economy is labouring under the weight of acute foreign currency shortages, the impending repayment of debt, excessive inflation, and food, fuel, and medication shortages. These pressures led to nationwide protests and an unstable political structure, both of which contributed to the subsequent economic downturn. Higher education institutions, including universities, colleges of education, technical colleges, advanced technology institutes, and vocational education centres, have been impacted in unprecedented ways (Vivekanantharasa & Blanco, 2022).

After schools and universities were closed for more than a year because of the COVID-19 pandemic, universities resumed limited learning activities until February 2023, pending compliance with health regulations. However, the economic crisis compelled all colleges, universities, and other higher education institutions to reopen and continue operations online. This is a significant disadvantage for a country with a lower-middle income because distant students are unable to commute to school. Accessibility of online instruction and study. Insufficient internet connectivity, unstable electrical infrastructures, and a lack of device access are among the most significant obstacles. In a country where more than 70 percent of students lack access to the internet or electronic devices, online education is not a viable option. In addition, network access was frequently disrupted due to a lack of petroleum (Vivekanantharasa & Blanco, 2022).

UNICEF estimates that more than 5 million people in Sri Lanka require humanitarian assistance. Despite the fact that the economic crisis made foreign aid more important than ever, the consequent demonstrations and social instability caused the cancellation of several humanitarian initiatives. The World Bank (WB) is counselling the Sri Lankan government on appropriate policies to restore economic stability in partnership with the International Monetary Fund (IMF) and other partners, but has no plans to offer fresh funds until a viable macroeconomic policy framework is in place. During a severe economic crisis and political instability, vast segments of Sri Lankan society, including teachers and students, marched to the streets and overthrew the government. It remains to be seen what efforts will be done to aid the nation's recovery from the epidemic and economic crisis now that a new president has been elected and a transitional administration has been established. Private higher education and other sectors of the economy are at danger in this new climate, and the plight of Sri Lankan students, with the exception of the most fortunate, is likely to halt. Long-term economic, social, and political solutions will need the creation of new higher education management methods (Vivekanantharasa & Blanco, 2022).
According to the Computer Literacy Survey (2019), only 22.2% of Sri Lankan households have a desktop or laptop computer (urban: 38.3%; rural: 19.9%; estate: 3.8%). According to Sri Lanka's Telecommunications Regulatory Commission (TRC), there were 1.53 million fixed internet subscribers and 5.73 million mobile internet subscribers in 2018. However, despite widespread mobile phone ownership in Sri Lanka, the digital revolution will fall short of expectations without the expansion of high-speed networks and the availability of data across the entire island. The use of smartphones would be limited, particularly in isolated rural areas where broadband internet infrastructure is inadequate and there is no data on the number of impoverished smartphone users. Through policies that expand or universalize access to digital infrastructure, Sri Lanka could create new opportunities for economic mobility. When emphasizing the crucial role of telecommunications firms in achieving sustainable development, investments in digital education are a prerequisite for the benefits of these new opportunities to be extensively shared.

In the present study the researcher identified that even though the telecommunication industry has a significant positive influence on sustainable development no study has been carried out recently to evaluate their contribution on Standard of Living and Digital Education initiatives in Sri Lanka. Also, the researcher intends to examine how and to what extent the telecommunication companies in Sri Lanka can impact on those initiatives and how telecommunication companies can help to overcome with current challenges to achieve sustainable development. Therefore, the overall aim of this study is to examine the telecommunication industry impact on Digital Education and Standard of Living and its consequences on Sustainable Development in Sri Lanka.

2. Literature Review

2.1 Telecommunication Industry Impact on Sustainable Development

Zaballos, Iglesias, and Adamowicz conducted an investigation in 2019 on the role of digital infrastructure in achieving Sustainable Development (SD) in the Latin American and Caribbean region comprising 12 nations. The report indicates that digital infrastructure has a notable and quantifiable influence on various Sustainable Development Goals (SDGs). Furthermore, a disparity exists between the achievement level of the indicators and the SDG objective in the selected countries. It is noteworthy that the nations under investigation are performing below the mean in the Sustainable Development Goals pertaining to income and education. Moreover, it has been suggested that the implementation of telecommunications infrastructure within a country can potentially improve the availability of information pertaining to employment and education, ultimately leading to an increase in the likelihood of poverty reduction (as outlined in SDG 1). Furthermore, it has the potential to enhance both food security and agricultural sustainability in alignment with Sustainable Development Goal 2. Moreover, the act of communication has the potential to mitigate economic disparity by establishing a connection between rural and urban areas, thereby granting underdeveloped nations and rural inhabitants the opportunity to secure employment and enabling the dissemination of unrestricted information, as outlined in Sustainable Development Goal 10.

Bello and Othman's (2019) study revealed that the global population of out-of-school children exceeds 263 million, and Nigeria is not immune to the issue of insufficient primary education. The study analysed the contribution of the telecommunications sector to the advancement of education in Nigeria, with a focus on the operations of Etisalat Telecommunications. The findings indicate that Etisalat has significantly contributed to the advancement of the education sector in Nigeria, with a particular focus on primary education. Furthermore, the intervention aligns with Sustainable Development Goal 4, which pertains to Quality Education. As a result of the intervention, there has been an enhancement in infrastructure, school enrollment, and notably, an improvement in the quality of learning. The present research endeavours to facilitate the investigation of private financing for the advancement of basic
education in Nigeria and other countries, thereby assisting educational institutions, governments, and international organisations in their efforts.

According to a report published by GSMA in 2018, the level of digital connectivity plays a crucial role in expediting the achievement of Sustainable Development Goals (SDGs). The report has determined that the implementation of the Sustainable Development Goals in Sub-Saharan Africa has been hindered by a variety of factors, including inadequate funding and awareness of ICT capabilities, insufficient technical skills, and the presence of a digital divide. Furthermore, it has been suggested that Africa's limited broadband capacity can be attributed to the inadequate infrastructure, unaffordability, lack of relevance, and insufficient distribution network coverage in remote rural areas and less connected regions. Moreover, the utilisation of mobile communications can facilitate the achievement of the Sustainable Development Goals (SDGs) through the provision of infrastructure and digital services that foster growth, efficacy, and sustainability. As per the 2019 United Nations Report, this phenomenon is particularly applicable to economies that possess restricted existing services or insufficient service infrastructure. The process of digitalization has the potential to generate novel prospects and amenities, such as micro-banking and micro-energy infrastructure. The principle of "leave no one behind" is a guiding tenet of Agenda 2030. In order to achieve the Sustainable Development Goals (SDGs), it is widely acknowledged that mobile technologies are indispensable for facilitating connectivity. Furthermore, Internet access is deemed a crucial factor in realising the SDGs.

The authors Matinmikko-Blue et al. (2020) underscored the potential of mobile communications as a means of establishing a communication infrastructure that can foster local economic growth in impoverished communities. This technology can also mitigate obstacles to accessing economic resources by enabling access to mobile money and micro-financing, and generate employment prospects for individuals residing in conditions of extreme poverty. The utilisation of mobile devices enables students to access educational resources at any time and from any location. Educators employ mobile devices for a wide range of purposes, including but not limited to literacy and numeracy instruction, as well as interactive tutoring. The implementation of mobile learning has the capacity to overcome economic disparities, geographical divides between rural and urban areas, and gender inequalities.

Shakil and Islam (2020) conducted an empirical investigation into the effect of telecommunication infrastructure on sustainable development in developing nations. They discovered that the infrastructure of telecommunications has a significant positive effect on economic growth, social development, and environmental sustainability. Examining the impact of telecommunication infrastructure on sustainable development, they conducted an empirical analysis using panel data from 45 developing countries. The study employed a variety of econometric techniques, including models with fixed and random effects.

Obeng-Odoom (2020) examined the effect of telecommunications on Africa's sustainable development objectives. The author identified several obstacles, such as insufficient infrastructure, high costs, and limited coverage, that impede the sector's ability to contribute to sustainable development. They conducted a comprehensive literature evaluation on the impact of telecommunications on Africa's sustainable development objectives. The author performed a literature review and identified research deficiencies.

Alhassan and Boateng (2020) examined the impact of mobile telecommunications on sub-Saharan Africa's economic growth and sustainable development. They discovered that mobile telecommunications have a positive impact on economic growth and social development, but policies are needed to assure the affordability and accessibility of services in order to promote sustainability. To investigate the impact of mobile telecommunications on economic growth and sustainable development, they conducted a quantitative study using panel data from 30 sub-Saharan African nations. The study estimated the impact of mobile telecommunications on the dependent variables using a model with fixed effects.
In their study, Gheasi et al. (2021) discovered that mobile broadband has a positive effect on economic development in Organization for Economic Cooperation and Development (OECD) nations, with a 1% increase in mobile broadband penetration resulting in a 0.06% increase in GDP per capita. Countries with a higher human capital level experienced a greater effect. The authors investigated the impact of mobile broadband on economic development in OECD nations using panel data analysis. From 2010 to 2018, they gathered information on mobile broadband penetration, GDP per capita, human capital, and other control variables for a sample of 34 OECD countries. To measure the impact of mobile broadband on economic growth, they estimated a fixed effects model and a dynamic panel data model and conducted numerous sensitivity analyses to evaluate the robustness of their results. The authors conclude that mobile broadband has a positive effect on economic growth, but observe that the magnitude of this effect varies across countries and time periods. The specific factors that influence the impact of mobile broadband on economic growth, such as distinctions in regulatory frameworks or investment levels, could be the subject of additional research.

Schulz et al. (2021) discovered that the use of ICT can have both positive and negative consequences on well-being. For instance, information and communication technologies can facilitate social connections and access to health information, but they can also contribute to addiction and tension. The authors conducted a literature review to investigate the influence of ICT on happiness. They identified several articles published between 2010 and 2020 through a search of multiple databases and included them in their review. In order to analyze the articles and identify common themes and patterns in the findings, they employed a narrative synthesis method. The authors provide a comprehensive literature review on the effect of ICT on well-being, noting that many of the studies they examined had methodological limitations or inconsistent results. Additional research could seek to resolve these limitations and produce more conclusive findings regarding the relationship between ICT use and happiness.

Zeng and Wen (2021) The authors found that 5G has the potential to stimulate innovation, increase productivity, and enhance quality of life, but its deployment is not without challenges and risks. They recommend that policymakers thoroughly consider these risks and devise mitigation strategies. To investigate the impact of 5G on economic growth and social welfare, the authors conducted a literature review. They searched multiple databases for articles published between 2010 and 2020 and identified several articles for their review. In order to analyze the articles and identify common themes and patterns in the findings, they employed a narrative synthesis method. The authors identify several potential benefits of 5G, but also noted that its deployment is fraught with numerous uncertainties and obstacles. How these challenges could be addressed and how the potential benefits of 5G could be maximized for future research.

Albarracin and Reardon (2021), The authors discovered that the digital divide exacerbates existing disparities, especially in terms of income, education, and health outcomes. They suggest that policies designed to bridge the divide, such as expanding broadband access and digital literacy, can have a positive effect on living standards. The authors examined the effects of the digital divide on economic and social outcomes by conducting a literature review. They searched multiple databases for articles published between 2010 and 2020 and identified several articles for their review. In order to analyze the articles and identify common themes and patterns in the findings, they employed a narrative synthesis method. They highlighted the negative effects of the digital divide on economic and social outcomes and noted the paucity of research on the efficacy of policies intended to bridge the divide. Additionally, research could examine the effect of specific policies, such as government subsidies or public-private partnerships, on bridging the digital divide and enhancing living standards.

Kim and Lee (2020), The authors discovered that the impact of ICT on income inequality in established nations is positive, but negative in developing nations. This indicates that ICT can have varying effects on living standards depending on the context. They suggest that policymakers should consider these distinctions when devising ICT and income inequality policies. The authors compared the impact of
ICT on income inequality in developed and developing nations using regression analysis. From 2000 to 2015, they collected data on ICT usage, income inequality, and other control variables for a sample of 34 countries. They estimated regression models with fixed effects and conducted multiple sensitivity analyses to evaluate the robustness of their results. They discovered that the impact of ICT on income inequality varies from country to country, but they do not provide an explanation for why this is the case. The specific contextual factors that influence the relationship between ICT use and income inequality, such as distinctions in institutional frameworks or industry structures, could be the subject of future research.

2.3 Telecommunication Industry and Its Impact on Digital Education

In the context of the COVID-19 pandemic and the subsequent transition to online learning, Vishnu et al. (2022) examined the digital competence of higher education students. The study employed a quantitative survey methodology to acquire data from 340 Indian college students. While the majority of higher education students had fundamental digital competence, there were voids in their knowledge and skills regarding online communication, online collaboration, and digital security, according to the study's findings. In addition, the degree of digital competence varied based on age, gender, and prior experience with online learning, as determined by the study.

In their study, Babatope et al. (2021) discovered that the Nigerian telecommunications industry had a positive impact on digital education, but also confronted obstacles such as inadequate network infrastructure and limited access to devices among students. The study proposed strategies, including public-private partnerships and investment in network infrastructure, to resolve these obstacles and enhance access to digital education in Nigeria. A literature review, online surveys, and in-depth interviews with experts from the telecommunications industry, digital education, and education policy were used to collect data for this mixed-methods study.

Hassan et al. (2021) found that the telecommunications industry had a significant impact on digital education, but also encountered obstacles such as the digital divide and a lack of regulatory frameworks. To enhance the industry's impact on digital education, the review proposed recommendations such as investments in network infrastructure and policies to promote digital inclusion. While this review provides a comprehensive analysis of the impact of the telecommunications industry on digital education, additional research on the specific strategies and technologies adopted by the industry to facilitate digital education could be conducted. This study employed a systematic literature review methodology, and data was gathered through an exhaustive search of academic databases using key terms and inclusion/exclusion criteria.

The study by Shahid et al. (2021) found that the Pakistan telecommunications industry had a positive impact on digital education in higher education institutions, but also confronted challenges such as inadequate network infrastructure and restricted access to devices. The study proposed strategies, such as public-private partnerships and investments in network infrastructure, to resolve these obstacles and enhance access to digital education in Pakistan. This study sheds light on the role of the telecommunications industry in facilitating digital education in Pakistan's higher education institutions. Future research could investigate the influence of the industry on digital education at other levels of education in Pakistan. This study employed a qualitative research design, and data was gathered via a literature review and in-depth interviews with experts from the telecommunications industry, higher education, and education policy.

The study by Hussain et al. (2021) found that the telecommunication industry in both China and India had a significant impact on digital education, despite facing obstacles such as the digital divide and a lack of regulatory frameworks. To increase the industry's impact on digital education in both countries, the study recommended investments in network infrastructure and policies to promote digital inclusion. This study provides a comparative analysis of the impact of the telecommunications industry on digital
education in China and India. Future research could examine the impact of the telecommunications industry on digital education in other countries with unique contexts and challenges. This comparative study used a literature review, online surveys, and in-depth interviews with experts from the telecommunications industry, digital education, and education policy in both countries to collect data.

2.4 Digital Education and Standard of Living Impact on Sustainable Development

In Bakar et al. (2021) and Azad et al. (2021), both studies aimed to investigate the role of digital education in achieving the Sustainable Development Goals (SDGs) and to identify research gaps and future directions in this area. The research gap in this study is the lack of empirical evidence and comprehensive analysis of the impact of digital education on SDGs in developing countries. The authors conducted a systematic literature review of articles published between 2015 and 2020. The study included several articles from various academic databases, including Scopus, Web of Science, and Google Scholar. The authors used a content analysis approach to synthesize the findings from the literature review. The study identified five themes that describe the potential of digital education in achieving the SDGs, which are: (1) increasing access to education, (2) enhancing the quality of education, (3) promoting lifelong learning, (4) improving employability, and (5) addressing environmental sustainability. The authors found that digital education has the potential to play a significant role in achieving the SDGs, particularly in developing countries where traditional education systems face significant challenges. However, the authors also noted that there is a need for further research to determine the most effective strategies for utilizing digital education to achieve the SDGs in specific contexts.

In their study Sreekumar et al. (2021), investigated the relationship between standard of living and sustainable development. Specifically, it aims to examine the impact of standard of living on environmental sustainability, social sustainability, and economic sustainability. While sustainable development has been widely studied, few studies have examined the impact of standard of living on sustainable development. The research gap addressed by this study is the lack of empirical research on the relationship between standard of living and sustainable development. The study used a quantitative research design, using secondary data from the World Bank for 132 countries. The study used composite indices to measure standard of living, environmental sustainability, social sustainability, and economic sustainability. The study also used regression analysis to examine the impact of standard of living on the three dimensions of sustainable development. The study found a positive relationship between standard of living and economic sustainability. However, the study found a negative relationship between standard of living and environmental sustainability and social sustainability. The study suggests that a high standard of living is associated with high levels of resource consumption and pollution, which negatively impacts environmental and social sustainability. The study highlights the need to balance economic growth with environmental and social sustainability.

According to Jiménez-Zarco et al. (2020), digital education has emerged as an important tool for achieving sustainable development goals (SDGs) globally. However, there is a lack of empirical evidence on the impact of digital education on sustainable development. The problem statement of this study is to assess the impact of digital education on sustainable development through a case study of a Massive Open Online Course (MOOC) on climate change. Although there are several studies on digital education and sustainable development, there is limited research on these areas. This study aimed to fill this research gap by exploring the impact of a MOOC on climate change on sustainable development. This study uses a mixed-method approach to analyze the impact of a MOOC on climate change on sustainable development. The study collected data from two sources: (1) pre and post-course surveys of MOOC participants, and (2) analysis of the MOOC content. The study analyzed the data using descriptive statistics and content analysis. The study found that the MOOC on climate change had a positive impact on sustainable development. The MOOC improved the knowledge, attitudes, and behaviors of the participants towards sustainable development. The study also found that the MOOC
content had a positive impact on sustainable development, as it provided relevant and practical information on climate change and sustainable development.

Awolusi et al. (2020), considered sustainable development is a key concern for developing countries, particularly in sub-Saharan Africa. Standard of living is an important factor that affects sustainable development in these countries. The problem statement of this study is to assess the impact of standard of living on sustainable development in sub-Saharan Africa. Although there is extensive literature on sustainable development and standard of living, there is limited empirical evidence on the impact of standard of living on sustainable development in sub-Saharan Africa. This study aims to fill this research gap by exploring the impact of standard of living on sustainable development in these countries. This study uses a panel data analysis to examine the impact of standard of living on sustainable development in sub-Saharan Africa. The study uses data from 24 sub-Saharan African countries over the period 2000-2018. The study uses two proxies for sustainable development: the Human Development Index (HDI) and the Environmental Performance Index (EPI). The study found that standard of living has a positive impact on sustainable development in sub-Saharan Africa. The study found that an increase in standard of living leads to an increase in the HDI and EPI scores. The study also found that other factors such as government effectiveness, education, and health also have a positive impact on sustainable development in sub-Saharan Africa.

The recent outbreak of the COVID-19 pandemic has enforced the organizations towards digitalizing their systems of operation significantly. While the use of digital platforms is not new, how those improved policy integration in the public service is relatively unexplored. The previous studies in several countries have confirmed that potentials of telecommunication industry impact on standard of living and Digital Education also its consequences Sustainable development. Therefore, the present study, explores how the telecommunication industry and its digitalization and the integration of the Sustainable Development in public administration helps the Sri Lankan situation. Also, it is important to consider bridging the digital divide that is essential for the people left behind due to a variety of unavoidable circumstances to promote available information to create new businesses and knowledge. Furthermore, in the present study according to the results obtained the researchers explored the potential contributions by the telecommunication industry to achieve the Sustainable development and impact on Standard of living and Digital education in Sri Lanka.

2.5 Research Conceptual Framework

According to a review of the applicable literature, each of those mentioned fundamental practices has its own effect on sustainable development and its objectives. The conceptual framework was devised as a result of a literature review. In this study, the independent variables (IV) are modified SDGs 1 and 4 out of 17: Standard of living (IV1) and Digital education (IV2). Sustainable Development is the dependent variable (DV). Using the current conceptual framework, the researchers will now provide hypotheses for this study (figure 1).

![Figure 1. Research Framework](image-url)
2.6 Research Hypothesis

H1: Standard of Living (IV1) has a significant positive relationship on Sustainable development (DV)
H2: Digital Education (IV2) has a significant positive relationship on Sustainable development (DV)

3. Methodology

3.1 General

This study employs a scientific research methodology to investigate the cause-and-effect relationship between the independent variables and the dependent variable. This study will adopt a positivist approach. Since the researcher intends to draw conclusions based on the questionnaire-derived hypothesis as part of quantitative research, the strategy would be deductive. As the primary data collection technique, a quantitative approach will be employed. The Non-probability convenience sampling technique is the principal focus of this study. Due to the specific categories included in the investigation, the researcher utilized nonprobability convenient sampling as a sampling technique. The investigation results were generalized using a sample of 400 individuals. The sample size will be determined using the confidence level of 95% and the estimated error of 5% from the study by Krejcie and Morgan (1970). 400 questionnaires were distributed to students at the advanced, undergraduate, and graduate levels. In addition, a statistical analysis software SPSS and Smart PIs was utilized to analyze the data.

The current research questionnaire consists of thirty questions using a six-point Likert scale to quantify variables based on previously defined characteristics. The first six queries assessed the first independent variable (standard of living) using the categories income, necessities, availability, affordability, knowledge, and employability. Skills, support, capacity, access, assistance, and quality were used to evaluate the second independent variable (Digital education). The dependent variable (Sustainable Development) was measured with ten questions based on the impact of the telecom industry on society, the environment, and the economy.

3.2 Figures and Tables

Table 1. Reliability Test Version 01

<table>
<thead>
<tr>
<th>Reliability</th>
<th>Cronbach's Alpha</th>
<th>Cronbach's Alpha Based on Standardized Items</th>
<th>N of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Of Living</td>
<td>0.936</td>
<td>0.933</td>
<td>6</td>
</tr>
<tr>
<td>Digital Education</td>
<td>0.956</td>
<td>0.961</td>
<td>6</td>
</tr>
<tr>
<td>Sustainable Development</td>
<td>0.985</td>
<td>0.985</td>
<td>10</td>
</tr>
</tbody>
</table>

Table 2. Re Visit Version 02

<table>
<thead>
<tr>
<th>Variable</th>
<th>Cronbach's alpha</th>
<th>Composite reliability (rho_a)</th>
<th>Composite reliability (rho_c)</th>
<th>Average Variance Extracted (AVE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital education</td>
<td>0.961</td>
<td>0.965</td>
<td>0.970</td>
<td>0.867</td>
</tr>
<tr>
<td>Standard of Living</td>
<td>0.933</td>
<td>0.946</td>
<td>0.948</td>
<td>0.755</td>
</tr>
<tr>
<td>Sustainable Development</td>
<td>0.985</td>
<td>1.001</td>
<td>0.986</td>
<td>0.876</td>
</tr>
</tbody>
</table>
Table 3. Path Coefficient

|                                      | Original sample (O) | Sample mean (M) | Standard deviation (STDEV) | T statistics (|O/STDEV|) | P values |
|--------------------------------------|---------------------|----------------|--------------------------|----------------|----------|
| Digital education -> Sustainable Development | 0.181               | 0.176          | 0.068                    | 2.656         | 0.004    |
| Standard of Living -> Sustainable Development | -0.340             | -0.339         | 0.054                    | 6.276         | 0.000    |

4. Results and Findings

The reliability test 01 showed that four of the three variables had a Cronbach’s alpha value higher than 0.80. Therefore, the variables Standard of living, Digital Education and sustainable development were deemed reliable (Table 1). The reliability test 02 showed that the Cronbach’s alpha value for the standard of living and didgital education variables have changed, however the value for susataianble development not changed and is therefore all are reliable. In addition, the composite reliability was calculated and values in all variables higher than 0.80. In conclusion it can be said that the variables have a high reliability and consistency (Table 2).

After the validation of the model and the testing of the constructs, the Hypotheses be were tested (Table 3), whether they get accepted or rejected.

The first hypothesis is H1: “Standard of Living (IV1) has a significant positive relationship on Sustainable development (DV).” The path coefficient of Digital education to Sustainable development The P-value is 0.004. The standard deviation is 0.068. With these values the Hypothesis is accepted.

The second hypothesis is H2: “Digital Education (IV2) has a significant positive relationship on Sustainable development (DV).” The path coefficient of standard of living to sustainable development The P-value is 0.000. The standard deviation is 0.054. With these values the Hypothesis is accepted.

As per the obtained in the current study, the researcher concluded that both digital education and standard of living have a positive relationship on sustainable development and that telecommunication industry can positively impact to on those initiatives and achieve to the sustainable development in Sri Lanka.

5. Conclusion

Researchers analyzed the impact of the telecommunications industry on Sri Lanka's Digital education and standard of living, as well as the impact of these initiatives on sustainable development. The COVID-19 and the current economic crisis had a disproportionately negative impact on the social and economic spheres of low-income developing nations like Sri Lanka. These nations cannot achieve sustainable development on their own and require mutual cooperation and partnership. In addition, COVID-19 had a negative impact on the industries that contributed the most to Sri Lanka’s economy and employment, such as export industries and the garment industry. In this regard, the telecommunications industry is vital to a nation’s development. It not only contributes to economic development, but also functions as a crucial platform for long-term development by offering innovative solutions to environmental and social issues. In this investigation, the conceptual framework was constructed using findings from the literature. Based on their review of the relevant literature, the researchers identified a research lacuna in this study. It was discovered that Sri Lanka lacks recent studies on how the telecommunications industry contributes to Sustainable Development in this regard.
Acknowledgements

S. K. Chama Ruklani Wickramasinghe expresses gratitude to the School of Business at the Malaysia University of Science and Technology for the assistance provided throughout the course of the work. We would like to acknowledge everyone who contributed to the preparation and revision of earlier versions of this document.

References


The Factor Affecting Childcare Services on Parents' Satisfaction

Siti Fatimah Azzahra Hashim
School of Business, Malaysia University of Science and Technology, Malaysia
fatimah@must.edu.my

Abstract: Childcare services refer to a variety of services provided for young children, typically from infants to preschool age. These services may be offered in a variety of settings, including childcare centers, family homes, and preschools. The specific services offered may vary depending on the setting, but generally include activities and care designed to support a child's physical, social, emotional, and cognitive development. Childcare services can have a significant impact on a parent's satisfaction. Parent satisfaction refers to the level of contentment or happiness a parent feels with a product or service, in this case, childcare services. It reflects the extent to which parents believe that the childcare services provided are meeting their expectations and fulfilling their needs. When parents feel confident that their child is receiving high-quality care, they are more likely to be satisfied with the childcare services. On the other hand, if parents have concerns about their child's safety, well-being, or the quality of care provided, they may be dissatisfied with the childcare services. Thus, the study aims to identify the factors that increase parents' satisfaction in childcare services in Selangor, Malaysia. Factors that were tested are empathy, reliability, responsiveness, and assurance. The data for this study was gathered using quantitative method and analyzed using survey method. The researcher recruited 200 parents based on convenience sampling on a voluntary participation basis. The findings from this study indicated that the current research confirmed a significant relationship between responsiveness and empathy toward parents’ satisfaction.

Keywords: childcare services, services, satisfaction, parent satisfaction, empathy, reliability, responsiveness, and assurance

1. Introduction

Cognizant that early childhood development programs are vital in preparing the nation's young to participate in nation-building. The Malaysian government plans to take the lead in children's services. Important legislation such as the Child Protection Act, the Child Care Centre Act 1984, and the Education Act 1996 was put in place to safeguard children's survival, protection, and development. As a result, there are two types of institutions that provide early childhood development programs: the childcare and development centers known as TASKAs, which cater to children 0-4 years, and the preschools or kindergartens for the 4–6-year-olds known as TADIKAs or TABIKAs or, if run by the Islamic religious organizations, TASKIs. In the Ministry of Women, Family, and Community Development, the former is licensed by the Social Welfare Department, and the Education Department licenses the latter, reporting to the Ministry of Education.

The Child Care Centre is described as any premises/organization that is cared for on a fee basis, with four children or more. Such centers are classified as home-based centers (with less than ten children) or Institutional centers (looking after more than ten children). Such centers offer childcare services ranging from half-day to full day. Only 1,788 childcare centers have registered with the Social Welfare Department. Private individuals and workplace-based care providers mainly run these. This is a small number vis-à-vis the growing number of children who need the places.

A recent case covered by the media involves a child who was severely burned due to the negligence of the childcare provider. The victim was awarded a compensation of RM 403,018.74 (Wahid, 2016). In another case, an infant suffered a severe injury causing bleeding in the brain and eyes after being...
violently shaken. The childcare operator was sentenced to five years imprisonment and ordered to pay RM 40,000 to the victim (Astro Awani, 2015). Those are just a few instances of the cases reported. It is believed that more cases go unreported due to various reasons. It is presumed that this phenomenon may occur due to the current inadequacy of the laws and policies in Malaysia’s childcare centers. Therefore, an urgent review is needed of current legislation to upgrade the services offered by childcare centers. To ensure children grow up in a conducive environment, studies on the quality of childcare centers are vital to practitioners and policymakers (Hanafi, 2015).

2. Literature Review

2.1 Parent’s Satisfaction

According to Ismai et al. (2006) and Aga and Safakli (2007), service quality has a beneficial effect on customer satisfaction, and this impact extends to the services provided by accounting firms. Additionally, there is a connection between service costs and customer happiness. Additionally, cost directly affects the value of services (Ismail et al., 2006). According to Aga and Safakli (2007), empathy has a substantial impact on customer satisfaction since it attends to the unique needs of each consumer. According to Jayasundara et al. (2009) and Naidoo (2011, 2014), customer happiness is significantly influenced by empathy, dependability, and certainty. Additionally, Berry et al. (1983)’s argument, the level of service offered might vary significantly depending on the organization, the circumstance, and the nation. In developed nations, the effect of service quality on customer satisfaction has been researched by Bedi (2010); and Khan and Fasih (2014).

Additionally, since people in low-income and illiterate nations have less money to spend on goods and services, it does not address the quality of service in those nations. Additionally, price would be a key concern when talking about customer happiness and service quality given the low income of the population. Therefore, focusing on customer satisfaction and service quality will be engaging as these constructs have not been explored in developing countries.

2.2 Service Quality (SERVQUAL)

The SERVQUAL scale can be used to assess service quality (Khan & Fasih, 2014). The SERVQUAL scale uses five variables to evaluate the quality of service both during and after the service. First, tangible results (which is a visible element of a service such as a site, tools, or building). Next is responsiveness (the willingness of service providers to assist customers and provide prompt services and how fast service providers respond to customer queries). Next is reliability, reliability (the ability of a service provider to assure customers of reliable and proper service). Next comes assurance. It is the expertise a service provider demonstrates while providing its services and its capacity to instill confidence and trust. Lastly, but certainly not least, is empathy (the capacity of a service provider to pay attention to unique consumer demands/individualize service).

2.3 Empathy

The empathy component of service quality is used to measure how much a business values each of its clients. It gives them individualized attention to meet their needs, which makes the customers feel incredibly important and treasured by the business. This feature is much more important in the telecommunications industry, where strong customer relationships are required to secure long-term success for brands rather than what is possible in the transactional sectors (Andaleeb et al., 2016). Empathy often operates in accordance with the service recovery method. If gaining clients' trust is the primary goal of service marketing, then it stands to reason that if the service in question is unsuccessful, this trust will need to be regained. This is because, after a service error, expectations rise rather than fall, and the conclusion is that customers become more sensitive to future errors (Gong & Yi, 2017).
In other words, businesses will have more possibilities to provide satisfying client experiences and establish enduring relationships if they increase the number of encounters, they have with them. As a result, empathy required that the company be able to respond to consumer input and offer high-quality services, even if doing so occasionally necessitates referring clients to outside sources (Ismail et al., 2016). According to Osarenkhoe et al. (2017), there is a huge mismatch between what customers and businesses consider to be an effective customer support system in personalized service offerings. This can have a big impact on the success of the business. Businesses appear to put a greater emphasis on the overall situation when assessing the quality of customer service.

2.4  Reliability

There are many definitions of reliability. Informally, reliability may be defined as "quality over time." Reliability is typically the aspect of quality that impacts customers the most. Abdul Rehman (2012) and Ahmed et al. (2017) said that reliability could create customer satisfaction. Employees' reliability is defined as their ability and commitment to provide services under the agreement (Yousapronpaiboon, 2014). According to Jun et al. (2004), employee attitudes with an element of dependability can be used to create customer satisfaction. This means that one factor that must be considered to achieve customer satisfaction is employee dependability (Jun et al., 2004). Organizations that provide services must be reliable because good employees can provide the services that customers expect.

Excellent reliability is the organization's ability to provide services that adhere to what is guaranteed by using facilities owned by the organization. Martini and colleagues (2018). An organization can provide physical facilities that enhance and support organizational goals, allowing employees to perform services on time (Moon, 2013). According to Yousuf (2017), the dependability aspect of service quality influences customer satisfaction. Famiyeh et al. (2018) agreed, stating that reliability is the company's ability to provide services in accordance with what was agreed upon. The relationship between customer satisfaction and reliability is that customer satisfaction influence’s reliability. The better understood consumer perceptions of company reliability, the higher customer satisfaction.

2.5  Responsiveness

Employee responsiveness is determined by the employee in charge of the organization. Personal conditions of good employee responsiveness can encourage the desire to act and treat customers fairly. Employees' ability to provide appropriate and timely services to customers by communicating clear information (Bebko & Garg, 1995). Good responsiveness can lead to customer satisfaction with the organization's services. According to Munusamy et al. (2010), responsiveness is defined as staff or employees' willingness to assist customers as well as provide service and responses. Employee willingness to solve customer problems when using services has a positive impact on customer satisfaction. According to Saad Andaleeb and Conway (2006), responsiveness has a positive effect on consumer satisfaction. This means that the greater the responsiveness of employees' willingness and speed to provide services to customers without being asked, the greater the increase in customer satisfaction.

According to Kuo et al. (2009), responsiveness is the awareness and desire to assist customers and provide services as soon as possible. Employees' desire, response, or alertness in assisting customers and providing quick and responsive services is referred to as responsiveness (Ahmad & Sungip, 2008). According to Kara et al. (2005), responsiveness is the ability of service providers to assist, as mentioned by Ngaliman et al. / IJEMS, 6(5), 86 - 92, 2019 88, who provides consumers with timely and appropriate services with precise delivery. One way to assess a company's dependability is through its responsiveness. The ability to provide promised services that are dependable, accurate, and dependable is referred to as reliability (Lau et al., 2013). Good responsiveness suggests that the company's employees are extremely dependable.
2.6 Assurance

According to Khan and Fasih (2014) and Blery et al. (2009), the process of acquired knowledge demonstrated by staff in conducting their terms and regulations during service delivery can assure customers. Customers will have a sense of trust that the delivering services representative will carry out his or her duties professionally and ethically. However, Naidoo (2014) contends that not all consumers have the knowledge and experience to understand the service quality and values they receive. As a result, efficient communication or specific explanations may be required to comprehend the value they end up receiving. This service quality is achieved through the individual component of service quality (Kaura et al., 2012). In other words, assurance refers to a service provider’s level of knowledge and ability to inspire when providing services.

According to Parasuraman et al. (1988), assurance is one of the core components of service quality that influences customer satisfaction because it creates a favorable perception of an organization in the mind of the customer. As a result, word-of-mouth activity is encouraged, particularly in financial institutions. A trustworthy financial service provider instils in its customers a high level of trust (Khan & Fasih, 2014; Ndubisi, 2006; Ndubisi & Wah, 2005). This dimension is made possible by the individual’s aspect of the service quality (Kaura et al., 2012).

2.7 Tangibility

According to Khan and Fasih (2014); and Blery et al., 2009), tangibles are accessed by visible existence or touch. Information and Communication Technology (ICT), site, instruments and the company’s employees, and any visible facilities form the tangible dimension of service quality. However, service providers use these tangibles in a variety of ways, and end users perceive and experience them on various levels. Tangibles are particularly important for service providers because they are critical to developing big and powerful, positive, and inspiring consumer relationships and perspectives through their specialized assets (Naidoo, 2014).

3. Research Methodology

Research methodology is a crucial component of the study, helping to establish the methods of data collection, analysis techniques, and information sources that align with the research objectives. In this quantitative research, the focus is on measuring parental satisfaction with childcare services using surveys and statistical analysis. The target population consists of urban parents with children aged newborn to 6 years old who have utilized childcare services. A sample size of 100 participants will be selected using probability sampling, ensuring equal chances for everyone. Primary data will be collected through a questionnaire, and the data will be analyzed using SPSS software, which facilitates statistical analysis and data management.

4. Data Findings

The studies were carried out based on gender, occupation, marital status, child age, type of provider, respondent age, income, spending and employment level.
Table 1. Result of Descriptive Statistics

<table>
<thead>
<tr>
<th>Descriptive Statistics</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>MeanSatisfaction</td>
<td>5.0356</td>
<td>1.10496</td>
<td>103</td>
</tr>
<tr>
<td>MeanTangibility</td>
<td>4.9845</td>
<td>1.15358</td>
<td>103</td>
</tr>
<tr>
<td>MeanReliability</td>
<td>5.0233</td>
<td>1.10553</td>
<td>103</td>
</tr>
<tr>
<td>MeanResponsiveness</td>
<td>5.0364</td>
<td>1.12318</td>
<td>103</td>
</tr>
<tr>
<td>MeanAssurance</td>
<td>5.0801</td>
<td>1.14469</td>
<td>103</td>
</tr>
<tr>
<td>MeanEmpathy</td>
<td>5.0461</td>
<td>1.12989</td>
<td>103</td>
</tr>
</tbody>
</table>

From Table 1, the results of the descriptive statistics showed that there were 207 analyzed data samples, and coefficients of means ranged from 4.9845 to 5.0801.

Table 2. Result of Correlations

<table>
<thead>
<tr>
<th>Correlations</th>
<th>MeanResponsiveness</th>
<th>MeanAssurance</th>
<th>MeanEmpathy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correlation</td>
<td>MeanSatisfaction</td>
<td>.914</td>
<td>.925</td>
</tr>
<tr>
<td></td>
<td>MeanTangibility</td>
<td>.832</td>
<td>.863</td>
</tr>
<tr>
<td></td>
<td>MeanReliability</td>
<td>.929</td>
<td>.932</td>
</tr>
<tr>
<td></td>
<td>MeanResponsiveness</td>
<td>1.000</td>
<td>.967</td>
</tr>
<tr>
<td></td>
<td>MeanAssurance</td>
<td>.967</td>
<td>1.000</td>
</tr>
<tr>
<td></td>
<td>MeanEmpathy</td>
<td>.940</td>
<td>.975</td>
</tr>
<tr>
<td>Sig. (1-tailed)</td>
<td>MeanSatisfaction</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>MeanTangibility</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>MeanReliability</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>MeanResponsiveness</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>MeanAssurance</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>MeanEmpathy</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>N</td>
<td>MeanSatisfaction</td>
<td>103</td>
<td>103</td>
</tr>
<tr>
<td></td>
<td>MeanTangibility</td>
<td>103</td>
<td>103</td>
</tr>
<tr>
<td></td>
<td>MeanReliability</td>
<td>103</td>
<td>103</td>
</tr>
<tr>
<td></td>
<td>MeanResponsiveness</td>
<td>103</td>
<td>103</td>
</tr>
<tr>
<td></td>
<td>MeanAssurance</td>
<td>103</td>
<td>103</td>
</tr>
<tr>
<td></td>
<td>MeanEmpathy</td>
<td>103</td>
<td>103</td>
</tr>
</tbody>
</table>
Table 3. Result of Model Summary

<table>
<thead>
<tr>
<th>Model Summary&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Change Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>R Square</td>
</tr>
<tr>
<td>1</td>
<td>.932&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), MeanEmpathy, MeanTangibility, MeanResponsiveness, MeanReliability, MeanAssurance
b. Dependent Variable: MeanSatisfaction

Table 4. The Results of the Analysis of Variance (ANOVA) Test

<table>
<thead>
<tr>
<th>ANOVA&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

a. Dependent Variable: MeanSatisfaction
b. Predictors: (Constant), MeanEmpathy, MeanTangibility, MeanResponsiveness, MeanReliability, MeanAssurance

Table 3 shows the significance was 0.000 (<0.005), and Table 4 shows that adjusted R-squared value of 0.862 indicates that approximately 86.2% of the variance in the dependent variable is explained by the independent variables included in the model, after adjusting for the number of predictors. In general, a higher adjusted R-squared value is desirable as it suggests a better fit of the model to the data.

Table 5. The Coefficients

<table>
<thead>
<tr>
<th>Coefficients&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>1 (Constant)</td>
</tr>
<tr>
<td>MeanTangibility</td>
</tr>
<tr>
<td>MeanReliability</td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>MeanResponsiveness</td>
</tr>
<tr>
<td>MeanAssurance</td>
</tr>
<tr>
<td>MeanEmpathy</td>
</tr>
</tbody>
</table>

Dependent Variable: MeanSatisfaction

From the results of the data in Table 5, the values of significance (p-values) of Responsiveness and Empathy were less than 0.05, therefore the hypothesis for both variables are accepted.

5. Conclusion

In conclusion, this study has provided valuable insights into the factors influencing parental satisfaction with childcare services. However, it is important to interpret the findings in the context of certain limitations. The reliance on a sample from a specific geographical area in Malaysia limits the generalizability of the results to childcare centers across the country. Additionally, the use of a cross-sectional design prevents establishing causal relationships between variables. The data collection method, conducted virtually due to the COVID-19 pandemic, may have affected the depth of understanding and real-time communication with respondents.

To enhance future research in this area, it is recommended to include explanatory notes and establish real-time communication channels to reduce response falsification and improve data quality. Furthermore, dedicating more time and resources to target larger sample sizes that accurately represent the population would enhance the precision, representativeness, and consistency of the findings. These measures would contribute to a more comprehensive understanding of parental satisfaction with childcare services.

Overall, despite these limitations, this study serves as a foundation for further exploration and provides valuable insights for policymakers, childcare service providers, and researchers interested in improving parental satisfaction and the quality of childcare services.

Acknowledgements

My deepest gratitude goes first and foremost to my respectable supervisor, Prof Dr Shaheen Mansori for his constant encouragement and guidance. I truly appreciate my husband Mr. Shafiq and parents who are always beside me. Also, thanks to all the people who have made the conference possible in such a difficult epidemic time.

References


Astro Awani. (2015, July 30). Nursery owner gets five years jail for violently shaking baby.


Moderator Role of Trust Ties and Environmental Dynamism in the Relationship of Entrepreneurial Orientation-Performance in a Developing Economy: A Study of B2B Relationships of SMEs in Malaysia

Nur Nadirah Mohamad Ishak\textsuperscript{a}\& Tapas Mishra\textsuperscript{b}

\textsuperscript{a}School of Business, Malaysia University of Science and Technology, Malaysia
\textsuperscript{b}Southampton Business School, University of Southampton, United Kingdom

\texttt{nadirah@must.edu.my}

Abstract: Even though the relationship between entrepreneurial orientation and business performance is dependent on a variety of variables, previous academic research has revealed that there is a good association between EO and business performance. The RBV theory, the contingency theory, and the regulatory emphasis theory are used to explain how the various domains of inter-organizational trust relationships and external environmental dynamics interact to affect EO-business performance. These theories are utilised in conjunction with one another. A survey of 253 Malaysian small and medium-sized firms in the service sector finds that the positive moderating influence of inter-organizational cognitive- and affective-based trust marginally strengthens the EO-performance connection in dynamic market scenarios. This was discovered as a result of the findings of the study. The implications of the study are analysed, and so are potential avenues for further research.

Keywords: SMEs, entrepreneurial orientation, developing economy, trust ties, environmental dynamism

1. Introduction

Entrepreneurial orientation (EO) scholars have conducted empirical researches on the independent effect on performance and its limited effect based on several contingencies. Studies in the past have demonstrated that businesses may enjoy the benefits of EO via networking (Parida et al., 2009). Despite the acknowledgment of the value of networking for businesses, it is unclear on how different network configurations affect the business performance (Luke Pittaway et al., 2004).

No rigorous study has examined the trust-based tie within the EO-performance relationship using networking as a moderating variable in EO research, to the author's knowledge. EO and networking experts seem to have overlooked trust's importance as a lubricant and governance agent in interorganizational relationships. This study investigates EO-firm performance and trust-based ties. This study claims that trust in relationships helps EO improve performance by interacting with firms' trust-based ties.

Given the unexpected success of new goods and services and the difficulty of developing new enterprises with limited resources, trust connections may motivate entrepreneurship by acting as supplemental capital which enabling entrepreneurial initiative to improve organizational performance (Doh & Zolnik, 2011; Gedajlovic et al., 2013). This research's model of trust relationships includes cognitive and emotive elements to reflect trust's complexity (McAllister, 1995). Cognition-based trust is based on an individual's cognitive appraisal of another's trustworthiness, integrity, and competency, whereas affect-based trust is based on emotional engagement and others' genuine care for their wellbeing (De Jong et al., 2016).
Thus, the current study adds to the body of information on how EO interacts with features of inter-firm trust connections to increase firm performance by arguing that trust links are essential to EO's performance-enhancing effects. An important conclusion is that while EO advises organisations in exploring new market chances, its effective implementation requires dedication and a strong team throughout the whole chain of operations. According to Shane et al. (2003), "the entrepreneurial process occurs because people act to pursue opportunities.” Trust and opportunity are linked by Nooteboom (2002): "Trust in things or people entails the willingness to submit to the risk that they may fail us, with the expectation that they will not, or the neglect or lack of awareness of the possibility that they might". This shows that the discipline of entrepreneurship, which is full of uncertainty and the value of being vulnerable and dependent on others, may be effective in performing entrepreneurial activities or otherwise.

This study examines how the company's environment influences EO and trust ties to have a better understanding of their relationship. Perrone et al. (2003) and Krishnan et al. (2006) demonstrate that environmental influences affect trust and this study proposes that in dynamic environments, leveraging each aspect of trust-based connections in the EO-performance relationship should be stronger (Krishnan et al., 2006). This shows that trust tie variables will moderate the connection between EO and firm performance more in situations with high activation than in contexts with low activation. Under these conditions, entrepreneurial firms need new knowledge and skills and a swift response to changing situations. Thus, EO's effect on performance is weaker in dynamic environments than in static ones.

Against this background, the present study examines the following research questions:

*RQ1:* How does the inter-organisational trust moderate the link between EO and firm performance?
*RQ2:* How does perceived environmental dynamism moderate this relationship?

### 2. Literature Review

#### 2.1 Research Model and Theoretical Rationale

This study uses RBV, contingency theory, and regulatory focus theory to analyse EO's effects. RBV is based on knowledge of how resources, external capabilities, and market environment can help businesses achieve sustained and superior performance (Barreto, 2010; Barney, 1991; Kraaijenbrink et al., 2010; Katkalo et al., 2010). Businesses are unequally distributed bundles of resources (Wernerfelt, 1984; 1995) that produce ongoing resource heterogeneity (Barney, 1991). The RBV believes that obtaining and managing important, rare, distinctive, and non-replaceable resources and abilities and properly utilising them in a dynamic market setting may give a firm a competitive edge (Teece et al., 1997). If it has more resources than its competitors, a corporation might get a competitive edge (Peteraf & Barney, 2003). Thus, firms’ EO may be a strategic advantage that allows them to compete in target markets by offering customers goods and services with more and/or different value than rivals (Kim & Park, 2010; Schilke, 2014).

In particular, this analysis predicts that EO and business performance would be greater at high levels of trust between firms and that trust networks will have less of a moderating effect when the environment is changing. This research claims that SMEs in emerging markets lack all of Barney's VRIO (value, unusual, distinctive, and organising) traits (1991). When some but not all VRIO criteria are present, the RBV provides some insight into likely outcomes. SMEs with a cognitive resource advantage may be able to use strategic resources like EO to gain an edge. Thus, resource-rich, innovative companies should flourish. Thus, SMEs in emerging economies that achieve all VRIO standards are expected to have the strongest relationship between EO and performance.

This study suggests that EO is a resource that may improve company performance and that trust networks between enterprises are a cognitive process that might improve performance when paired with EO. Trust is vital, thus firms' trust-based linkages may boost strategy execution. Trust improves
cooperation (Pillutla et al., 2003), transaction costs (Granovetter, 1985), and management and organisation performance (Kim et al., 2006; Dirks & Ferrin, 2001; Jones & George, 1998). Interfirm and intrafirm trust tend to be intricately intertwined in studies of small entrepreneurial enterprises (Howorth et al., 2004; Larson, 1992; Sapienza & Korsgaard, 1996; Zaheer & Harris, 2006). Under uncertainty, trust's efficacy fluctuates. This study uses regulatory focus theory (Higgins, 1997) and contingency theory to explain how EO and trust networks interact in the company's dynamic market situation.

The regulatory focus theory suggests that people may value potential harmful consequences more than potential positive ones (Brockner et al., 2004; De Carolis & Saparito, 2006; Higgins, 1997). Based on the idea that individual attributes like trust would erode and opportunistic conduct will increase, the current study proposes that trust networks should enable the EO-firm performance connection in stable markets. Thus, dynamic settings yield worse results (Baron & Tang, 2011). According to regulatory focus theory, individuals approach pleasure and pain differently (Brockner et al., 2004). Two basic self-regulatory systems, "promotion focus" and "prevention focus," convey this notion. "Promotion" emphasises profits, whereas "prevention" emphasises avoiding profits (Brockner et al., 2004). Entrepreneurial thinking places "promotion emphasis" and "prevention focus" at the confluence of the individual and the environment (Shane & Venkataraman, 2000).

Management choices are affected by external factors, according to contingency theory. According to previous research, a company's strategy is shaped by its surroundings (Covin & Slevin, 1991). The paper states that shifting conditions allow enterprises to be first and exploit new market niches and regional marketplaces ahead of competition. Trust networks help businesses adapt to external restrictions and embrace new market opportunities by improving operational efficiency and information exchange. We apply a contingency theory notion to show that EO's value to a corporation decreases when the environment changes. Figure 1 summarizes this reasoning. EO impacts firm performance, as seen in Figure 1. In stable conditions, strong trust-based connections increase EO's impact on business performance.

![Figure 1. Conceptual Framework](image)

2.2 **Moderating Effects of Inter-Organisational Trust-Based Ties**

This study used two trust criteria to match multi-layered trust. They are summarised in Table 1.
Table 1. Elements of Trust (Source: Dowell et al., 2015)

<table>
<thead>
<tr>
<th>Base</th>
<th>Element</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive</td>
<td>Competency</td>
<td>A person’s ability to complete a task to a desired level. An industry or academic attainment that creates a perception of a person being capable to complete a task.</td>
</tr>
<tr>
<td></td>
<td>Integrity</td>
<td>Adherence or delivering on what is promised and contracted and conforming to ethical standards.</td>
</tr>
<tr>
<td></td>
<td>Goodwill</td>
<td>Completion of tasks over and above what is required and agreed to. The presumption of a positive orientation, motives and intentions of the other person.</td>
</tr>
<tr>
<td>Affective</td>
<td>Relational</td>
<td>Faith in the norm of reciprocity.</td>
</tr>
<tr>
<td></td>
<td>Intuitive</td>
<td>Results from friendship with and/or feeling towards another.</td>
</tr>
</tbody>
</table>

2.2.1 Cognitive Trust

The first is integrity trust, also known as contractual trust (Sako, 1992), commitment trust (Newell & Swan, 2000), and promise trust (Dasgupta, 1988). Trust's cognitive components should improve relationship performance as contract and sanctions can be reduced, resulting in cost saving and improved relationship performance (Sako, 1992).

The second component of cognitive trust is competency trust, also known as ability trust (Mayer et al., 1995) or expertise trust (Maathuis et al., 2004). When trust is present in this domain, oversight and negotiating can save money and improve relationships (Mayer et al., 1995).

The third cognitive facet of trust is goodwill or benevolent trust, which is the degree to which one partner trusts the other to look out for their interests without being asked (Roy et al., 2004). Trust and goodwill affect relationship performance, according to research. In some instances, when more kind and less self-centered partners are trusted, little control over the connection can be exerted, allowing for activities and efforts that may provide better outcomes (Ganesan, 1994). Therefore, if goodwill and trust exist, partners are more inclined to trust each other despite short-term imbalances due to the benefits of the other partner taking advantage of them, cutting monitoring costs, and improving performance (Ganesan, 1994).

2.2.2 Affective Trust

Affective trust is related with emotions and social abilities, including care and concern for the other person (Dayan & Di Benedetto, 2010; Massey & Dawes, 2007). This exhibits emotional understanding and relationship dependence. Thus, affective-based trust has relational and intuitive components. Relational trust is linked to affective trust's "leap of faith" and reciprocity criterion. Relational trust is based on a partner's reliability (Mollering, 2001). It means that people will treat you as you treat them (McAllister, 1995). The standard of reciprocity, not knowledge or prior behaviour, is used to determine trustworthiness (Mollering, 2001). In the early stages of a relationship, faith in the reciprocity standard will influence emotions. The second component of emotional trust is intuitive trust, which is based on mood and feeling (Hansen et al., 2002; Newell & Swan, 2000). For instance, a consumer may trust or dislike a service without giving a reason.

Thus, this study hypotheses the following:

H1: Cognitive trust acts as a moderator between EO and firm performance
H2: Affective trust acts as a moderator between EO and firm performance
2.3 The Combined Impacts of Trust-Based Ties and Perceived Environmental Dynamism

This study examines how environmental dynamic influences the EO-firm performance connection to better understand the boundary condition and the function of inter-organizational trust. Dynamism refers to the degree to which corporate environments are unpredictable and fast changing, creating significant degrees of uncertainty (Dess & Beard, 1984; Miller, 2007). Trust is more important in dynamic markets because it helps managers deal with turbulence and uncertainty due to the high levels of activation in these environments (Baron & Tang, 2011; Baas et al., 2008). This study implies that changing settings may be linked to trust networks' moderating effect on the relationship between EO and company success.

Management literature defines entrepreneurship as resource allocation. Thus, this study suggests that entrepreneurial firms must have inter-organizational trust to properly utilise EO. The degree to which people feel secure while performing work-related activities motivates them to support entrepreneurial endeavours and direct their cognitive efforts towards exploiting knowledge resources to develop capabilities to manage environmental pressures (Cardon et al., 2009; Foo et al., 2009; Kogut & Zander, 1992). These feelings seem more relevant in fast-changing environments. This suggests that inter-organizational trust will moderate the relationship between EO and firm performance more in dynamic settings with high activation than in low-activation conditions. Managers are more activated in dynamic situations.

Highly dynamic circumstances are unexpected, full of rapid and dramatic change, and require vital decisions to be made with limited knowledge (Miller, 2007). Due to these reasons, EO vital roles are likely to be higher in dynamic markets than stable markets. Thus, inter-organizational trust may improve business performance by boosting EO's influence.

H3: The moderating effect of cognitive trust on the relationship between EO and firm performance is stronger when environmental dynamism is high than when it is low.  
H4: The moderating effect of affective trust on the relationship between EO and firm performance is stronger when environmental dynamism is high than when it is low.

3. Research Methodology

3.1 Sample and Data

This research defines a SME as a company with 200 employees or RM50 million in revenues in manufacturing or 75 employees and RM20 million in services and other industries. SME Corporation Malaysia created these SME definitions. To test the assumptions, 274 SMEs who met the SME criteria were randomly selected from a SME company directory (Acquaah, 2007). Data was collected July–September 2018.

On-site questionnaires collected data. CEOs or another member of senior management will be contacted via letter or email to complete the questionnaire. Several steps will boost response rate. First, company executives must verbally consent to the research. Second, the topic will receive a research summary. 92.3% of 253 firms responded with valid responses. Non-response bias will be measured by comparing early and late respondents (Armstrong & Overton, 1977). Multivariate t-tests employing firm age, legal form, sector, and turnover growth showed no significant difference between early and late responders, showing no non-response bias.

The analysis excluded industrial and agricultural enterprises since it focused on the service sector. The Malaysian economy is primarily service-based (Malaysia, 2018). Number tables and figures consecutively, not section-wise.
3.2 Questionnaire Development

The questionnaire for this study was created in three stages. To discover candidate ideas and measures, the literature was rigorously reviewed. A questionnaire was generated. Each item was graded on a Likert scale of 5. Then, four Malaysian small and medium business owners were interviewed using the same questionnaire. The protocol describes structures and investigates non-measurable factors. In the third step, three researchers assessed the entire questionnaire, ranked each item's content validity, and suggested adjustments in language and structure. The build instrument utilised in this investigation will be shared upon request.

3.3 Reliability and Validity Assessment

To assess concept reliability and validity, the sample will undergo exploratory factor analysis (EFA). EFA determines the number of variables impacted by diverse factors and the variables that move together (DeCoster, 1998). EFA with an oblimin kaiser normalisation rotation was used to load a single item on several variables, showing its true influence across all factors (Hair et al., 2014; Samiee & Chabowski, 2012). Principal component analysis (eigenvalue > 1) was used to extract components. Sample restrictions required EFA on each concept. EFA was performed on business performance, entrepreneurial orientation, cognitive trust, emotional trust, and environmental dynamism to use this technique. EFA was performed on all constructs with factor loading larger than 0.40 to be thorough and demonstrate the items' robustness.

Confirmatory factor analysis (CFA) will refine the items. CFA results match data well. 2 (df) = 840.16 (482); p 0.00; RMSEA = 0.05; NNFI = 0.94; CFI = 0.92. The sample factor loadings for each construct are 1%, showing convergent validity (Bagozzi & Yi, 1988).

CR and AVE were employed to assess dependability. We calculated the square roots of all multi-item AVEs to determine construct discriminant validity. Our metrics are discriminating since each construct correlation is smaller than the square root of its AVE (Fornell & Larcker, 1981). The study's measurable ideas are distinct (Bagozzi & Phillips, 1982). Composite reliability (CR) assessed the study's scales' convergent validity. CR estimates larger than 0.60 and statistically significant concept-to-domain coefficients (t > 2.0; p 0.05) suggest convergent validity (Bagozzi & Yi, 1988). All values satisfied CR and were statistically significant.

4. Analysis and Results

Moderated hierarchical regressions with mean-centering for independent and moderating variables minimise multicollinearity (Cohen et al., 2003) are used to test hypotheses. Our data are not multicollinear since all variance inflation factors were smaller than 525 (Gareth et al., 2013; Neter et al., 1989). We estimate the following model:

Equation 5-1

\[ \text{Firm Performance} = i + \beta_1 \text{EO} + \beta_2 \text{CT} + \beta_3 \text{EOCT} + e \]

Equation 5-2

\[ \text{Firm Performance} = i + \beta_1 \text{EO} + \beta_2 \text{AT} + \beta_3 \text{EOAT} + e \]

Equation 5-3

\[ \text{Firm Performance} = i + \beta_1 \text{EO} + \beta_2 \text{CT} + \beta_3 \text{EOCT} + \beta_4 \text{ED} + \beta_5 \text{EDEO} + \beta_6 \text{EDCT} + \beta_7 \text{EDEOCT} + e \]

Equation 5-4

\[ \text{Firm Performance} = i + \beta_1 \text{EO} + \beta_2 \text{AT} + \beta_3 \text{EOAT} + \beta_4 \text{ED} + \beta_5 \text{EDEO} + \beta_6 \text{EDAT} + \beta_7 \text{DEEOAT} + e \]
The regression results for the models tested are shown in Table 2. Model 1 contains only the control variables; Model 2 adds the effect of EO; Model 3 adds the direct effect of cognitive trust and perceived environmental dynamism; and Models 4-5 add the two corresponding interaction terms one at a time in order to prevent concealing genuine interaction effects (Aiken & West, 1991; Cohen et al., 2003), as suggested in prior entrepreneurship. Model 6–8 is the same step as Model 3-5, which is applied to the affective-based trust variable. Affective- and cognitive-based trust are analysed in different models to avoid multicollinearity issues and respond to the high correlations between these two variables.

Table 2. Ordinary Least Squares Estimation of Performance of Trust

<table>
<thead>
<tr>
<th>Variables</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
<th>Model 6</th>
<th>Model 7</th>
<th>Model 8</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Firm control variables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Company age (years)</td>
<td>0.041</td>
<td>0.039</td>
<td>-0.032</td>
<td>-0.080</td>
<td>-0.015</td>
<td>-0.010</td>
<td>-0.051</td>
<td>-0.014</td>
</tr>
<tr>
<td>Company location (urban)</td>
<td>0.505**</td>
<td>0.391**</td>
<td>0.457**</td>
<td>0.452**</td>
<td>0.496**</td>
<td>0.466**</td>
<td>0.416**</td>
<td>0.505***</td>
</tr>
<tr>
<td>Type of business (finance related)</td>
<td>-0.249</td>
<td>-0.236</td>
<td>-0.332**</td>
<td>-0.423***</td>
<td>-0.278*</td>
<td>-0.247</td>
<td>-0.327**</td>
<td>-0.112**</td>
</tr>
<tr>
<td>Legal form (informal)</td>
<td>0.100</td>
<td>0.077</td>
<td>0.119</td>
<td>0.136</td>
<td>-0.000</td>
<td>0.081</td>
<td>0.101</td>
<td>0.060</td>
</tr>
<tr>
<td>Market orientation</td>
<td>0.452**</td>
<td>0.128</td>
<td>0.118</td>
<td>0.123</td>
<td>0.156**</td>
<td>0.138</td>
<td>0.164</td>
<td>0.207***</td>
</tr>
<tr>
<td><strong>Individual control variables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Higher education</td>
<td>-0.206*</td>
<td>-0.212*</td>
<td>-0.129</td>
<td>-0.128</td>
<td>-0.178</td>
<td>-0.141</td>
<td>-0.148</td>
<td>-0.155</td>
</tr>
<tr>
<td>Management experience</td>
<td>0.206</td>
<td>0.180</td>
<td>0.187</td>
<td>0.231**</td>
<td>0.168</td>
<td>0.189</td>
<td>0.203*</td>
<td>0.127</td>
</tr>
<tr>
<td><strong>Main effect variables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entrepreneurial orientation (EO)</td>
<td>0.536***</td>
<td>0.526***</td>
<td>0.274</td>
<td>0.385***</td>
<td>0.560***</td>
<td>0.216</td>
<td>0.391***</td>
<td></td>
</tr>
<tr>
<td>Cognitive trust (CT)</td>
<td>0.279***</td>
<td>0.337</td>
<td>0.237***</td>
<td>0.211***</td>
<td>0.023</td>
<td>0.184***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Affective trust (AT)</td>
<td>-0.067**</td>
<td>1.124***</td>
<td>-0.134**</td>
<td>-0.110-</td>
<td>1.090***</td>
<td>-0.173***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived environmental dynamism (PED)</td>
<td>-0.170**</td>
<td>0.014</td>
<td>-0.091</td>
<td>0.051</td>
<td>0.014</td>
<td>-0.090</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Two-way interaction</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H1: EO x CT</td>
<td>0.130**</td>
<td>0.038</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H2: EO x AT</td>
<td>-0.161**</td>
<td>-0.107</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H3: EO x CT x PED</td>
<td>0.192***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H4: EO x AT x PED</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.184***</td>
</tr>
<tr>
<td><strong>Model fit</strong></td>
<td>F-value</td>
<td>9.31***</td>
<td>12.71***</td>
<td>13.69***</td>
<td>11.30***</td>
<td>10.51***</td>
<td>12.53***</td>
<td>10.61***</td>
</tr>
<tr>
<td>R2</td>
<td>0.210</td>
<td>0.294</td>
<td>0.361</td>
<td>0.381</td>
<td>0.382</td>
<td>0.341</td>
<td>0.366</td>
<td>0.349</td>
</tr>
<tr>
<td>Adjusted R2</td>
<td>0.271*</td>
<td>0.335***</td>
<td>0.347***</td>
<td>0.349***</td>
<td>0.314***</td>
<td>0.329**</td>
<td>0.332**</td>
<td>0.331***</td>
</tr>
</tbody>
</table>

Notes: Number of observation, N = 253. Dependent variable: firm performance. ***p<0.01, **p<0.05, *p<0.10

Equation 5.1 is the econometric models for Hypothesis 1 and the regression result in column Model 4. Equation 5.2 is the econometric models for Hypothesis 2 and the regression result in column Model 7. Equation 5.3 is the econometric models for Hypothesis 3 and the regression result in column Model 5. Equation 5.4 is the econometric models for Hypothesis 4 and the regression result in column Model 8.

In Model 2, consistent with the starting point of the theoretical review, this study finds a positive effect of EO on performance (β = .536, p<.001), and the EO variable explains additional variance (ΔR²=.271, p<.100). In Model 3 and 6, the additional of each element of trust and perceived environmental dynamism further increases the explained variance (ΔR²=.335, p<.010; ΔR²=.314, p<.010), suggesting that these factors also affect firm performance. The main effect of cognitive and affective trust is positively significant, whereas the main effect of perceived environmental dynamism is negatively significant.

Hypotheses 1-2 predict positive moderating effects of the affective trust and cognitive trust
variables on the relationship between EO and performance, where representing Equation 5.1 and 5.2 respectively. To test these hypotheses, the individual interaction terms were added in Model 4 (Equation 5.1) and 7 (Equation 5.2). It is noted that each of the interaction terms improves the explanatory power of the models ($\Delta R^2=.347$, $p<.01$; $\Delta R^2=.329$, $p<.05$). Model 4 and 7 reveal a positive and significant interaction effect between EO and cognitive and affective trust on performance ($\beta=.13$, $p<.05$; $\beta=.17$, $p<.05$). In terms of economic significance, an increase in entrepreneur’s EO effort in cognitive and affective trust relationship aided will result in slightly better firm performance.

Hypotheses 3-4 predict a three-way interaction effect among EO, cognitive and affective trust and environmental dynamism on firm performance, where representing Equation 5.3 and 5.4 respectively. As hypothesized, Model 5 (Equation 5.3) and Model 8 (Equation 5.4) show the three-way interactions effect is positive and significant ($\beta=.20$, $p<.01$) ($\beta=.19$, $p<.01$), indicating that the moderation effect of cognitive and affective trust on the EO-performance relationship is generally affected by a dynamic environment. Also, the results indicate that EO and cognitive and affective trust are jointly reinforcing and complementary in terms of their influences on firm performance and that this relationship is slightly improved in dynamic environments. In terms of economic significance, an increase in entrepreneur’s perceived environment dynamism will result in slightly strengthen the cognitive and affective trust, which ultimately resulting in slight better firm performance.

In Table 2 show that PED coefficients have negatively behave in all models, except for Model 5 and Model 8. Simple correlation test in the earlier stage shows very weak but positive relationship between PED and firm performance. The coefficient of PED might affect as other independent and controlling variables are included. Negative coefficient in regression suggest that, while controlling for other variables, as the PED increases, the firm performance is reducing.

5. Conclusion

The RBV, contingency theory, and regulatory focus theory are used to explain how inter-organisational trust in the supply chain helps the EO-firm performance link. It also introduces the notion of environmental dynamic to establish the boundary requirements for inter-organizational trust in the EO-firm performance link. This study emphasises theoretical and practical repercussions of closing this gap. Inter-organizational trust appears to promote the link between EO and company performance in a static setting but has the opposite effect in a dynamic setting. These findings aid microeconomic studies on economic optimisation and interorganizational trust.

In conclusion, this study sought to better understand how EO, inter-organizational trust, and environmental dynamism effect corporate performance. This study found that inter-organisational cognitive trust moderates the influence of EO on firm performance. Thus, the current study conceptually stresses the crucial importance of inter-organisational trust in company success and provides supporting empirical data, enhancing our knowledge of EO and its effects on firm performance. Environmental dynamism moderates the combined effect of EO and inter-organizational trust on corporate performance, the study found. These findings illuminate how organisations might balance EO and trust-based interactions in shifting markets.

References


Effective Classroom Management and the Academic Performance of Students at Secondary Schools in the Mentakab District

Vimala Devi Martham Muthu* & M. Vikneswary Suresh

Malaysia University of Science and Technology, Malaysia
*vimala@must.edu.my

Abstract: The academic performance of Malaysian public secondary school students has been consistently poor for a long time after the endemic, which led to a decrease in students' motivation to attend classes due to their familiarity with online classrooms. The study aims to evaluate the impact of classroom management practices on the academic performance of secondary school students in the Mentakab district. The research employed Operational Skinner Theory and used representative sampling techniques to select 40 teachers, four principals, and 304 students from four schools in the Mentakab district, Pahang Darul Makmur. The study objectives were to assess the academic performance of secondary school students, assess the effectiveness of classroom management, and assess the relationship between classroom management and academic performance. Data were collected using a self-administered questionnaire with a 5-point Likert scale completed by 348 members of the general population. The collected data were analyzed using version 28 of the Statistical Package for the Social Science. The findings indicate a positive relationship between effective classroom management practices and academic performance. Spearman correlation was used to determine the relationship between classroom management and student achievement, and multiple regression analysis was used to identify which classroom management variable best predicts student achievement. The study recommends that principals, teachers, and students use the findings to improve classroom management for better academic performance. Encouraging supportive feedback can boost students' morale and academic performance. The study's findings should also help education policymakers, principals, teachers, and other stakeholders emphasize the use of various instructional strategies to improve students' academic performance.

Keywords: effectiveness, classroom management, students' performance

1. Introduction

Effective classroom management is crucial for a successful educational system. The students' total performance is dependent on the teacher's ability to keep order in the classroom. Students are involved in the creation of a conducive learning environment. It ultimately leads to a vicious cycle of high performance.

Management of the classroom is viewed as the activities performed during the teaching and learning process. The successful completion of these activities can increase the positive regard students have for their teachers (Brannon, 2010). Effective teacher interaction enhances students' critical thinking, a precondition for boosting their academic achievement (Harmer, 2008). Hence, classroom discipline is the basis of a constructive learning process. In terms of classroom management, instructors' positive demeanour has a major effect on their students' academic progress. Instructors use a range of techniques to interest and excite pupils, as well as to equip them with the necessary material for best performance (Egbule, 2005).

Teachers must be sufficiently prepared to maintain classroom order. Thorough thinking and planning for a new class augur well for the class's success throughout the lesson. Teachers must plan classroom management with clarity and consistency to do this. Regarding classroom disciplinary tactics, teachers
must have the information and understanding of how they should conduct themselves in the classroom. This is vital for maximizing the students’ abilities (Abdul Hameed Abdul Majid et al., 2014). This demonstrates that the teacher, who plays a key role in classroom management, must use the best approach to managing the class.

The Malaysian National Education Philosophy states that: “Education in Malaysia is an ongoing effort towards further developing the potential of individuals in a holistic and integrated manner, to produce individuals who are intellectually, spiritually, emotionally, and physically balanced and harmonious based on a firm belief in and devotion to God. Such an effort is designed to produce Malaysian citizens who are knowledgeable and competent, who possess high moral standards, and who are responsible and capable of achieving a high level of personal well-being and ability to contribute to the betterment of the family, society, and the nation at large” (Ministry of Education, 2008).

This statement demonstrates that society today holds schools responsible for all elements of student achievement. Students’ academic progress is substantially influenced by classroom management (American Association of School Administrators, 2002; Brannon, 2010). The purpose of classroom management techniques is to foster an environment conducive to student learning and academic improvement. Each of these strategies may be utilized in the classroom, depending on the nature of the situation at hand. The researcher considered it vital to study the effectiveness of classroom management on the academic achievement of secondary school students in Mentakab District, Pahang Darul Makmur, based on the previous statements.

Too far, however, relatively little research has investigated potential disparities between classroom management and student academic success (Brannon, 2010). Moreover, properly implemented reinforcement strategies would stimulate students’ desire to study and fully involve them in academic pursuits (MOE, 2013). Several interconnected issues could be responsible for the low performance of secondary school students. Therefore, this research was motivated by these fundamental difficulties (Govindaraju et al., 2022).

In addition, the applicability and significance of connected studies in secondary schools in the Mentakab District have not been determined. Thus, the goal of this study is to assess the impact of classroom management techniques on academic achievement in the public secondary schools of the Mentakab District.

2. Literature Review

2.1 Effectiveness of Classroom Management

A classroom setting would enable students to study in an engaging, entertaining, and purposeful manner. Among the models to restructure a good classroom environment is the use of a variety of teaching methods and student participation in numerous learning activities, a physical class arrangement that allows a teacher to access students, the efficient use of class time, and the promotion of positive student interaction during cooperative learning activities (Emmer & Sought, 2001).

2.1.1 Teacher’s Lesson Preparation and Classroom Management on Students’ Academic Performance

The teacher designs and executes courses to ensure success. The management skills of the teacher affect student achievement (Oboegbulem, 2011). Teachers are responsible for managing the educational, social, and physical environments. Teachers oversee students’ assignments. The classrooms of teachers are well-appointed, attractively arranged, and stocked with seats and instructional materials. Effective classroom administration requires the organization and arrangement of materials.

Teachers manage their many classrooms and coordinate people and resources to achieve school objectives. Effective classroom administration, according to Adeboyeje and Afolabi (2012), requires
the intelligent coordination of academic and non-academic tasks. They consist of maintaining class records, monitoring attendance, regulating student conduct, and modifying instructional programmes and resources. Wong and Wong (2005) recommend that teachers plan one or two lessons per day so that they have sufficient time to prepare. Lesson plans based on activities reduce repetition and extraneous topics. This demonstrates that a professional educator enhances learning.

2.1.2 Teacher’s Lesson Presentation and Classroom Management on Students’ Academic Performance

According to research, some educators are incapable of organizing group activities or understanding the subject matter. This demonstrates a lack of preparation, resulting in poor educational presentation. Obwoya (2013) discovered that most of the observed instruction consisted of uninspiring "chalk-and-talk" and that many instructors were unprepared. According to Martin Obwoya (2013), teachers lack subject preparation and presentation skills. Evaluations of academic aptitude, certifications, and teaching experience aid in determining instructor quality. This study examines how instructors apply their training to classroom management. Prior research concentrated on teacher preparation. The way a teacher instructs impacts classroom administration (Obwoyo, 2013).

According to Robert (2001), the most challenging aspect of school and classroom structure is accommodating students with varied prior knowledge and learning rates. The author noted that without prior knowledge, pupils may not comprehend a lesson. To enhance student performance, educators must prioritize quality, relevance, incentives, and time. Teachers must ensure that resolving one problem does not create a new one.

2.1.3 Teacher’s Class Control and Classroom Management on Students’ Academic Performance

Modern education necessitates classroom management. Managed classrooms can be lively and engaging. However, classroom management must optimise student achievement. Management of the classroom necessitates the ability to address classroom management issues and disruptive student behaviour. According to Soyouwanttoteach (2012), outstanding classroom managers are tolerant.

Classroom management requires setting standards. Teachers should first establish guidelines to prevent conflicts (Rosenblum, 2000). These principles ought to increase student expectations, thereby enhancing learning. Teachers must post classroom rules in plain view, explain them, and have students and parents sign a rule sheet. Lastly, classroom norms should be established early and modified throughout the school year (Nevin & Knoblock, 2005).

The personality of a teacher is also crucial (Backes & Ellis, 2003) Educators who are inspired and imbued with a strong sense of zeal for their work cultivate exceptional learning environments. Students will acquire this knowledge. Respecting students includes learning their identities and addressing their concerns. Classroom management extends beyond discipline. Preparation eliminates classroom concerns. Teachers influence the motivation and attitudes of their students (Backes & Ellis, 2003).

2.1.4 Teacher’s Record Management and Classroom Management on Students’ Academic Performance

The classroom environment is crucial to student achievement. The structure of each classroom establishes learning areas or centres that teach and strengthen cognitive and social skills, thereby increasing academic achievement (Mark, 2011). Farrell and Thomas (2011) found, based on observation records, that an organised teacher classroom record helps a beginning teacher become more aware of their classroom practises and improve their instruction for improved learning.

Gropper (2011) suggests that teachers observe and document classroom behaviours to better meet the requirements of their students and rethink the daily schedule. The classroom teacher's record-keeping assists in monitoring student development and promotes student learning responsibility, particularly in
practical classrooms where individual attention is crucial (Clariani & Roy, 2009). This study implies that all students are pleased with their performance, which may not be the case in secondary institutions in the Mentakab District. This research, however, investigates the secondary schools in the Mentakab District that were omitted from the previous study.

2.2 Students' Academic Success

According to Pansiri (2008), teachers' lack of interpersonal skills to coordinate planned classroom activities, as well as their lack of creativity and innovativeness for managing curriculum change, can result in learners' incapacity and lack of freedom for self-expression, as well as the inadequate acquisition of basic literacy skills in schools, thereby affecting learning achievement. This study seeks to determine how exam scores, time management, regular attendance, and classroom focus influence learning outcomes in Mentakab District secondary schools.

Robert (2001) defines the achievements of learners in terms of prior knowledge and learning rates. He also noted that students lack subject knowledge and struggle to comprehend certain courses. According to Wong and Wong (2005), student progress is determined by a teacher's ability to sustain consistency in a classroom with numerous needs and challenges. This study investigates whether secondary school teachers in Mentakab can persuade students to heed and comply with instructions.

Robert (2001) believed that classroom anxiety must be effectively managed, or it will impede student development. These researchers have exhausted the teacher's role and the students' prior knowledge, but they have neglected the students' participation, which could have improved their performance. Good grades increase student involvement. Irene (2008) argues that educational efficacy, high standards, and positive reinforcement motivate and engage students. This study investigates the most prevalent pedagogical practices in secondary schools in the district of Mentakab and their impact on student achievement.

Recent research has established a correlation between student engagement and academic performance, indicating that disengagement results in poor performance. This study establishes a correlation between student engagement and academic achievement. Regardless of their similarities or differences, ineffective instructors will result in subpar academic performance (Marzano, 2003). Effective instruction can increase student achievement (Palumbo & Sanacore, 2007). Rosenblum (2000) disagrees with the findings that regular class schedules help students concentrate. This study investigates how secondary school students in the Mentakab district respond to various teaching methods that encourage critical thinking.

Marina (2001) discovered that teaching students to be courteous, dependable, accountable, and compassionate improved their academic performance. Natalie (2008) emphasised that teachers must be adaptable to the learner profile to modify content presentation based on the requirements of the students, but I believe this is only partially accurate. Student performance will improve. Due to time constraints, it may not be appropriate to impart social ideals in the classroom. Outside of class, guidance and counselling would execute the task.

The learning experience is enhanced by a teacher's lesson preparation, secure learning environment, instruction, and response to student concerns (Backes & Ellis, 2003). Educators who are enthusiastic and inspired enhance student learning.

Test and exam performance may discourage secondary school students in the Mentakab District. However, the ability to communicate ideas clearly and persuasively, to create effective learning environments, to nurture productive teacher-student relationships, to be creative and enthusiastic, and to work effectively with colleagues and parents is more difficult to measure but is nonetheless essential to students' learning. The research, unlike the current study, focused on teacher professional development to enhance classroom management (Hakizimana, 2016).
2.3 Relationship between Classroom Management and Student Academic Success

According to Baker (2005), classroom administration training is essential for subject mastery. The administration of a classroom is influenced by the instructor's approach, the course's design, student motivation, and interpersonal interactions (Obwoye, 2013). The classroom teacher, unlike other professionals, maintains order, provides resources, directs events, and focuses on educational objectives (Hakizimana, 2016).

Classroom management determines academic achievement. To ensure that students benefit from interactive classroom activities, instructors must oversee the entire process. This would significantly enhance instructor-student synchronisation and responsiveness (Hakizimana, 2016). According to Akpakwu (2004), the success or failure of any teaching and learning process depends on classroom management. School academic performance may be impacted by classroom management. When educators consider classroom management, discipline, control, motivational teaching, leadership styles, instructional materials, and communication come to mind (Hakizimana, 2016).

According to the findings of Marina's (2001) study, training students to be courteous, trustworthy, responsible, and compassionate enhances classroom character and student achievement. I disagree with Natalie's (2008) assertion that teachers should be adaptable to the learner profile to modify content presentation to meet students' requirements. Students' achievement will rise.

Obwoya (2013) also discovered that lesson planning improved the academic performance of secondary school students in Kitgum Town Council. Consequently, student achievement is high when lesson preparation is adequate and low when it is inadequate.

However, effective presentation enhances course comprehension and student achievement, whereas ineffective presentation diminishes both. Vance (2012) also demonstrated that observing students during presentations decreases disruptive behaviour and enhances learning. Student achievement is affected by classroom presentation (Jackson & Davis, 2013). Obwoya (2013) discovered that record keeping as a component of classroom management increased student achievement in secondary institutions within the Kitgum Town Council. This demonstrates that adjustments to recordkeeping have no effect on student achievement. Smith (2011) discovered that keeping records enhances student achievement by allowing teachers to monitor student development.

According to a study, effective classroom management improves student performance. Monitoring in the classroom encourages attendance, behaviour, and participation, which enhances student progress. Self-monitoring enables pupils to make decisions and improve their performance. This study addresses the dearth of research on classroom management and student achievement in secondary institutions in the Mentakab District.

2.4 Theoretical Foundation and Conceptual Model

This research proposes the application of Skinner’s theory to assist teachers and students to improve their academic performance and become more successful learners by employing positive reinforcement and avoiding negative reinforcement. The following is the conceptualization explanation for the proposed research model. Skinner's theory and other reinforcement strategies were applied to school settings with the belief that applying reinforcers may raise the frequency of productive actions and decrease the frequency of disruptive behaviours (Skinner, 1961).

According to Skinner's Operant Conditioning of Learning (1961), positive and negative reinforcement influence voluntary behaviour. This implies that teachers who use positive reinforcement on the learner, that is, "if the learner does something pleasant," that learner receives a reward, and teachers who use negative reinforcement on the learner, that is, "if the learner does something good," the unpleasant experience is removed from that learner. Skinner argues that both conditions promote accomplishment,
and it is ultimately up to the teacher and the situation to determine which consequence will work best to improve student behaviour and ensure the class runs as an efficient learning environment.

The greatest method to comprehend behaviour is to examine the origins and effects of an activity (Skinner, 1961). Jones (2000) derived a non-adversarial model of establishing a smooth-moving classroom from Skinner's idea of positive reinforcement. In that, he devised three steps: positive practices, how the class might benefit from positive practices, and collecting notes on every day and minute problem encountered by the teacher. This, he claims, can lead to student achievement.

Skinner (1961) stated that in the context of education, students' academic performance is heavily influenced by their surroundings, particularly the reinforcement and punishment they receive from instructors and parents. Skinner believed that positive reinforcement, such as rewards and praise, could be used to encourage students to engage in desirable academic behaviours like studying and participating in class, whereas negative reinforcement, such as criticism and punishment, could be counterproductive and discourage learning.

Skinner also stressed the value of immediate feedback in moulding behaviour, suggesting that teachers provide pupils with immediate feedback on their performance to help them learn more successfully. Grades, comments on tasks, or spoken feedback in class could all be forms of feedback. Ultimately, Skinner's behaviourism theory emphasizes the need to provide a good learning environment that supports desirable academic activities and gives students instant feedback. Teachers can assist students improve their academic performance and become more successful learners by employing positive reinforcement and avoiding negative reinforcement.

The proposed conceptual model is graphically presented in Figure 1.

3. Proposed Methodology

The research objectives are: (i) to examine the level of classroom management effectiveness in secondary schools in the Mentakab District; (ii) to examine the academic performance of secondary school students in the Mentakab District; and (iii) to identify the relationship between classroom management effectiveness and student academic performance in Mentakab District secondary schools. As such this research will utilise a blend of quantitative paradigm with a descriptive correlational survey approach. This is because the study seeks to investigate the relationship between two measurable variables: effective classroom management and secondary school students' academic success. As a result, this topic necessitates the collecting of quantitative data via surveys to investigate the relationship between classroom management and academic success. The location for this research is secondary schools in Mentakab district and it includes all students, teachers, and principals from the Mentakab district's four secondary schools. As per the data provided by the Ministry of Education in Malaysia.
(MOE, 2023), an approximate of 1214 public secondary schools are involved in the education sector. Thus, the samples obtained are from four schools to represent the education sector in Malaysia. The research will employ a representative sample yield results that can be generalized to the research population. The quantitative approach will be employed and the data collection through the distribution of questionnaires will be chose. IBM Statistical Package for the Social Sciences (SPSS) version 28 will be used to analyse the data.

4. Conclusion

The main goals of the study were classroom management and academic performance. Regarding the first study question, preparation, presentation, class control, and record keeping are the four primary classroom management techniques. When the teacher controls classroom administration, students can manage their time, attend class frequently, and participate in class, according to the study. The researcher concluded that effective classroom management increases student achievement. Academic success is influenced by classroom management. The findings of this study can assist management, teachers, and students in comprehending the relationship between classroom management and academic achievement. This research is intended to aid management in establishing class achievement goals, supervising the teaching, and learning process, and training teachers in classroom management. Rewriting the discipline policy for secondary schools should involve all stakeholders. Additionally, school management should elucidate rules to students. This study should encourage educators to reconsider classroom management. Therefore, they must be able to plan, instruct, and assess students based on predetermined achievement objectives. Setting personal objectives and class rules will encourage students to take responsibility for and implement their work. Additionally, the school should make it simple for students to make critical learning decisions. Lastly, the management of the school should routinely organise meeting session for students to express their frustrations, concerns, and discontent. This reduces school disruptions and improves academic achievement. Finally, this research can assist students in appreciating their class's accomplishments and adapting to the classroom's demands for enhanced learning. Thus, students can concentrate in class, adhere to rules, and complete all teacher-assigned task.

Acknowledgements

The authors express their gratitude to the Malaysia University of Science and Technology for their support in the publication of this conference paper.

References


Egbule, H. (2005). The roles of college of education, agbor students towards examination malpractice. A project submitted to the department of counselling psychology, Delta State University, Abraka for the award of BA, Ed in Counselling Psychology.


Robert, E. S. (2001). Quality, appropriateness, incentive, and time: A model of instructional effectiveness: Johns Hopkins University, 3505 North Charles Street, Baltimore, MD 21218-2498, U.S.A. 

Rosenblum-Lowden, R. (2000). They’re here. You have to go to school, you’re the teacher! Corwin Press


Soyouwanttoteach, (2012). Five classroom management skills every teacher must have. https://www.soyouwanttoteach.com/5-classroom-management-skills-every-teacher-must-have


Understanding Digital Innovations in Omnichannel Retail Ecosystem: The Role of In-Store Technology in Enabling the Survival of Physical Retail

Ahmad Alashmawy a* & Harwindar Singh b

a,b Malaysia University of Science and Technology, Malaysia

*alashmawy.ahmad@gmail.com

Abstract: This paper addresses the challenges faced by the retail industry in the current post-pandemic time and explores the use of in-store technologies in the technological retail ecosystem. The author reviews, in brief, relevant academic literature and introduces a conceptual framework based on the unified theory of technology acceptance and use of technology II incorporating the attributes of customer experience, shopper’s perceived value, and omnichannel purchase journey. The framework helps to understand the role of in-store technology in improving the customer experience in omnichannel retail models and outlines relationships defining the role that in-store technology plays in enabling the survival of physical retail. The study then shifts the focus toward in-store technology adoption, featuring mini-case studies of pioneers in digital retail innovation, namely, Nike, Walmart, and Alibaba's Hema-Freshippo supermarkets. The studies highlight the implementations of in-store technologies by the three retail giants, allowing them to enhance shoppers’ experience, become more customer-centric, improve business operations, and subsequently, differentiate themselves from competitors. Moving forward, the study presents valuable insights for global retailers on the significance of implementing innovative in-store technologies, including a thorough discussion of the diffusion of in-store technology innovation, and the adoption decision-making process. The paper concludes with managerial recommendations based on the reviewed research work, key findings from the mini-case studies, and an agenda for future research.

Keywords: digital disruption, in-store technology, customer experience, omnichannel

1. Introduction

Traditional retail has been disrupted by e-commerce and m-commerce, and significantly impacted by the Covid-19 pandemic. While technology is shaping the retail industry's future, the retail business environment has become more customer-centric. The digitally enhanced in-store shopping experience is seen as the focal point in shaping consumers’ preferences, as well as driving their purchase decisions, satisfaction levels, and brand loyalty. The implementation of in-store technology is a main aspect of the digital transformation strategy that traditional retailers should adopt to overcome disruption, increase value proposition, and optimise overall operations.

The COVID-19 pandemic has expedited digital transformation and created an extra urge to adopt retail 4.0 strategies involving the digitisation of physical retail. The online shopping experience has raised customers’ expectations of what a physical store can offer in services and facilities. On the other hand, the function of the conventional physical store has been reimagined in the omnichannel retail model. Thus, the implementation of in-store technology is essential to integrate offline and online retail channels, improve the shopping experience, and offer customers a seamless omnichannel shopping journey. And from here emerges the research question:

R1: How would in-store technology cater to the survival of physical retail?

In light of the global efforts to embrace digital disruption, it became necessary that researchers present insightful guidance for retailers to catch up with the fast-paced change in the retail landscape, narrow
the knowledge gap created by the changed shopping behaviours due to the Covid-19 pandemic, and help to address the challenges of the technological leap the world currently experiences.

2. Methodology

Based on research previously conducted by the author, titled “The Role of In-Store Technology in Enabling the Survival of Physical Retail - Insights for Malaysian Retailers: An Investigative Study Approach”, this paper reviews and qualitatively investigates how early adopters and innovators of retail technologies have utilised in-store technology to create value for customers and improve the shopping experience.

3. Literature Review

3.1 The UTAT 2 Model for In-store Technology Acceptance

This study explores the behavioural dimension of the interaction between shoppers and in-store technology. It develops its conceptual model based on The Unified Theory of Acceptance and Use of Technology II - UTAT 2 (Venkatesh et al., 2012). UTAT 2 investigates technology acceptance in a non-organisational context and is the first behavioural model of consumer technology acceptance. UTAT 2 added constructs of social influence, hedonic motivation, price, and habit to the original TAM model (Davis, 1989). Age, gender, and experience all moderate the effect of predictors.

![Figure 1. The UTAT2 Model (Venkatesh et al., 2012).](image)

3.2 Omnichannel

Omnichannel retailing is an integrated sales experience that melds the advantages of physical stores with the information-rich experience of online shopping, with retailers being able to interact with customers through countless channels (Rigby, 2011). Omnichannel provides a unique, complete, and seamless shopping experience that breaks down the barriers between virtual and physical stores (Mosquera et al., 2018). Business experts describe omnichannel as a form of retailing that allows customers not only to shop across channels but also to interact with the brand anywhere and at any time, providing them with a unique, complete, and seamless shopping experience that breaks down the
Customer experience is the customer’s cognitive, emotional, behavioural, sensorial, and social responses to a firm’s offerings during the customer’s entire purchase journey (Lemon & Verhoef, 2016). It encompasses the total experience, including the search, purchase, consumption, and after-sale phases of the experience, and may involve multiple retail channels (Verhoef et al., 2009). Customer experience has been the focal point in research discussing the future role of physical retail (Mosquera et al., 2018; Andajani, 2015), being the conventional retail channel, physical stores complete the puzzle of the seamless omnichannel experience customers are expecting to get (Alexander & Kent, 2022).

3.4 In-Store Technology

In-store technologies are bundles of hardware and software that change or enhance the interface between retailers and customers, such technology is implemented in the store to increase efficiency, reduce costs, and improve the customer shopping experience (Grewal et al., 2019). In-store technology will redefine the role of the physical store as it helps combine the multi-sensorial experience of the offline with the access, interactivity, and convenience of the online (Alexander & Alvarado, 2017). In-store technology delivers the seamless experience that independent omnichannel shoppers expect. On the other hand, it gives retailers the ability to control the omnichannel experience of nowadays independent shoppers (Bèzes, 2018).

In-store technology can be visible or invisible to customers. Invisible technologies such as AI, ML, Cloud computing, RFID, Wi-Fi, IoT, and I-Beacons, among others, help inventory management and data processing. Visible in-store technologies such as smartphones, e-wallets, store apps, iPads, wearables, virtual fitting rooms, AR/VR, and QR codes, among others, enhance the shopping experience with real-time personal recommendations, hedonic motivation, cashless payments, self-checkouts, and product information (Roggeveen & Sethuraman, 2020).

3.5 Shoppers’ Perceived Value

Shopping value is a key element in predicting consumers’ shopping intentions. It can be either hedonic or utilitarian (or both). Hedonic shopping value refers to the value received from the multisensory, and emotional aspects of the shopping experience, while utilitarian shopping value, is rational and task-oriented, and considered a cognitive and non-emotional outcome of shopping (Blázquez, 2014). Convenience, flexibility, selection, and cost-effectiveness are factors that affect utilitarian shopping value, while hedonic shopping value is affected by social interactions and entertainment (Yu et al., 2018).

4. Conceptual Framework

The study develops a conceptual framework as shown in “Figure 2” based on interdependent constructs derived from the theories and concepts reviewed. The antecedents to the framework’s variables are derived from the UTAT2 model’s constructs of consumer use behaviour namely usefulness (performance expectancy), ease of use (effort expectancy), hedonic motivation, and social influence. It suggests that shoppers’ perception of the actual use of a certain in-store technology promotes or detracts one or more of the cognitive, affective, sensorial, and social attributes of the customer experience which impacts the process of customer experience creation (e.g., a shopper would get a cognitive shopping experience if he/she used a self-checkout machine and perceived it as useful and easy to use).

Shopping hedonic and/or utilitarian values can be obtained from the in-store shopping experience, the actual use behaviour of in-store technology, and/or the seamless/integrated omnichannel shopping
journey. The study argues the interdependence of the relationship between the shoppers’ use of in-store technology and the seamlessness and integration of the omnichannel shopping journey. In one case, these seamlessness and integration of the omnichannel shopping journey are obtained as a consequence of the usage of in-store technology (e.g., a shopper uses an endless aisle digital kiosk in a physical store to buy an online-only item).

In another case, the usage of in-store technology can result from the seamlessness and integration of the omnichannel shopping journey (e.g., a shopper buys an item online and picks it up in-store via an in-store online order vending machine)."

Figure 2. Antecedents to The Role of In-Store Technology in Enabling the Survival of Physical Retail

As seen in “Figure 3”, The author incorporates the latter relationships to conclude the study’s conceptual framework, proposing that; for a physical retail store to be described as digitised, connected, convenient, omnichannel, and experiential (DV), it should:

I. Offer customers a superb in-store shopping experience (IV No. 1),

II. Heighten customers’ utilitarian and hedonic perceived shopping values (IV No. 2).

III. Offer the seamlessness and integration of the omnichannel shopping Journey (IV No. 3).

The study considers the relationship between DV and IVs to be moderated by implementations of in-store technology both visible and invisible to customers as they are understood to have a direct impact on the direct relationship between DV and IVs.
As opposed to the ideas which argue that online shopping is becoming the “New Norm” and physical shopping is eventually dying after failing to deliver the same shopping advantages that the online shopping experience delivers to customers. The framework conceptually demonstrates how in-store technology is instrumental in enhancing the physical shopping experience and helps the survival of physical retail in an omnichannel setup.

Figure 3. The Role of In-Store Technology in Enabling the Survival of Physical Retail

5. Mini Case Studies

5.1 The Case of Nike

Nike is seen as one of the most innovative brands in the world, though its “innovation mixed with speed” strategy Nike is always a step ahead of its competitors, the credit goes to the huge investment in digital transformation. In 2019, Nike’s “Consumer Direct Offense” strategy came to light, its key element entails shifting sales to its own “Nike Direct” omnichannel retail platform. “Nike Direct” allows customers to shop both online through the “Nike website” and a suite of “Nike Apps”, and offline through its concept stores “Nike Live”, “Nike Rise” and “Nike Unite”. In the Nike flagship, concept, and experiential physical stores customers can shop in digitally enhanced, immersive shopping environments that deliver a personalised omnichannel “Nike Consumer Experience (NCX)”.

The ”Nike Store App” forms the bridge between digital and physical shopping environments, while shopping in Nike concept and experiential stores, consumers use the Nike apps to access the digital features of the store and use the facilities offered by in-store technology. The Nike app allows in-store contactless “Scan & Go” self-checkouts. Once a “Nike Plus” member walks into the store, they get hyper-personalised recommendations on their app driven by AI and data analytics. Through interactive digital kiosks powered by augmented video mapping technology “Nike by You” allow customers to customise their sneakers and outfits. In Nike concept stores customers can feel a social presence via Nike’s “Media Wall”, A multi-touch, multi-user, ultra-high-definition wall that displays campaigns, products, and social media bursts.

5.2 The Case of Walmart

While Amazon began as an online retailer and acquired brick-and-mortar retail space, Walmart as a
traditional retailer followed an inverse path. In 2009 Walmart launched the Walmart Marketplace. With its Walmart marketplace, the Walmart suite of apps, and Walmart’s traditional retail channels (10,500 stores in 24 countries, Walmart has developed into an omnichannel retailer. For the fiscal year 2022, Walmart set an investment of $14 billion for automation, technology, supply chain, and customer-facing technologies. The Omnichannel integrated experience that Walmart offers its customers is a result of a consistent growth strategy and investment in gaining dynamic digital capabilities.

Walmart customers can use the Walmart app on their phones to perform various activities and unlock all technology-facilitated services in-store. Walmart’s app uses navigation inspired by airport wayfinding systems to help customers efficiently locate products in the stores. Walmart physical stores use a wide array of in-store technologies with various functions that serve the customers’ needs for a convenient, effective, and enjoyable shopping experience. Walmart introduced the “Scan & Go” feature on the Walmart app and made it available to “Walmart Plus” members in selected stores, it is planned to gradually substitute self-checkout kiosks in most Walmart stores. To facilitate the buy online pickup in-store (BOPIS) service, Walmart installed robotic “Pickup Towers” that serve as vending machines for customers’ online orders in over 1500 of its stores.

5.3 The Case of Alibaba’s “Hema – Freshippo”

In 2015, Alibaba opened its first Hema – Freshippo supermarket in China, 3 years before Amazon opened its first Amazon Go physical store in 2018. Hema’s English name is “Freshippo”, Alibaba is planning to open 2000 Hema - Freshippo stores around the world by 2023. The new and innovative technologies that Alibaba uses in Hema-Freshippo are changing the conventional way supermarkets operate, the stores are not any more offline sales channels. The AI technology applied in Hema focuses on improving consumers’ experience and operations efficiency. Hema has a customer-first strategy, which aims at giving its customers a super convenient and hyper-personalised shopping experience. The Alibaba “New Retail” vision sees the physical store as a “Retail Hub” and an omnichannel ecosystem.

Speed and convenience are the core element of Alibaba’s New Retail; therefore, the Hema customers’ shopping experience is designed around the “Hema App”. Using the app, shoppers navigate through the store aisles and scan QR codes to get detailed information about the products. Hema uses “Digital Price Tags” updatable in real-time based on market rates, especially for fresh products, to ensure synchrony between online and in-store prices.

Hema adopts a 100% cashless payment strategy with Alibaba’s Alipay e-wallet integrated with the Hema app. Customers perform self-checkout using the app-enabled “Scan & Go” service powered by “Facial Recognition” technology. Alibaba has also introduced the “Hybrid Shopping” concept using technology to change Hema supermarkets to a hybrid of centralised distribution and fulfilment centres for online orders. The Hema-Freshippo supermarket’s restaurant in Shanghai is an element of experiential shopping, shoppers can get a unique dining experience powered by technology and enjoy being served by the “Robot.He.”

6. Discussion

6.1 Obtaining In-Store Digital Capabilities

Digital capabilities of in-store technology help gain a competitive advantage through cost optimisation and differentiation through individualisation, one technology can serve both individualisation and cost optimisation (Betzig et. al., 2018). Cost optimisation is obtained for example through the self-checkout machines that reduce staff costs. While individualisation is obtained by analysing the data captured while customers interact with in-store technology in real-time to offer a personalised experience based
on the customer’s traits, purchase history, and shopping behaviour.

6.2 Retailers’ Strategic Decision of In-Store Technology Adoption

Applying The Diffusion of Innovation Theory (DOI) to retailers’ decision to adopt retail 4.0 innovations, retailers should consider five main factors before taking the adoption decision, namely, Relative Advantage, Complexity, Compatibility, Trialability, and Observability (Rogers, 2003). Retailers would usually assess the relative advantage of a certain technology based on a projected ROI, however, in the current omnichannel retail landscape retailers should consider how technology impacts the shopper’s experience. The implementation would be more successful when retailers differentiate between technologies that increase operational efficiency and those that enhance the customer experience and understand the overall benefit of each technology.

6.3 In-Store Technologies & The Purchase Journey

One of the clearest ways to assess the deliverables of in-store technologies is their functionality in facilitating the customers’ purchase journey. In-store technology functions the best within the seamless omnichannel customer’s purchase journey given the high degree of information integration between channels that allows capturing more data. Therefore, retailers should choose in-store technologies that facilitate customers’ purchase journey to guide their purchase decision, hence increasing shopping basket sizes, and generating more sales (Roggeveen & Sethuraman, 2020).

6.4 In-Store Technology & The “Servitization” of Retail

Servitization in retail is the innovation of a retailer in its capabilities and processes to sell not only products but products and associated services (Narvaiza et al., 2015). Servitization is evident in the transformation of Alibaba’s “Hema- Freshippo” and Walmart into fulfilment centres for online orders, as well as the variety of services customers have access to while shopping, such as entertainment centres, restaurants, and interactive services powered by in-store technology. In the current retail landscape servitization is an interactive process that is highly valued by customers and defines the retailer-customer relationship. It also adds value to the existing products a retailer sells. Customised, and IOT-equipped products are evidence that servitization functions throughout the customer purchase journey and allows value co-creation.

6.5 Technology-Enabled Personalisation (TEP)

Riegger et al. (2021) define TEP as “the integration of physical and digital personalisation dimensions at the point of sale to provide individual customers with relevant, context-specific information, according to historic and real-time data in combination.” In the context of this study, as previously exhibited in the mini case studies, in-store technology enables retailers to offer a hyper-personalised shopping experience, that creates self-association with customers and provides them with relevant information/offerings that match their needs/preferences.

7. Conclusion

7.1 Findings

The findings from reviewed literature and mini-case studies support the study’s conceptual framework as follows:

a. The utilitarian advantage perceived by customers while using in-store technology overweighs the hedonic advantage. Customer-perceived advantages such as speed, convenience, and
efficiency fulfil the cognitive dimension of the shopper’s experience, positively affect purchase intentions, and result in increased sales.

b. The hedonic function of in-store technology creates value for the retailer, it makes the shopping encounter more appealing to customers, elevates customers’ footfall rates and their dwell time, and consequently results in potential sales and increased customer loyalty and lifetime value. Also serves the multisensory dimension of the shopping experience.

c. The human factor will remain the most important determinant of the physical experience, thus, store employees are seen to play a crucial role in a digitally enhanced physical store, equipped with employee-facing apps as in Walmart and Hema-Freshippo cases, they help traditional shoppers who are dependent and value human-to-human interactions.

d. In omnichannel the best way to give independent customers a sense of control is to integrate their mobile phone usage while in-store with in-store digital facilities. Such integration takes place through a functional and user-friendly store mobile application that helps the creation of the state of flow.

a. Nike as a manufacturer of sports shoes and outfits, has surpassed its historical rival Adidas by investing in retail technology innovations and created an incomparable brand image, digitally enhanced concept, and flagship stores that deliver the Nike unique experience within an omnichannel retail setup.

b. Alibaba’s Hema-Freshippo demonstrated the highest degree of integration between all retail operations including the supply chain, also pioneering servitization strategies that transformed the store into a logistics hub and Third Place for customers to enjoy a variety of services of hedonic/utilitarian natures while shopping in-store.

7.2 Managerial Recommendations

Collecting customers’ data remains the most valuable digital capability acquired from the adoption of in-store technology. Customers’ data constitutes a foundation for the implementation of differentiating strategies such as individualisation and personalisation. It also helps increase efficiency and productivity when integrated with data of the rest of retail operations across the entire retail value chain.

The adoption decision of in-store technology comes inseparably from the strategic decision to adopt retail 4.0 strategies that aim to digitalise the physical shopping experience through the integration of emerging retail and data capture technologies and combine both offline and online channels in unity that gives rise to omnichannel shopping digital transformation.

Innovation is an ongoing process. As technology evolves, retail innovators keep pace with the change and allocate huge budgets to R&D, and the acquisition of tech innovators, which has transformed them into tech companies themselves.

Retail innovators are ready now to monetise their digital capabilities by offering shared services such as Alibaba cloud company that shares the services of cloud computing, storage, networking, security, Big Data, and AI.

7.3 Future Research Agenda

The proposed research agenda covers three components of the retail value chain, namely customers, retailers, and employees as examples below:

a. Quantitative research to determine factors influencing shoppers’ intention to use one or various
in-store technologies applying TAM using generation/age, gender, experience, and/or personal innovativeness as moderators.

b. Qualitative research based on structured interviews with strategists of small and medium retail enterprises to indicate the drivers/barriers to the adoption of in-store technology.

c. Quantitative or Qualitative research targeting store employees within a certain retail organisation that implemented in-store technology applying TAM to determine their perception regarding the usage of such technology/technologies.

Acknowledgments

I would like to express my sincere gratitude to my academic supervisor Associate Professor Dr. Harwinder Singh for his valuable guidance, support, and encouragement throughout the course of my research. His expertise and insights were fundamental in shaping the direction of my work and improving its quality. I would also like to extend my appreciation to the organisers of the ICDI2023 conference for providing me with the opportunity to present my research.

References


Attitudes Toward Seeking Professional Psychological Help: A Conceptual Paper

Noor Syamilah Zakariaa, Neerushah Subarimaniamb, M. Iqbal Saripanc, Wan Marzuki Wan Jaafard, Khoo Bee Leeec & Rohani Che Hashimf

a, b, d Faculty of Educational Studies, Universiti Putra Malaysia, Malaysia
b Institute of Postgraduate Studies, Malaysia University of Science and Technology, Malaysia
b Faculty of Engineering, Universiti Putra Malaysia, Malaysia
c Institut Pendidikan Guru Malaysia Kampus Pulau Pinang, Malaysia
d Institut Pendidikan Guru Malaysia Kampus Sultan Abdul Halim, Malaysia
f neerushah@must.edu.my

Abstract: The Malaysian government has been implementing continuous efforts to enrich the living of the Orang Asli. Nonetheless, they remain isolated with their own ways of living and hardly assimilate into the mainstream communities. They hardly seek help from the mainstream communities and professionals too. Thus, this conceptual paper is aimed to identify factors that could help the Orang Asli deal with challenging life situations through counseling perspectives. To achieve the research objectives, a total of four new instruments will be developed to measure self-efficacy, self-esteem, resilience, and attitudes toward seeking professional psychological help among the Orang Asli secondary school students. A survey consists of five components including demographic background will be distributed to the Orang Asli secondary school students in the selected states of Malaysia. Data collected through the survey will be analyzed to measure the extent of each factor, to study the relationship between factors, and finally, to identify factor that has the greatest influence on the Orang Asli secondary school students’ attitudes toward seeking professional psychological help. This study may trigger transformation on holistic aspects of the Orang Asli’s living now and future. The psychological aspects of the secondary school students can be improved too.

Keywords: attitudes toward seeking professional psychological help, Orang Asli, students

1. Introduction

The Malaysian government has been implementing constant exertions to enhance the living standard of the Orang Asli (OA) which cover a diverse range of economic and social development programs (Abdullah et al., 2013). However, they are still lagging behind as compared to other ethnics in Malaysia (Ong et al., 2018). The OA remain isolated with their own ways of living and hardly link connections with the other communities (Sadeka et al., 2020). Mohd Shah et al. (2018) mentioned about few issues being encountered by the OA such as poverty, land rights, way of life, and academic achievements; and these issues are often related to the OAs’ unwillingness to get access to various resources and support from mainstream communities.

In terms of poverty, the OA remain as the poorest people in Malaysia and 76.9 percent of them remain below the poverty line (Ong et al., 2011). Not only that, more than one third of the OA’s population is categorized as hardcore poor (Ong et al., 2018). For example, they could not afford to send their children to schools. Although the difficulties experienced by the OA are evident, the OA are resistant towards development and apparently quite apprehensive to change (Abdullah et al., 2016). They are not ready to experience huge changes (Abdullah et al., 2013). In contrast, Abdullah et al. (2013) reported that the poverty rate among the OA has decreased gradually; and it is a considerable reduction as compared to their poverty status in the 1990s, as they slowly get involved in commercial crop projects and other economic development initiatives to improve their socio-economic status.

In terms of way of life, the OA are too dependent on the government assistance (Mohd Shah et al., 2018). They, including their children are reported to have low self-esteem (Abdullah et al., 2013),
possess low self-resilience, and lack of efficacy beliefs to explore the modern world in reality (Mohd Shah et al., 2018). Besides poverty and way of life, the academic achievements among the OA is also still poor (Mohd Shah et al., 2018). Majority of the OA attend schools only at the primary level (Abdullah et al., 2013). The government has implemented a comprehensive education plan through Five-Year Development Plan and Long-Term Development Plan of Malaysia; and targeted all children in Malaysia to have at least primary level education by 2015 (Abdullah et al., 2013). However, the Department of Orang Asli Development (JAKOA) reported that in 2018, only about half of the students’ population who have completed their primary education enrolled to secondary level education. The dropout rate among the OA secondary school students is higher compared to the OA primary school students (Mohd Shah et al., 2018). On the contrary, the statistics produced by the JAKOA in 2017 reported the number of dropout cases among the OA students which has decreased to 17 percent as compared to 29 percent in 2009. It took almost eight years to reach 17 percent of dropout and thus, continuous efforts are needed to improve the academic achievements of the OA until they become equally successful at every aspect of their living.

Above all, Ghazali et al. (2017) highlighted that the psychological aspect of the OA is often neglected and they need attention specifically on their mindset and value orientation although OA like to protect their own community specifically their culture and traditions (Sadeka et al., 2020). Furthermore, the OA community offer mutual help to their community members and share almost similar values with them. However, they rarely seek help and get access to resources outside of their protected environment. Referring to the challenges encountered by the OA, this proposed research aims to identify factors such as self-efficacy [SEF], self-esteem [SES], resilience [RSL], and attitudes toward seeking professional psychological help [ATSPPH] that could help the OA to deal with challenging life situations through counseling perspectives; a lens through, which children and teenagers can receive support and experience tremendous growth throughout the pupilage years.

The focal point of this research is on psychological aspects of the OA secondary school students, which may trigger transformation on holistic aspects of their living now and future. The transformation would provide them essential new set of life skills, which could lead them in overcoming issues related to poverty, land rights, living conditions, education, and academic achievement. In the government policy implementation manuals, the OA have been marginalized as resistant toward development and thus, their development is now subjected to cultivation of positive mindset and attitudes. Otherwise, all government’s efforts to upgrade the living standard of the OA would be regarded as effortless.

1.1 Research Hypotheses

HO₁: There is a significant relationship between SEF, SES, RSL, and ATSPPH among the OA secondary school students in Malaysia; and

HO₂: There is a significant influence of SEF, SES, and RSL on ATSPPH among the OA secondary school students in Malaysia.

2. Literature Review

2.1 Population of the Orang Asli (OA)

The ‘Orang Asli’ is also known as the indigenous peoples of the Peninsular Malaysia and this official collective term of ‘indigenous peoples’ was established after the Second World War, with the onset of Independence in 1957 and the formation of Malaysia in 1963 (Lye, 2011). According to Syed Hussain et al. (2017), the population of Malaysia in 2010 was 28,334,135 million and 0.6 percent of the population are the OA. The OA covered 0.8 percent of the total population of Malaysia. Surprisingly, the Department of Orang Asli Development (JAKOA) revealed that the percentage of the OA in Malaysia has increased to 178,179 in 2018. The population showed an increase of 8,192 within one
year. Although the growth of population is evident, there are still many challenges encountered by the OA toward improving their holistic well-being.

2.2 Attitudes Toward Seeking Professional Psychological Help (ATSPPH)

The research landscape is becoming more complex and many researchers start working with the Orang Asli (OA) over the past 30 years (Lye, 2011). However, research involving the OA specifically in counseling is still limited, both nationally and internationally. To the researchers’ knowledge by conducting a thorough preliminary desktop search, there exists no one single research that examines relationship between the three factors: (a) self-efficacy (SEF); (b) self-esteem (SES); and (c) resilience (RSL) on attitudes toward seeking professional psychological help (ATSPPH) among the OA secondary school students. As mentioned by Sadeka et al. (2020), the OA community builds mutual help network in their own community. However, they rarely seek professional help from people out of their community. Thus, the primary objective of this proposed research is to identify factor that has the strongest influence on OA secondary school students’ ATSPPH, followed by examining the relationship between the three factors and ATSPPH. The development of four instruments to measure SEF, SES, RSL, and ATSPPH will take place prior to working on the other objectives.

SEF refers to individuals’ capability to perform (Udayar et al., 2020); SES refers to individuals’ subjective evaluation of their worthiness (Harris & Orth, 2019); and RSL involves a dynamic process that integrates multiple factors such as biology, cognitive, and interpersonal to confront with challenging life events (Surzykiewicz et al., 2019). On the other hand, ATSPPH refers to individuals’ attitudes toward help seeking preferences (Picco et al., 2016). Kandasamy and Jusoh (2011) found that the expectations of the OA students for counseling services was high and they also have willingness to seek psychological help from the registered counselors. This finding is contrary to what other researchers found. The attitude towards seeking help is somehow found to be related to SEF, SES, and RSL.

Individuals with depression or suicidality have had high confidence when they have successfully communicated with their health care staff (Umubyeyi et al., 2016). Whereby, individuals who have doubt about their capability are most unlikely to seek professional help. Ng (2014) conducted research to investigate the relationship between students’ social SEF and instrumental help seeking. She found that students are vulnerable to seek for professional help when they perceive themselves as socially incompetent. The similar approach can be applied in research involving the OA, specifically secondary school students. The OA refuse to embrace modernity and assimilate with the mainstream society (Idrus, 2011). The researchers believed that both OA community and the OA students would be reluctant to change as they grow up in the same environment. For current situation and in the future, this phenomenon will affect their attitudes in seeking help from the mainstream society, specifically the professionals. On the basis of these findings, the researchers propose that there is a significant relationship between SEF and ATSPPH.

The researchers also hypothesized that there is a significant relationship between SES and ATSPPH. Primus et al. (2017) found that the OA students have lower adaptation and are more prone to psychological issues such as SES. Lannin et al. (2014) found that self-stigma of seeking professional psychological help affected individuals’ SES. In the same Lannin and colleagues’ research, self-stigma of seeking professional psychological help predicted individuals’ decreased intention to seek for counseling. A little inhibition of help seeking will occur when the potential help seekers held low evaluation of themselves (Tessler & Schwartz, 1972). Thus, the researchers propose that self-esteem of individuals is related to their ATSPPH.

Finally, the researchers found associations between RSL and ATSPPH. ATSPPH is proven to increase level of RSL (Crowe et al., 2016). Females were more likely to seek help as compared to males (Santhosh & Nguille, 2017). Individuals with low RSL may encounter capability deprivation to recognize available resources to solve issues (Santhosh & Ngullie, 2017). In this research, the OA secondary school students are expected to transform into RSL group. They should be able to bounce
back during adverse situations, and their ability to recognize available resources that can help them would be an advantage. Professional psychological helpers such as registered counselors would cater the needs of the OA secondary school students in the aspect of academic achievements, mental health, moral development, increased self-esteem, and social support. The professional psychological helpers can also educate them about coping strategies. Hence, this proposed research is an attempt to understand the OA secondary school students’ ATSPPH and to identify the strongest factor that can improve their ATSPPH.

3. Methodology

3.1 Proposed Research Design

A quantitative method incorporating parametric statistics will be applied to address research problems and illuminate significance of the research. The researchers will employ correlational design as the research involves measuring multiple factors to identify relationships between them (Stangor, 2011). This research design would fit the current research as its primary objective is to examine the influence of self-efficacy (SEF), self-esteem (SES), and resilience (RSL) on the Orang Asli (OA) secondary school students’ attitudes toward seeking professional psychological help (ATSPPH).

3.2 Research Population

This research will be conducted in Malaysia. Therefore, the focus of this proposed research will be on the Orang Asli (OA) community who live in Malaysia. The indigenous peoples are also known as the ‘Orang Asli’ which refers to the literal meaning of ‘original people’ (Jamiran & Wee, 2013). Anthropologists and historians predicted that the OA are originated from Burma, Cambodia, and Northern Thailand before they migrated to Malaysia circa 3000 to 8000 years ago (Syed Hussain et al., 2017). The OA consist of 18 sub-ethnic groups which are classified into three major groups: (a) Semang (Negrito); (b) Senoi; and (c) Aboriginal Malay (Proto-Malay) (Jamiran & Wee, 2013). Furthermore, the OA are governed by The Aboriginal Peoples Act 1954 (Revised 1974) (Idrus, 2011). In 2010, the highest population of OA was recorded in Pahang and Perak (Masron et al., 2013). Similarly, the Department of Orang Asli Development (JAKOA) reported the highest population of the OA in both, Pahang and Perak in the year of 2018. The statistics of population revealed by the JAKOA also showed that the OA live in Johor, Kedah, Kelantan, Melaka, Negeri Sembilan, Selangor, and Terengganu.

However, the current research will involve the OA secondary school students from all states in Malaysia depending on the sampling technique. The target population which is the OA secondary school students, is considered as a significant group in the indigenous communities. One source of data from the JAKOA, which retrieved from the Malaysian Open Data 2018 depicted the statistics relevant to the OA students. In 2018, there were a total of 26,588 OA students in secondary schools located in Malaysia. They were all enrolled in 768 secondary schools located in Johor, Kedah, Kelantan, Melaka, Negeri Sembilan, Pahang, Perak, Selangor, and Terengganu. This research will only involve both male and female OA secondary school students. The OA secondary school students will be selected as respondents for this research based on the sample size needed to represent the population.

3.3 Sample Size

A sample of the OA secondary school students will be used to achieve the research objectives. Referring to the data obtained from the Department of Orang Asli Development (JAKOA), there are more than 26,588 OA students enrolled in secondary schools located in Malaysia. The selection of sample from the population will be based on the Cochran’s (1977) sample size calculation. The researchers would increase the sample size by 40 to 50 percent as suggested by Salkind (1997) to account for uncooperative respondents and missing responses.

3.4 Sampling Technique
Simple random cluster sampling will be applied to recruit groups of respondents consisting of the Orang Asli (OA) secondary school students. There is a total of nine states in Malaysia that reported enrollment of the OA secondary school students: (a) Johor; (b) Kedah; (c) Kelantan; (d) Melaka; (e) Negeri Sembilan; (f) Pahang; (g) Perak; (h) Selangor; and (i) Terengganu. The researchers will divide the population into nine clusters based on the nine states. Then, clusters will be chosen through simple random sampling and this method is also known as geographical cluster sampling (Cochran, 1977).

3.5 Instrumentation

The researchers will develop four new different instruments to measure self-efficacy (SEF), (b) self-esteem (SES), (c) resilience (RSL), and attitudes toward seeking professional psychological help (ATSPPH) of the Orang Asli (OA) secondary school students. The instruments’ development will follow the process and procedure of instrument development as suggested by Brown (1983) in Mohd Noah (1995). The process of instrument development is as follows:

1. Objectives for instrument development;
2. Literature review and document analysis;
3. Items construction and development;
4. Content validity analysis;
5. Items and instrument structure refining [EFA];
6. Pilot testing and reliability analysis;
7. Instrument refining; and
8. Instrument establishment (offline and online).

4. Data Collection

The researchers will obtain ethical approval from the Ethics Committee for Research Involving Human Subjects, Universiti Putra Malaysia and another specific approval to conduct research using the Orang Asli (OA) secondary school students from the Department of Orang Asli Development (JAKOA) prior to collecting data. The targeted respondents will be the OA secondary school students. Surveys consisting of five sections: (a) demographic information; (b) self-efficacy (SEF); (c) self-esteem (SES); (d) resilience (RSL); and (e) attitudes toward seeking professional psychological help (ATSPPH) will be distributed to the OA secondary school students in the selected states. The respondents will be given 10 to 20 minutes to complete the survey.

5. Data Analysis Method

The researchers will conduct exploratory factor analysis (EFA) to examine the factor loading of the items in all developed instruments. This is an effort to ensure construct validity of the instruments. Items with factor loading values of less than .50 will be removed. In addition, the internal consistency of the instruments will also be examined prior to data collection. Data will be collected once EFA and internal consistency are finalized. The data will be analyzed using multiple methods to test the research hypotheses and concomitantly, achieve the research objectives. First, the researchers will prepare the data by screening for missing responses. Second, the researchers will conduct exploratory data analysis (EDA) or test of assumptions to ensure suitability of data for intended analyses. Third, the data will be analyzed using descriptive analysis to measure the extent of SEF, SES, RSL, and ATSPPH among the OA secondary school students. Fourth, the researchers will use Pearson Correlation to determine the relationship between SEF, SES, RSL, and ATSPPH. Finally, multiple regression analysis will be used to examine the influence of SEF, SES, and RSL on ATSPPH. The factor (SEF, SES, or RSL) that has the strongest influence on ATSPPH will be identified through the multiple regression analysis.
6. Conclusion

The results from this proposed research can provide a means to profile self-efficacy (SEF), self-esteem (SES), resilience (RSL), and attitudes toward seeking professional psychological help (ATSPPH) among the OA secondary school students throughout Malaysia. The profile can help the registered counselors to identify common challenges encountered by the OA secondary school students in seeking professional psychological help. This initiative would help to eliminate negative stereotypes exist between the two parties, attributed to either registered counselors by the OA secondary school students or the OA secondary school students by registered counselors. Developmentally, the secondary school students would have high identity needs and they will be in a challenging life phase until they emerge as mature individuals in young adulthood. There is lack of empirical data in this research that provides evidence of how this research can be beneficial as this research is still its infancy stage. The researchers hope to disseminate the data as soon as it is ready, perhaps after securing the intellectual property of the instruments.

Acknowledgements

This research is funded and supported by the Ministry of Higher Education Malaysia through Fundamental Research Grant Scheme (FRGS/1/2020/SS101/UPM/02/1). The researchers would like to thank the ICDI2023 committee for the opportunity given to propose this research.

References


Counseling Ethics Competence of Malaysian Registered Counselors

Noor Syamilah Zakariaa, Neerushah Subarimaniamb, Wan Marzuki Wan Jaafarc, Ahmad Fauzi Mohd Ayubb, & M. Iqbal Saripande
aFaculty of Educational Studies, Universiti Putra Malaysia, Malaysia
bInstitute of Postgraduate Studies, Malaysia University of Science and Technology, Malaysia
cFaculty of Engineering, Universiti Putra Malaysia, Malaysia
dneerushah@must.edu.my

Abstract: This research is instrumental as it may bridge the gap in the literature indicating the need to measure counseling ethics education application and comprehension. Enhanced counseling ethics education application and comprehension may improve delivery counseling services to the clients and move the counseling profession forward. Lack of ethical skills, knowledge, and awareness can contribute to poor ethical decision-making process and affect the professional development and wellness of the counselors. Eventually, this research offers an instrument, Counseling Ethics Competency Scale which can be utilized to examine levels of counseling ethics competency among registered counselors in Malaysia. A total of seven instruments including Counseling Ethics Competency Scale were used to meet the following research objectives: (a) to determine perceived level of counseling ethics competency among registered counselors in Malaysia; and (b) to determine factors that may influence counseling ethics competency among Malaysian registered counselors. The analysis revealed that emotional intelligence has greatest influence on counseling ethics competency. This study is conducted to accentuate ethics comprehension towards best practices of ethics application and internalization to become excellent counselors. Future studies may apply the newly developed scale to be utilized in various counseling settings.

Keywords: counseling ethics competency, registered counselors, counseling ethics education

1. Introduction

Ethics competency refers to ethical awareness, ethical knowledge, character strength, willingness to do good, and moral judgment skills (Kulju et al., 2016). Professional experience, ethical knowledge, ethical awareness, virtuous professional, human communication, and supporting surroundings are prerequisites for ethical competence (Kulju et al., 2016). According to Rodgers et al. (2014), competence is needed to master challenging tasks. On the other hand, Sperry (2011) highlighted that ethical competency comprises ethical awareness, ethical knowledge, and ethical sensitivity. There are numerous ethical codes that reflect the concept of competency in counseling profession (Francis et al., 2018; Zakaria et al., 2016). The ethical individuals are expected to apply the ethical behaviors in accordance with the ethical codes and create a supportive environment (Barkhordari-Sharifabad et al., 2018). In this environment, values are identified and shared to direct individuals’ actions (Barkhordari-Sharifabad et al., 2018). Individuals who are facing ethical dilemmas require adequate ethical competency to make right and rational decisions; and eventually, resolve the ethical dilemmas in a successful manner (Pettersson et al., 2018).

In overall, ethics competency is a result of integrated ‘being’, ‘doing’, and ‘knowing’ (Pettersson et al., 2018). It involves the abilities of character which can be observed in the ‘being’, action in the ‘doing’, and finally, knowledge from the ‘knowing’ (Pettersson et al., 2018). Individuals would have the capacity to implement suitable and effective actions in a given situation by acquiring good level of ethics competency (Sperry, 2011; Zakaria et al., 2017). In counseling, ethics competency is required to assist counselors in making ethical-related decisions. Although the importance of counseling is evident, there is still limited research that focused on counseling ethics competency (CEC). Moreover, there is no valid or reliable instrument available to measure counselors’ level of ethics competency (Kocet,
Hence, this study offers an instrument to measure CEC among Malaysian registered counselors. It is crucial to measure the level of CEC to accentuate ethics comprehension towards best practices of ethics application and internalization to become bright counselors. This research was conducted to meet the following objectives and the research hypotheses are as stated in section (b):

1.1 Research Hypotheses

H1: Emotional intelligence has a significant influence on CEC;
H2: Perceived stress has a significant influence on CEC;
H3: Resilience has a significant influence on CEC;
H4: Social support has a significant influence on CEC;
H5: Spiritual well-being has a significant influence on CEC; and
H6: Self-efficacy in dealing with legal and ethical issues (SELE) has a significant influence on CEC.

2. Literature Review

According to Kocet (2006) and Board of Counselors [Malaysia] (2016), there is no code of ethics that can completely solve ethical issues in counseling. Thus, besides referring to Counselors Code of Ethics, it is necessary for registered counselors to cultivate moral principles to support them in making decisions during ethical dilemmas. The six moral principles or also known as ethical principles in counseling are: (a) autonomy; (b) beneficence; (c) nonmaleficence; (d) justice; (e) fidelity; and (f) veracity (Board of Counselors [Malaysia], 2016; Bokhari et al., 2014; Lambert, 2011; Mohd Ishak et al., 2012).

Autonomy refers to a norm that provides individuals with freedom to make decisions and the autonomous action involves understanding, intentionality, and absence of controlling influences that may affect their actions (Bokhari, 2012; Finlay, 2020; Jahn, 2011). On the other hand, beneficence refers to moral obligation that encourages individuals to act for the benefit of others such as protect the rights of others, prevent harm to others, rescue individuals in danger, and help individuals with disabilities (Bokhari, 2012; Finlay, 2020; Jahn, 2011). Next, nonmaleficence involves the act of not inflicting harm and pain on others and justice is the act of distributing benefits, costs, risks, and resources equally. Fidelity reflects faithfulness to a person and counselors are expected to keep promises made to their clients to build therapeutic counselor-client relationships (Mohd Isyak et al., 2012). Finally, veracity refers to the act of being truthful to clients by conforming to the ethics and moral principles (Kwong-Liem, 2003).

The six ethical principles contemplate counselors’ responsibilities as Malaysian registered counselors ought to play functional roles to consolidate their identity as professional and ethical counselors. The tasks performed by the registered counselors such as assessment and treatment process would reflect their years of professional counseling training and experiences (Kwong-Liem, 2003). According to Mat Rani et al. (2017), counselor education training curriculum focuses on ethics knowledge to enhance the trainee counselors’ understanding about the professional functions, history of counseling, the function of organizational structure, ethics, licensing, legislation, and accreditation. The exposure of ethics knowledge in counselor education training program would guide and determine the quality of their future performances. The Malaysian counselors’ performances are always governed by the ethical standards (Kwong-Liem, 2003) and they are monitored by the Board of Counselors (Malaysia). A combination of ethics knowledge, ethics skills, and ethical awareness would be a package of ethics competency that would help counselors to deliver quality counseling services.

The counselors in Malaysia should strive to offer the highest quality of counseling services, particularly when they are faced ethical dilemmas and legal ramifications. The ethics knowledge can guide counselors’ behaviors, actions, and enhance ethical decisions (Mat Rani et al., 2017). The simple steps
that can be applied in ethical-legal decision making are: (a) determine whether an ethical-legal issue needs to be addressed; (b) address contextual issues such as personal bias and culture; (c) formulate an ethical-legal course of action; and (d) implement an action plan (Nystul, 2016). Prevention and removal of an issue should be prioritized. Malaysian counselors should have no doubt about how to handle the occurrence of legal and ethical issues in counseling. Current research would be a venue to predict factors that may help counselors in Malaysia to improve their ability to solve ethical issues as this research attempts to measure CEC among Malaysian registered counselors. The factors that would be examined as the influential factors of CEC are emotional intelligence, perceived stress, resilience, social support, spiritual well-being, and SELE. Integration and identification of the greatest predictor factors hopefully would assist registered counselors in dealing with legal and ethical issues efficaciously, as ethical codes alone are not adequate to positively affect the process of ethical decision-making (Fernando & Chowdhury, 2010; Mohd Ishak et al., 2012).

There are numerous well-established theories that could be used to judge ethical related matters including ethical competency and dilemmas (Pettersson et al., 2018). Kantian Deontology Theory by Kant is known as the originator of critical ethics (Devine et al., 2014). Kantian Deontology Theory emphasizes on duties and rights, where behaviors are regarded as rational or irrational, irrespective of the consequences (Pettersson et al., 2018). Furthermore, deontology refers to the ethics of ‘doing’. The deontological reasoning requires individuals to fulfill their duties by respecting human dignity and treating everyone equally (Pettersson et al., 2018). In relation to the ethical guidelines, individuals who adhere to Deontological Theory will follow instructions as stated in the guidelines (Eriksson et al., 2007).

Finally, Bentham’s Utilitarian Ethical Theory is also an example of ethics-related theories. Utilitarianism focuses on consequences, where individuals who adhere to utilitarianism would make efforts to maximize the good consequences for others (Pettersson et al., 2018). Utilitarianism is also considered as ethics of ‘doing’ similar to the Kantian Deontology Theory and it can be used to deal with common ethical issues. There are three levels of utilitarianism: (a) practical utilitarianism; (b) theoretical utilitarianism; and (c) philosophical utilitarianism (Caillé, 1992). Practical utilitarian attempts to satisfy superior interests such as altruistic or religious interests. On the other hand, theoretical utilitarian attempts to make selfish calculations of others. Finally, philosophical utilitarian attempts to contribute to the maximization of happiness in others. These two theories would act as backbone of the current research and support the research as a whole.

3. Methodology

3.1 Research Design

The researcher employed correlational research design using a survey method. Correlational research design involves measuring multiple variables to identify relationships among the variables (Beins, 2004; Stangor, 2011). Thus, this design would fit the current research since its main objective is to examine the influential factors of CEC.

3.2 Research Population

Registered counselors in Malaysia are the population of this research. They are individuals who have received formal training from local universities or universities abroad, graduated with a bachelor’s, master’s or doctorate’s degree in the field of counseling, obtained supervision, and hold a license to practice counseling (Burns & Cruikshanks, 2018; Mohamad & H. Ab. Rahman, 2011).

3.3 Sample Size

The actual research involved a total of 267 respondents and this number fulfills required sample size. As of 14 February 2020, there was a total of 9,099 registered counselors in Malaysia. The sample size
was determined using Cochran’s (1977) formula and the formula for continuous data (Bartlett et al., 2001). Cochran’s (1977) formula yielded a sample size of 267.

### 3.4 Sampling Technique

The researchers applied systematic sampling. The researchers picked a random number between 0001 and 9099, and then sample the registered counselors on the list with that number. The rest of the sample is selected at regular intervals in which every \( k \)th is selected as respondent after the first person is sampled. Each respondent is selected at a regular interval of 23.

The \( k \) value is obtained by dividing population size \( (N) \) with the sample size \( (n) \). The calculation to determine the \( k \) value is as follows:

\[
k = \frac{N}{n}
\]

\[
k = \frac{9099}{401}
\]

\[
k = 23
\]

### 3.5 Instrumentation

**Table 1. Instrumentation**

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Data Collected from Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section A</td>
<td>Demographic details</td>
</tr>
<tr>
<td></td>
<td>1. Registered counselor number</td>
</tr>
<tr>
<td></td>
<td>2. Gender</td>
</tr>
<tr>
<td></td>
<td>3. Age</td>
</tr>
<tr>
<td></td>
<td>4. Years of experience in the field of counseling</td>
</tr>
<tr>
<td></td>
<td>5. Year registered with the Board of Counselors (Malaysia).</td>
</tr>
<tr>
<td>Section B</td>
<td>Emotional Intelligence</td>
</tr>
<tr>
<td></td>
<td>1. Emotional Control</td>
</tr>
<tr>
<td></td>
<td>2. Emotional Maturity</td>
</tr>
<tr>
<td></td>
<td>3. Emotional</td>
</tr>
<tr>
<td></td>
<td>Conscientiousness</td>
</tr>
<tr>
<td></td>
<td>4. Emotional Awareness</td>
</tr>
<tr>
<td></td>
<td>5. Emotional Commitment</td>
</tr>
<tr>
<td></td>
<td>6. Emotional Fortitude</td>
</tr>
<tr>
<td></td>
<td>7. Emotional Expression</td>
</tr>
<tr>
<td>Section C</td>
<td>Perceived Stress</td>
</tr>
<tr>
<td></td>
<td>1. Perceived Distress</td>
</tr>
<tr>
<td></td>
<td>2. Perceived Coping</td>
</tr>
<tr>
<td>Section D</td>
<td>Resilience</td>
</tr>
<tr>
<td></td>
<td>1. Personal Competence</td>
</tr>
<tr>
<td></td>
<td>2. Acceptance of Self &amp; Life</td>
</tr>
<tr>
<td>Section E</td>
<td>Social Support</td>
</tr>
<tr>
<td></td>
<td>1. Significant Others</td>
</tr>
<tr>
<td></td>
<td>2. Family</td>
</tr>
<tr>
<td></td>
<td>3. Friends</td>
</tr>
</tbody>
</table>

**Total Items**

| Section B | 33 |
| Section C | 10 |
| Section D | 24 |
| Section E | 12 |

**Subscale**

- Emotional Control
- Emotional Maturity
- Emotional Conscientiousness
- Emotional Awareness
- Emotional Commitment
- Emotional Fortitude
- Emotional Expression
- Perceived Distress
- Perceived Coping

**Number of Items**

- Emotional Control: 5
- Emotional Maturity: 6
- Conscientiousness: 5
- Emotional Awareness: 5
- Emotional Commitment: 4
- Emotional Fortitude: 4
- Emotional Expression: 4
- Perceived Distress: 4
- Perceived Coping: 6

**Type of Scale**

- 5-point Likert scale
- 7-point Likert scale

**Perceived Stress Scale**

- Personal Competence: 17
- Acceptance of Self & Life: 7

**Resilience Scale**

- Significant Others: 4
- Family: 7
- Friends: 4
3.6 Validity and Reliability of the Instruments

The CEC Scale and other instruments incorporated in this research were checked for its validity and reliability values. For face validity, a total of seven Malaysian registered counselors indicated their ratings for each scale ranging from one (Strongly Disagree) to 10 (Strongly Agree). The Malaysian registered counselors’ agreement for all items covering sentence structure, font size, language accuracy, and suitability were scored at more than 80%. All items were retained; and minor amendments were made based on the comments prior to proceeding to content validation.

For content validity, a total of seven experts reviewed whether the measures are operationally defined, grouped according to the theoretical construct, and measure what it is supposed to measure. All six experts gave constructive comments and items were modified based on their comments. The Content Validation Index (CVI) was used to calculate the experts’ agreement for content validity of the subconstructs. CVI takes into account the average rating and level of suitability (Yusoff et al., 2018) ranging from 1 (Extremely Unsuitable) to 10 (Extremely Suitable) rated by the experts.

All items for each subconstruct were comprehensively reviewed and the items were modified based on the comments provided by experts. According to the validation experts, some of the items are not measuring what it is supposed to measure and may not be suitable for local context. Thus, these items
were omitted. They also mentioned that items reduction is necessary to reduce cognitive burden on participants whereby the initial questionnaire consisted of 206 items. The results of CVI and established items were all above .80. Upon completion of content validation process, the established items, constructs, and subconstructs were retained for pilot test. The pilot test is necessary to ensure reliability and further validity of the items. Eventually, a total of 165 items were retained for pilot test.

4. Data Collection

After the pilot test, the survey questionnaire was revised and finalized for actual study. An online survey questionnaire was used to collect data from the respondents. The questionnaire was prepared using Google Form. Then, a link to the Google Form was sent to the selected respondents through emails, followed by multiple follow-up emails: (a) Details of the research and invitation to participate; (b) second invitation one week after the first email; and (c) a final request for participation one week after the second email (Mullen et al., 2014). The process was repeated until required sample size is obtained. The respondents are instructed to click on the link which will direct them to the online survey and they spent about 15 to 20 minutes to complete the survey.

5. Data Analysis

Upon completion of the final survey questionnaire and pilot testing, the actual research was carried out. The survey questionnaire in the Google Form was distributed through emails. In this survey questionnaire, the respondents were requested to respond based on their perceptions. They were assured that their responses will be confidential. The data collected through this source was analyzed using statistical analyses. Prior to that, data were transferred from original response excel spreadsheet into data analysis format and coded to ease the data entry process. The researcher further filtered missing data and transformed all the reverse-scored items. Here, five responses were removed as they resulted in outliers. A total of 262 responses were used for the statistical analyses. Descriptive analysis was conducted to identify the level of counseling ethical competency among registered counselors in Malaysia. The factors influencing CEC were identified through multiple regression analysis.

6. Findings and Discussion

6.1 Research Objective 1

The researchers measured the level of CEC and the results such as mean (M) and standard deviation (SD) were recorded:

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean, M</th>
<th>Std. Deviation, SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEC</td>
<td>262</td>
<td>9.448</td>
<td>.489</td>
</tr>
<tr>
<td>Valid N (listwise)</td>
<td>262</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The mean and standard deviation of CEC, \( M = 9.45, SD = .49 \) are as shown in Table 2. Referring to the scoring level of CEC, the level of CEC among the respondents is categorized as ‘competent’. The CEC Scale provided evidence that registered counselors in Malaysia have adequate level of CEC and this finding is in line with the concern revealed by Pettersson et al. (2018) and Rodgers et al. (2014). According to the researchers, adequate CEC is required to make right decision and resolve ethical issues in counseling. However, what are methods available to ensure registered counselors in Malaysia
continue developing their CEC as their career evolves? We should ponder this question and work towards moving the counseling profession forward.

6.2 Research Objective 2

Next, the researchers determined the factors that may influence CEC among Malaysian registered counselors. To determine the factors that have influence on counseling ethics competency, the researchers conducted correlation analysis prior to multiple regression analysis. The correlation analysis between the factors (emotional intelligence, perceived stress, resilience, social support, spiritual well-being, SELE) and counseling ethics competency as shown in Table 3 revealed that all factors are significantly correlated with counseling ethics competency. The results showed that emotional intelligence is positively correlated with emotional intelligence \( r = .648, p < .01 \). According to Guildford’s rule of thumb, the coefficient of \( r \) value which is between .40 and .70 reflects moderate correlation between emotional intelligence and ethical competency. There is also a significant positive relationship between perceived stress and ethics competency \( r = .375, p < .01 \), resilience and ethics competency \( r = .576, p < .01 \), social support and ethics competency \( r = .405, p < .01 \), and spiritual well-being and ethics competency \( r = .319, p < .01 \). However, the strength of relationships between perceived stress and spiritual well-being; and ethics competency are low. On the other hand, the strength of relationships between resilience and social support; and ethics competency are moderate. Finally, the researchers found a significant relationship between SELE and ethics competency \( r = .583, p < .01 \). The strength of relationship between SELE and ethics competency is also moderate.

Table 3. Correlations between the Factors and CEC

<table>
<thead>
<tr>
<th></th>
<th>CEC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Emotional Intelligence</strong></td>
<td>Pearson Correlation</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
</tr>
<tr>
<td><strong>CEC</strong></td>
<td>Pearson Correlation</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
</tr>
<tr>
<td><strong>Perceived Stress</strong></td>
<td>Pearson Correlation</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
</tr>
<tr>
<td><strong>Resilience</strong></td>
<td>Pearson Correlation</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
</tr>
<tr>
<td><strong>Social Support</strong></td>
<td>Pearson Correlation</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
</tr>
<tr>
<td><strong>Spiritual Well-Being</strong></td>
<td>Pearson Correlation</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
</tr>
<tr>
<td><strong>SELE</strong></td>
<td>Pearson Correlation</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
</tr>
</tbody>
</table>

Upon confirming the relationship between the factors and ethics competency, the researchers proceeded to multiple regression analyses to determine the influential factors of CEC. The researchers confirmed that there is no issue of collinearity as presented in the multicollinearity section. Table 4, Table 5, and Table 6 show the results of multiple regression analyses.
Table 4. Model Summary of Multiple Regression

<table>
<thead>
<tr>
<th>Model</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
<th>Change Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.732a</td>
<td>.536</td>
<td>.525</td>
<td>.33690</td>
</tr>
</tbody>
</table>

R Square = .536, Adjusted R Square = .525, Std. Error of the Estimate = .33690

F Change = 49.131, df1 = 6, df2 = 255, Sig. F Change = .000

a. Predictors: (Constant), SELE, Spiritual Well-Being, Social Support, Resilience, Perceived Stress, Emotional Intelligence

Table 5. Analysis of Variance (ANOVA)

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Regression</td>
<td>33.459</td>
<td>6</td>
<td>5.577</td>
<td>49.131</td>
</tr>
<tr>
<td></td>
<td>Residual</td>
<td>28.943</td>
<td>255</td>
<td>.114</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>62.403</td>
<td>261</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Dependent Variable: CEC

b. Predictors: (Constant), SELE, Spiritual Well-Being, Social Support, Resilience, Perceived Stress, Emotional Intelligence

Table 6. The Coefficients between the Factors and CEC

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Constant)</td>
<td>5.023</td>
</tr>
<tr>
<td></td>
<td>Emotional Intelligence</td>
<td>.490</td>
</tr>
<tr>
<td></td>
<td>Perceived Stress</td>
<td>.001</td>
</tr>
<tr>
<td></td>
<td>Resilience</td>
<td>.142</td>
</tr>
<tr>
<td></td>
<td>Social Support</td>
<td>.038</td>
</tr>
<tr>
<td></td>
<td>Spiritual Well-Being</td>
<td>.077</td>
</tr>
<tr>
<td></td>
<td>SELE</td>
<td>.141</td>
</tr>
</tbody>
</table>

a. Dependent Variable: CEC

7. Conclusion

A significant regression equation was found for influence of emotional intelligence on ethics competency, \[ F(6, 255) = 49.1, \ p = .000 \], with an R^2 of .536. Next, SELE has significant influence on ethics competency, \[ F(6, 255) = 49.1, \ p = .000 \], with an R^2 of .536. R^2 was .536 which means 53.6% of the variances predicted respondents’ CEC. The regression analysis showed that emotional intelligence (\( \beta = .369, \ t = 6.06, \ p < .01 \)) and SELE (\( \beta = .304, \ t = 5.93, \ p < .01 \)) have significantly influenced respondents’ CEC. Based on Table 6, emotional intelligence (\( \beta = .369 \)) has the greatest influence on ethics competency, followed by self-efficacy in dealing with legal and ethical issues (\( \beta = .304 \)). The regression equation formed was \( y = .490x + .141x^2 \).

The findings revealed that both emotional intelligence and SELE can improve counselors’ level of ethics competency. Emotional intelligence which is an affective component consists of four different skills: (a) perception of emotion; (b) facilitation of emotion; (c) understand emotion; and (d) management of emotion (del Carmen Pérez-Fuentes et al., 2019). Good level of emotional intelligence
probably allows the counselor to master and utilize ethics competency effectively. Similarly, self-efficacy refers to individuals’ confidence in applying ethical and legal knowledge in counseling (Mullen et al., 2014). Efficacious beliefs would lead to successful accomplishment of tasks. Hence, efficacious beliefs would support development of ethics competency (culmination of ethics knowledge, skills, and awareness) and encourage counselors to deal with ethical dilemmas confidently.

Acknowledgements

This research is funded and supported by the Universiti Putra Malaysia through Putra Impactful Grant Incentive (UPM/700-2/1/GPB/2017/9550400). The researchers would like to thank the ICDI2023 committee for the opportunity given to disseminate the research findings.

References


How Important are the Trust-Based Ties to Businesses? A Meta-Analysis of the Association between Inter-Organizational Trust and Constructive Behaviours

Nur Nadirah Mohamad Ishak* & Tapas Mishra

*Malaysia University of Science and Technology, Malaysia
bUniversity of Southampton, United Kingdom
*nadirah@must.edu.my

Abstract: There is widespread consensus that inter-organizational trust boosts business performance, as trust is typically related to social capital or the resources inherent in personal networks. For example, network connectivity helps entrepreneurs discover new business prospects, acquire new resources at a discount to market prices, and establish legitimacy with external stakeholders. Despite these possible benefits, the multifaceted nature of trust raises the following question: at what stage of trust ties is the business most beneficial? However, no consensus exists about the factors that contribute to improved company performance. This perplexity persists because of significant changes in construct definitions, study methodologies, and sample circumstances among earlier investigations. Thus, elucidating what is known about the link between trust ties and company success becomes both topical and critical. Meta-analyses are used to synthesise existing empirical data on the trust-performance relationship in this study. Thus, we can ascertain the direction and effect of trust strength on the performance of inter-organizational connections. Additionally, the meta-analysis technique enables us to demonstrate if moderators influence the trust-performance connection. Our study combines data from 52 empirical investigations examining 17516 connections. Our findings indicate that trust has a beneficial influence on the performance of interorganizational relationships. These discoveries, taken together, have significant theoretical and practical ramifications. By synthesising research findings from a large number of studies and identifying novel moderators, this meta-analysis contributes to a better understanding of the contingent value of trust ties for large and small firms and demonstrates how sampling, study design, and construct measurement can affect research findings. For small enterprises, our findings clearly demonstrate the benefit of developing trust networks that are dense with structural flaws, but they also demonstrate that unique networking techniques are required at various moments in time and across industries and nations. Our analysis, although confirming the rising prominence of social capital theory in the literature, raises additional concerns regarding its temporal and contextual boundary requirements.

Keywords: inter-organizational trust, constructive behaviour, business performance, meta-analysis

1. Introduction

Researchers increasingly see network links in entrepreneurial activities. Direct resources for linked enterprises (Hoang & Antoncic, 2003). According to the resource-based approach (RBV), the organisational structure of an organisation can affect its ability to harness the competitive potential of its resources and capabilities, resulting in competitive advantages and superior performance (Alvarez & Barney, 2017; Dess et al., 2003; Hult & Ketchen, 2001). Organisational theorists say an organization's position in a network of vital resource suppliers might constrain or enable international entrepreneurial behaviour (Kilduff & Tsai, 2003). Distributors, overseas financiers, and alliance partners may benefit from a diverse network. They may fill a "structural void" by connecting essential vendors and buyers and extorting greater rents in internationalisation attempts (Burt, 2001). New
product or market entry may be risk-free. Bridging relationships are stable, homogeneous, and few, while bonding ties are temporary, heterogeneous, and diverse (Uzzi, 1996). Business networks in emerging economies with weak institutional infrastructures lack "bonding" links. Businesses must build trust-based partnerships to obtain resources (Khanna & Palepu, 2000). This network may impede creativity by limiting exposure to good ideas. Industrialised nations with strong institutional infrastructures expose businesses in large cities to new ideas.

Businesses have several bridge partnerships that give a variety of experiences and resources to encourage creativity and proactive initiative (Uzzi, 1996). Trust networks are widely explored. Interorganizational trust (IOT) benefits firms and relationships, according to recent meta-analyses (Delbufalo, 2012). Despite these benefits, when will trust networks become a valuable resource and competitive advantage for the company? How does the trust network effect dyadic interorganizational relationships? The external elements that increase entrepreneurial orientation in the firm and improve business performance are still unclear. Responding to trust's least researched regions will reveal IOT's dark side.

Thus, this research seeks modifiers that enhance IOT's benefits and mitigate its negative effects on corporate performance. This research uses a meta-analysis to demonstrate the external environmental influences on the dynamic role of trust in explaining business performance by quantitatively evaluating existing empirical evidence. Meta-analysis and meta-regression are used to create a valid theoretical process by which trust affects corporate success. This research uses decision analytical modelling to forecast business success using changeable trust-based relationships. Meta-analysis also corrects statistical aberrations (sampling error, measurement error) to estimate the moderator model.

Meta-analysis helps reconcile empirical findings. First, meta-analysis estimates mean values and effect sizes across trials. Researchers can estimate true correlations. Second, meta-analytic evidence can be used to create a more comprehensive list of attributes and examine their relative influence on behaviour outcomes (process blocks) and critical organisational outcomes. Meta-analysis can uncover moderating effects.

This paper reviews empirical research on inter-organizational trust and corporate performance. Since IOT-performance research has been mostly empirical and it focuses specifically on the literature review, there is a need for this current research. Thus, our research created an economic model to predict the best trust-performance conditions by incorporating previous findings.

2. Trust and Hypotheses

2.1 Nature of Trust-Based Ties

Trust is still undefined. Despite disputes, certain concerns are consistent across definitions. Positive expectations and vulnerability are key elements of trust, according to Rousseau et al. (1998).

"The willingness to be vulnerable," from Mayer et al. (1995), is one of the most quoted definitions of trust and has been crucial to various conceptualizations, including Bromiley and Cummings (1995); and Mishra (1996). Other definitions include "the willingness to rely on another" (Doney et al., 1998), "increase of one's vulnerability to another" (Deutsch, 1962; Zand, 1972), and "intention to accept vulnerability" (Rousseau et al., 1998). Some authors underline trust expectations. Trust is a "set of optimistic expectations" for Elangovan and Shapiro (1998) and "positive expectations about the characteristics or intentions of those involved and the risks associated with the acting or situations" for Lewicki and Bunker (1996). Trust may be "risk-taking behaviour" or "the willingness to engage in such behaviour" (Bromiley & Cummings, 1996). According to Zand (1972), the "decision to trust" is also the individual's willingness to become vulnerable and the expectation or belief that others will act in a way that benefits or at least doesn't harm the connection (Gambetta, 1998).
What is organisational trust? Inter-organizational trust is the extent to which members of one organisation trust another (Zaheer et al., 1998a). Trust in inter-organizational interactions encourages enterprises to go beyond the relationship’s basic necessities to maximise mutual gain (Panayides & Venus Lun, 2009).

Trust is multifaceted and recursive (Welter, 2012). Jones and George (1998) believe that values, attitudes, and moods create trust. Sako (1992) investigates three independent origins of trust—the ability to predict another’s actions in a “mutually acceptable manner.” First, because the parties are contractually obligated. Second, confidence in the participants. Thirdly, a belief in participants’ kindness. This resembles Shapiro et al.’s (1992) trust typology, which divides trust into deference, knowledge, and identification. Others stressed trust. Zucker (1986) identifies three main trust creation mechanisms: process-based (based on reciprocal, repeated interaction), characteristic-based (based on social likeness), and institutional-based (based on expectations ingrained in societal norms and structures). Newell and Swan (2000) divide literature typologies into three categories: companion, competence, and commitment and trust.

Various theories have been used to explain corporate trust. By addressing the relational component of trust, the possibility of a trade-off between weak and strong linkages has been highlighted. A corporation may analyse more unique information via weak ties using Granovetter’s (1973) weak tie theory. Homophily theory (McPherson et al., 2001) states that strong overlapping linkages between socially close persons tend to form, making weak ties more likely to connect distant social circles. Strong relationships increase a network actor’s desire and ability to contribute necessary resources (Batjargal, 2003). Regular, personal meetings facilitate trustworthy resource transfers and tacit knowledge transmission, according to Uzzi’s (1997) embeddedness study. According to Burt’s (2000) structural hole hypothesis, firms gain strategic advantages through connecting with previously separated individuals (Batjargal, 2010). Based on resource dependence logic (Pfeffer & Salancik, 2003), mediating trades between unrelated parties improves an entrepreneur’s timely access to and control over external resources (Burt, 2005). This section explores how a cohesive network can reduce structural defects and directly connect entrepreneurs’ contacts (Hansen, 1999). Closed networks encourage cooperation through trust, social support, and reciprocity (Obstfeld, 2005).

2.2 The Model Framework

![The Model Framework](Adapted from Ashnai et al., 2016; Fishben & Azben,1975)

*Figure 1. The Model Framework (Adapted from Ashnai et al., 2016; Fishben & Azben, 1975)*
The framework's attitude-behavior constructs (Ajzen & Fishbein, 1977; Fishbein & Ajzen, 1975) come from social exchange theory and transaction cost economics. The framework is expanded by incorporating resource-based company outcomes. It shows how different viewpoints shape construct selection and conceptualization. B2B trust is the topic of this investigation. Trust is the framework's input. Commitment and information sharing make up the process block's behavioural qualities. Trust and commitment are influenced by social exchange theory (Anderson & Weitz, 1992; Jap & Ganesan, 2000; Morgan & Hunt, 1994). Information sharing's behavioural traits (Cannon & Homburg, 2001; Heide & John, 1992) are chosen because transaction cost economics emphasises them (Delbufalo, 2012; McEvily et al., 2003).

The resource-based view's emphasis on relationship outcomes and performance (Palmatier et al., 2007) is used to examine how different attributes affect relationship performance. An input-process-output model is developed in this study. Figure 1 shows the model framework's building blocks. Finally, a model with moderating effects is created by examining the impact of a dynamic environment (Krishnan et al., 2006).

2.3 Inter-Organisational Trust and Information Sharing

Trust's positive effects on commercial transactions, operational performance, product quality, and inter-organizational relationships are extensively documented (Shin et al., 2000; Szulanski et al., 2004). Trust in partner intent, dependability, and fairness reduces the specification and monitoring process (Krishnan et al., 2006; Zaheer et al., 1998a).

Business partnerships depend on information exchange (Mohr & Spekman, 1994). Information sharing and trust are favourably associated (Denize & Young, 2007). Trust gives exchange partners the confidence to be open with each other, knowing that the information shared will not be used against them (Dirks & Ferrin, 2001; Zaheer et al., 1998a), which opens opportunities for leveraging business relationships and opening networks to gain competitive advantage (Denize & Young, 2007; Young, 2006). A high-trust network may help convey tacit knowledge (Becerra et al., 2008), which is more relevant for competitive advantage under the resource-based view (Barney, 1991; Grant, 1996). Trust reduces information filtering from others (McEvily et al., 2003).

Trust in the recipient reduces knowledge sender concerns about information appropriation and abuse. Organisational actors are expected to share sensitive information about themselves, others, and their company after building trust. Senders' confidence in recipients affects how openly they share knowledge (Inkpen, 2001; Nahapiet & Ghoshal, 1998; Ouchi, 1981). Openness increases knowledge exploitation and allows for creative information recombination, laying the framework for organisational learning. These actions maximise the influence of EO on organisational success (Covin et al., 2006). EO may therefore aid management with organisational learning and skills (Wang, 2008; Zahra et al., 2006). According to Zahra et al. (1999), EO promotes organisational learning, and concepts like cooperation and transparency.

Information's perceived authenticity depends on trust. The recipient is more likely to trust information from a credible source. Information shortcuts can boost organisational learning, awareness, and reactivity.

Both parties have little influence over how the other uses shared knowledge (Becerra et al., 2008). Since rival buyers sometimes buy from the same suppliers in different sectors, disclosing a buyer's exclusive knowledge may flow over to other firms (Kotabe et al., 2003). A buyer won't provide knowledge unless it trusts the recipient. Thus, without trust, buyers will take defensive steps to limit knowledge sharing (Edmondson, 1999; Wu, 2008). Trust increases the willingness to share knowledge (Cai et al., 2010; Kaufman et al., 2000; Renzl, 2008) and the amount of information that can be shared (Szulanski et al., 2004). Second, trust facilitates information sharing and partnership. Buyers are more willing to share technical knowledge with suppliers, such as R&D, manufacturing, and marketing information, and suppliers are more prepared to accept and use it (Andrews & Delahaye, 2000). Therefore:
Hypothesis 1a: Inter-organisational trust positively related with information sharing.

2.4 Inter-Organizational Trust and Commitment

Lewicki and Bunker (1996) stated that as parties gain knowledge about one another through knowledge-based trust, they may also develop a strong identification with the needs, preferences, and priorities of others and regard them as their own (p. 125). Shared identity generates a sense of interconnectedness and shared destiny (Gaertner et al., 1996; Kramer, 1991), which are essential to commitment and teamwork. Devoted people are more loyal and willing to devote time, effort, and attention to a group (Currall & Inkpen, 2002). Identification increases attachment to a group and its aims (Kramer, 1993). Identification creates expectations about collective members’ actions and intentions, fostering commitment.

The extent to which trust affects commitment depends on how it is understood. Organisational issues arise from over-identification. Organisational members are less likely to explore diverse perspectives or critically analyse their own organisation, which leads to groupthink, the not-invented-here syndrome, and other limiting thinking. Extreme identification can lead to organisational inertia and rigidity, hindering its ability to adjust to environmental change (McEvily et al., 2003).

Trust-commitment theory, based on social exchange theory, says that commitment is essential in commercial interactions (Blau, 1964; Thibaut & Kelley, 1959) and that commitment is closely related to trust (Morgan & Hunt, 1994). Interorganizational studies also consider commitment and trust.

This research examines commitment as a concept that encompasses both behavioural and attitudinal dimensions, with an emphasis on the behavioural dimension for two main reasons: (1) the definition's behavioural focus (i.e., the desire to develop the relationship and willingness to make sacrifices); and (2) the underlying emphasis on 'intention' to maintain and continue the relationship (Anderson & Weitz, 1992; Mohr & Spekman, 1994) versus an attempt. This goal fits the theory of reasoned action's "behavioural intention" (attitude-behavior framework) (Fishbein & Ajzen, 1975). According to that theory, behavioural intention is the strength of an intention to perform an activity, which is similar to commitment. In addition, behavioural assessment items dominate the operationalization of commitment (e.g., supporting the other firm when others critique them; the relationship is a long-term collaboration) (Anderson & Weitz, 1992).

Anderson and Weitz (1992) and; Jap and Ganesan (2000) define commitment as the degree to which one company wants a stable relationship, is willing to make short-term sacrifices to maintain it, and has confidence in the other company's stability.

Hypothesis 1b: Inter-organisational trust positively related with commitment.

2.5 Information Sharing and Firm Performance

Organisational knowledge as a strategic advantage was popularised by leading management and organisation theorists (Nonaka, 1994; Grant, 1996). Information exchange has becoming more important to supply chain performance (Malhotra et al., 2005). Information sharing involves exchanging relevant, timely information (Anderson & Narus, 1990; Heide & John, 1992). It helps exchange partners create common expectations and understandings (Lusch & Brown, 1996) to support relationship learning (Frazier et al., 2009; Selnes & Sallis, 2003).

Information sharing also improves decision-making, teamwork, and market response time. Sharing information improves performance (Cheung et al., 2011; Gilliland et al., 2010). Information sharing may reduce opportunism by revealing one's behaviours. According to Jap (2001), being able to see another party's behaviour encourages them to follow the contract more closely. Thus, it should boost relationship satisfaction and reduce opportunism. Inter-organizational learning is essential for
competitive success (Dyer & Singh, 1998), hence organisations often collaborate to learn (March & Simon, 1958; Levinson & Asahi, 1995; Powell et al., 1996). Therefore:

Hypothesis 2a: Information sharing in B2B relationship is expected to be positively related with business performance

2.6 Commitment and Firm Performance

Attitudinal or emotional commitment is the most researched concept of commitment. Affective commitment is an employee's emotional connection to and acceptance of the company's goals and ideals. High-emotional commitment employees stay to help (Meyer & Allen, 1997; Meyer et al., 1989). Anderson and Weitz (1992) propose that commitment mediates relationship-specific investment and performance. Mainstream theories of inter-organizational interactions promote commitment as a key to partnership success (Morgan & Hunt, 1994). Palmatier et al.'s (2006) extensive meta-analysis shows that devotion affects performance. Palmatier et al. (2007) show that commitment affects relationship outcomes, including financial performance. Therefore:

Hypothesis 2b: Commitment is positively related with business performance.

2.7 Contingencies in the Organizational Trust-Based Ties – Business Performance Relationship

This research predicts a positive association between trust and company success, although it depends on external factors. Strategic management literature promotes a contingency approach to strategy generation and implementation since it takes into account a firm's diverse business environment (Cyert & March, 1963; Lawrence & Lorsch, 1967; Saeed et al., 2014). We examine the corporate environment's hostility and dynamism when analysing external variables' moderating effect.

2.8 Environmental Hostility

"Hostility" refers to a business's environment's threat to its survival (Miller & Friesen, 1982). Hostility includes intense price, product, technological, and distributional competition within an industry, constraints on input access, labour and material scarcity, government intervention, severe regulatory restrictions, and unfavourable demographic trends (Caruana et al., 2002; Mcgee et al., 2012; Miller & Friesen, 1983; Alexandrova, 2004). Environmental hostility includes hazard and a lack of control over external factors that harm a firm (Alexandrova, 2004).

Competition for resources and opportunities and hostile environments lower profit margins and limit strategy options (Miller & Friesen, 1983). Thus, a hostile environment requires strategic discipline (Porter, 1980) because bad decisions could kill a corporation. Scholars expect inter-organizational links in R&D-intensive businesses to yield considerable opportunistic profits (Ulset, 1996; Allen & Phillips, 2000). But learning and using are different. In hostile settings, firms should develop a strategic orientation based on modest risk-taking and innovation. Thus, in non-hostile contexts, trust-based ties can provide actual strategic guidance.

Hypothesis 3: Trust-based tie will have lesser effect on business performance in a highly hostile environment.

2.9 Environmental Dynamism

"Environmental dynamism" describes the unpredictability and uncertainty of future market adjustments and breakthroughs (Khandwalla, 1972; Miller and Friesen, 1983; Thompson, 1967). Uncertainty might arise from customer demand, competitor and supplier behaviours, or technology discontinuities. Thus, uncertainty arises from a lack of knowledge about future events, their effects, and how they will be
handled (Khandwalla, 1972). Developing nations have rapid economic growth, market liberalisation, and weak formal institutions (Hoskisson et al., 2000; Puffer et al., 2010). Emerging nations build their own trusted networks to address uncertainty caused by variable government regulation, rapid economic expansion, and increased competition (Luo, 2003; Xin & Pearce, 1996).

Rapid change and volatility give enterprises several possibilities. Demand fluctuations allow organisations to leverage on new customer desires, while technology discontinuities offer new technological opportunities (Utterback, 1994). In dynamic situations with rapid changes in technology, demand, and rivalry, existing opportunities and resources might quickly become obsolete. While shifting surroundings complicate strategic decision-making, companies that explore and exploit them can outperform their rivals. Trust-based connections can help you be proactive in a world that changes quickly and is hard to predict. When partners trust each other, they share information and resources. Proactive companies can use these additional resources to enter new markets (Lumpkin & Dess, 2001).

Proactively introducing new products and services reduces the risk of organisations’ knowledge and skills becoming obsolete (Leonard-Barton, 1992; March, 1991). Trust-based links encourage innovative methods and resource flexibility in dynamic environments, improving performance. Thus, we propose:

Hypothesis 4: Trust-based ties will have greater effect on business performance for firms that operate in highly dynamic environment.

Figure 2. Summary of Hypotheses and Conceptual Model

3. Methodology

3.1 Literature Search and Sample

The study identification approach identified a representative sample of published and unpublished studies on trust-based linkages and company performance. This research used computerised keyword searches in the Business Source Premier and Web of Science databases and manual searches in relevant journals. Computer searches used trust and performance keywords. *,# were used for key word multivariations.

Our meta-analysis required research to meet numerous selection criteria. The study had to (a) be empirical and quantitative; (b) measure trust at the inter-organizational level; (c) use measures that align with this study’s definition of core constructs; (d) report sufficient information to compute effect size
using Hunter and Schmidt (1990) formulas: sample size and a correlation coefficient or another outcome statistic (e.g., univariate F, t, c2); and (e) be published as a peer-reviewed journal article. To improve quality control, books, chapters, conference proceedings, working papers, and other unpublished works were removed (David and Han, 2004).

When necessary information was absent, writers were contacted. To quantify effect size, "duplicate studies" with the same sample and covariates were pooled. Our acceptable conceptualization required trust-based tie measures. 17516 organisations and links were sampled in 52 empirical investigations.

3.2 Coding and Measure

3.2.1 Measurement for Dependent Variables

Performance may be measured by objective financial indicators, subjective indicators of goal achievement, financial performance, and organisational success (Luo, 2002; Parkhe, 1993). Information sharing reflects how willingly a supplier or buyer shares future or private information that may benefit the partnership (Cannon & Homburg, 2001; Jap & Ganesan, 2000). Commitment indicates a desire to develop a secure relationship, a willingness to make short-term sacrifices, and a belief in the partnership's longevity.

3.2.2 Measurement for Independent Variable

Trust-based tie measurements measure how much one organisation trusts another (Zaheer et al., 1998a). These include integrity-based measures (Zaheer et al., 1998a) as well as benevolence-based measures (Carson et al., 2003). The proportion of items assessing (1) integrity-based trust, (2) benevolence-based trust, (3) "overall" trust, and (4) other types of trust (e.g., competence-based trust) or a more mixed relationship construct characterised all trust measures. This meta-analysis included only trust measures that included at least 75% of items measuring integrity and/or kindness (95%) or that measured "overall" trust in the relationship using a single, global item (5%).

3.2.3 Moderator Variables

(1) Environmental hostility indicates a business's survival risk (Miller and Friesen, 1982). This study used poor regulation quality as a composite indicator of market-unfriendly policies like price controls or insufficient bank supervision, as well as perceptions of the burdens imposed by excessive regulation in areas like foreign trade and business development in the host country, as defined by Kaufmann et al. (2010) to quantify hostility. This study used the regulatory quality score for the year the data were collected to establish study sample sizes. -2.5 to 2.5. Higher ratings mean poorer regulation.

(2) Environmental dynamism measures change and unpredictability in future environmental developments and their effects (Khandwalla, 1972; Miller & Friesen, 1983; Thompson, 1967). This study uses Krishnan's et al. (2016) environmental dynamism measurement. The coefficient of alienation (1-R2) of the regression of industry sales in the sample year on those of the prior years was estimated (c.f. Delacroix & Swaminathan, 1991; Krishnan et al., 2006b; Krishnan et al., 2016). Then, a weighted environmental dynamism score was calculated by multiplying each industry's score by the sample's fraction of inter-organizational linkages associated with that industry and summing across industries. Environmental dynamism is 0–1. Compustat and the UN's INDSTAT4 database provided sales numbers for all 50 key research sectors.

3.3 Meta-Analytic Procedure

Hunter and Schmidt (2004) meta-analytic methods, which use a random effect model and adjust for sampling and measurement error in independent and dependent variables, were used in this investigation. Hunter and Schmidt (2004) advocated using the mean of available alphas to reconstruct
reliability estimates for both independent and dependent variables in studies that did not publish them. Effect magnitude was measured using Pearson's correlation coefficients.

4. Results

4.1 Main Effects of Trust-Based Ties on Business Performance

Table 1 shows our hypotheses 1a, 1b, 2a, and 2b meta-analytic outcomes. This study examined the relationship between trust-based ties and company performance as a topic of interest and as a baseline for comparison. Sample size weighted and reliability corrected effect size was 0.37, moderately associated. The effect size was statistically significant because the 95% confidence interval did not contain zero. The effect was heterogeneous because sampling error accounted for 0.22% of variation, much below the 75% threshold for homogeneity. The credibility interval was relatively broad and contained zero, indicating moderators. Overall connection $I^2$ was over 98%. This large proportion shows that this meta-analysis does not include studies of the same population.

Trust and indirect outcomes have a modest and positive link ($r = 0.37$ for information sharing (H1a) and $r = 0.40$ for commitment (H1b)). The sample-size weighted correlation between information sharing and performance (H2a) was 0.34, and the correlation between commitment and performance (H2b) was 0.37, indicating a moderate and positive correlation between indirect outcomes and direct economic outcomes. All four hypotheses 1a, 1b, 2a, and 2b were supported by the 95% confidence interval of all constructs under indirect outcomes and direct economic outcomes (Table 1).

4.2 Theoretical Moderator Analysis

To examine if environmental antagonism and environmental dynamism affected business success differently, this study conducted moderator studies. When the homogeneity $Q$ statistic is high, moderators must be investigated (Hedges & Olkin, 1985). All four outcome variables met this condition, as shown in Table 1. Because the samples for the other effect sizes were tiny, the anticipated moderator effects were only explored for the link between trust-based ties and company success (Hedges & Pigott, 2004).

Hypothesis 3 projected that decreased environmental hostility will strengthen the relationship between trust and company performance. As shown in Table 2, the magnitude of the trust-performance relationship varies across levels of environmental hostility ($\rho_{\text{high}} - \rho_{\text{low}} = 0.06$, CI $95\% = 0.27, 0.49$),

Table 1. Meta-Analytic Relationships between Trust-Based Ties and Business Performance

<table>
<thead>
<tr>
<th>Variable</th>
<th>k</th>
<th>N</th>
<th>rc</th>
<th>95% confidence interval (p)</th>
<th>95% credibility interval (p)</th>
<th>Sampling error (% variance)</th>
<th>Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trust – business performance</td>
<td>20</td>
<td>3549</td>
<td>0.37</td>
<td>0.26 to 0.47</td>
<td>-0.26 to 0.78</td>
<td>0.41%</td>
<td>315.33*</td>
</tr>
<tr>
<td>Trust - information sharing (H1a)</td>
<td>11</td>
<td>17516</td>
<td>0.37</td>
<td>0.29 to 0.41</td>
<td>-0.37 to 0.81</td>
<td>0.22%</td>
<td>2209.27*</td>
</tr>
<tr>
<td>Trust – commitment (H1b)</td>
<td>14</td>
<td>7067</td>
<td>0.40</td>
<td>0.29 to 0.50</td>
<td>-0.36 to 0.84</td>
<td>0.41%</td>
<td>712.86*</td>
</tr>
<tr>
<td>Information sharing – business performance (H2a)</td>
<td>37</td>
<td>7063</td>
<td>0.34</td>
<td>0.25 to 0.43</td>
<td>-0.47 to 0.84</td>
<td>0.42%</td>
<td>1237.93*</td>
</tr>
<tr>
<td>Commitment – business performance (H2b)</td>
<td>27</td>
<td>3630</td>
<td>0.37</td>
<td>0.25 to 0.48</td>
<td>-0.14 to 0.72</td>
<td>0.28%</td>
<td>206.82*</td>
</tr>
</tbody>
</table>

$k =$ number of independent samples; $N =$ total sample size, $rc =$ sampling error corrected average correlation, $Q =$ chi-square test for homogeneity statistic (*p<0.001), $H =$ hypothesis
with an above-medium true correlation estimate for a high hostile environment and a strong estimate for a low hostile environment (r = 0.40). Environmental dynamism moderation roles as in Hypothesis 4 was supported. The magnitude of the trust-performance relationship varies greatly across levels of environmental dynamism (ρ high – ρ low = 0.07, CI 95% = 0.29, 0.50), with a strong true correlation estimate for a high-dynamic environment (r = 0.43) and an above-medium estimate for a low-dynamic environment (r = 0.36).

Table 2. Results of Bivariate Theoretical Moderator Analysis

<table>
<thead>
<tr>
<th>Subset</th>
<th>Within-subgroup statistics</th>
<th>Between-subgroup statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>k</td>
<td>N</td>
</tr>
<tr>
<td>Environment Hostility (H3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>6</td>
<td>930</td>
</tr>
<tr>
<td>Low</td>
<td>13</td>
<td>5793</td>
</tr>
<tr>
<td>Environment Dynamism (H4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>12</td>
<td>2637</td>
</tr>
<tr>
<td>Low</td>
<td>8</td>
<td>4430</td>
</tr>
</tbody>
</table>

k = number of independent samples; N = total sample size, rc = sampling error corrected average correlation

4.4 Meta-Regression

Meta-regressions then assessed bivariate analysis robustness. As shown in Table 3, trust-based links’ main effect, interaction terms, and moderators predict indirect outcomes. The relevance of interaction terms was used to assess if moderator subgroups had different trust relationship impacts.

Strong links had a reduced effect size for inter-organizational interactions in hostile situations but a higher effect in dynamic environments. For both dependent variables. These theories indicate opposing causality. Trust ties decrease information sharing commitment in hostile circumstances but increase it in dynamic environments.

This study did not hypothesise models 2, 3, 5, or 6. However, further effort was made to check if analysing these two environmental factors separately would yield a different outcome. Values match as refer to Table 3.

Table 3. Results of Meta-Regression Predicting Effect Size of Trust-Based Ties on Indirect Outcomes

<table>
<thead>
<tr>
<th>Variables</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
<th>Model 6</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>P-value</td>
<td>B</td>
<td>P-value</td>
<td>B</td>
<td>P-value</td>
</tr>
<tr>
<td>Environmental hostility</td>
<td>-0.047</td>
<td>0.401</td>
<td>-0.032</td>
<td>0.081</td>
<td>-0.059</td>
<td>0.350</td>
</tr>
<tr>
<td>Environmental dynamism</td>
<td>0.012</td>
<td>0.101</td>
<td>0.083</td>
<td>0.000</td>
<td>0.014</td>
<td>0.110</td>
</tr>
<tr>
<td>Trust ties</td>
<td>0.094</td>
<td>0.216</td>
<td>0.094</td>
<td>0.000</td>
<td>0.094</td>
<td>0.100</td>
</tr>
<tr>
<td>Trust ties * Environmental hostility</td>
<td>-0.067</td>
<td>0.001</td>
<td>-0.015</td>
<td>0.071</td>
<td>-0.009</td>
<td>0.001</td>
</tr>
<tr>
<td>Trust ties * Environmental dynamism</td>
<td>0.091</td>
<td>0.046</td>
<td>0.026</td>
<td>0.209</td>
<td>0.088</td>
<td>0.044</td>
</tr>
<tr>
<td>R2</td>
<td>0.495</td>
<td>0.447</td>
<td>0.497</td>
<td>0.487</td>
<td>0.444</td>
<td>0.488</td>
</tr>
<tr>
<td>F-value</td>
<td>5.77</td>
<td>4.92</td>
<td>5.94</td>
<td>5.56</td>
<td>4.80</td>
<td>5.57</td>
</tr>
<tr>
<td>Significance level</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
</tr>
<tr>
<td>--------------------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
</tr>
</tbody>
</table>

Note: Dependent variable for model 1, 2 and 3 is the overall effect size of trust-based ties on information sharing; Dependent variable for model 4, 5 and 6 is the overall effect size of trust-based ties on commitment.

5. Discussion and Conclusion

Trust-based relationships increase corporate performance by encouraging knowledge exchange and commitment. This research's performance variables consider subjective evaluation (Zaheer et al., 1998a), financial (Gulati & Nickerson, 2008), cost (Corsten & Felde, 2005), and business process perspectives (Carson et al., 2003). The meta-analysis supports the trust-performance link. However, this result aggregates all economic outcomes—direct and indirect—into one. Our literature evaluation suggests studying specific direct economic outcomes.

Interorganizational trust research shows non-economic but positive effects for the relationship. Numerous research concur that interorganizational trust improves relationship openness (Squire et al., 2009) and reduces the need for information protection procedures (Cheng et al., 2008; Norman, 2004).

The relationship between trust and commitment has been thoroughly demonstrated (Geyskens et al., 1998) in previous studies. Inter-organizational trust boosts partners' loyalty and support for change (Jambulingam et al., 2009; Chow & Holden, 1997). Trust and commitment also have an above-average relationship. Since commitment involves vulnerability, Morgan and Hunt's (1994) seminal study drew our attention. Meta-analysis shows that interorganizational trust increases emotional and decreases calculative commitment. This study integrates these two parameters into one variable, which may explain the inconsistent results. More study is possible.

This meta-analysis synthesizes cumulative findings and identifies novel moderators to better understand the contingent value of trust-based ties for organisations and their inter-organizational relationships and shows how environmental and cultural factors can influence research findings. Our findings show that enterprises need market- and country-specific networking strategies and trust networks rich in bridging social capital. This research advances the transaction costs hypothesis, which scholars use to explain how trust connections improve organisational performance. This research verifies the growing importance of social capital and social network theory in entrepreneurship but raises new questions about their temporal and contextual boundaries. Our meta-analysis should inspire future research on this important topic.

References


Mohr, J., & Spekman, R. (1994) Characteristics of Partnership Success: Partnership Attributes, Communication Behavior, and Conflict Resolution Techniques Author (s): Jakki Mohr and


A Comprehensive Survey of Techniques for Lung Cancer Diagnosis and Prediction

Danish Jamil*, Maheen Fatima¹, SMH Rizvi⁵ & Sellappan Palaniappan⁴

¹⁺ Department of Information Technology, Malaysia University of Science and Technology, Malaysia
²⁻ Department Software Engineering, Syed University of Engineering and Pakistan

*danish.jamil@phd.must.edu.my

Abstract: In spite of substantial progress, lung cancer remains a major health problem worldwide. The results of recent studies in this area are very concerning: approximately 200,000 new instances are documented annually. The purpose of this review is to analyze and synthesize the current literature in order to pinpoint the methods and models now in use for the diagnosis and prognosis of lung cancer and to evaluate their merits, shortcomings, and potential future developments. Improved prognoses for those with lung cancer through early diagnosis. The strategy used is one of reviewing and summarising a large body of research in order to offer a thorough grasp of the methods and models used in lung cancer diagnosis and prognosis. Recently proposed methods and models are discussed in this paper. These include deep learning architectures like CNN, Google Net, VGG-16, U-Net, 3D CNN, and RNN, as well as machine learning algorithms like XGBoost, SVM, KNN, ANN, Random Forest, and hybrid models. Feature selection, nodule categorization, risk factor analysis, and early-stage prediction are just some of the ways in which these methods are used in lung cancer detection. The potential of these methods to enhance lung cancer detection and prognosis is highlighted in this work. Deep learning architectures have shown excellent accuracy in identifying aberrant lung tissue development from CT images and categorizing lung nodules, while optimization models and machine learning algorithms have shown better prognosis using microarray datasets. Nevertheless, a number of caveats have been pointed out, including the need for robust computing resources, difficulties with non-numerical characteristics, overfitting, and extensive training cycles. Several unfilled research holes are highlighted in this publication. Challenges exist in areas such as the interpretability of deep learning models, the validation of suggested approaches in the actual world, and the restricted integration of different techniques. Researchers, physicians, and policymakers may all benefit from this study's findings in the area of lung cancer detection and prognosis. It brings attention to the possibilities of different methods, points out their limits, and proposes avenues for further study. The ultimate aim is to aid in the battle against lung cancer by improving patient outcomes.

Keywords: lung cancer, diagnosis, prediction, survey, techniques, optimization models, machine learning algorithms, deep learning architectures

1. Introduction

Lung cancer is a highly prevalent and lethal form of cancer worldwide, with one of the highest incidence and mortality rates among common cancers. Early detection of suspicious lung nodules plays a vital role in combating this disease (Nageswaran et al., 2022). In this paper, our objective is to provide an analysis of various machine learning and deep learning models trained on different types of datasets and databases, along with multiple artificial intelligence techniques, to leverage their performance in lung cancer diagnosis and prognosis. Furthermore, it is projected that approximately 7,650 deaths will be attributed to melanoma in 2022, with 5,080 men and 2,570 women succumbing to the disease (Chikkara & Parang, 2023; Raghu et al., 2022). Looking ahead to 2023, the estimations suggest that around 5,420 men and 2,570 women in the United States will lose their lives to melanoma of the skin(Sung et al., 2021). This highlights the significance of studying both lung cancer and melanoma to address the major health problems they pose. Cells in the body grow out of control in cancer, and when it starts in the lungs, it is called lung cancer. Lung cancer is the leading cause of cancer death and the second most diagnosed cancer in both men and women in the United States. Reportedly, approximately
1 in 6 United States citizens will be diagnosed with lung cancer throughout their life. Cigarette smoking is the primary cause of lung cancer, but it can also be caused by other factors such as tobacco use, exposure to second-hand smoke, asbestos, or radon at work (AL-Huseiny & Sajit, 2021).

Deep learning-based models heavily rely on the use of accessible data, and data collection is one of the most challenging tasks in training such models. This challenge becomes even more difficult in the field of medical diagnosis due to the limited accessibility of medical data on the Internet and the need to ensure data privacy and security. The quality of the dataset used for training directly impacts the overall accuracy and correctness of the model. High-quality medical images capturing all relevant features are essential for training deep learning models effectively. Choosing the appropriate model architecture and hyperparameters depends on a thorough understanding of the data. If the available data is adequate, models can be built from scratch by defining each layer of a convolutional neural network (Deepapriya & Kumar, 2023).

This study contributes significantly to the field of lung cancer diagnosis and prognosis by conducting a comprehensive literature review, analyzing current research, and identifying the methods and models used. The strengths and limitations of these approaches are evaluated, with a specific focus on advanced techniques such as deep learning architectures and machine learning algorithms. The study explores their application areas in lung cancer detection and emphasizes their potential for improving prognosis. Additionally, research gaps and challenges are identified, providing valuable directions for future studies. The findings of this research are expected to benefit researchers, practitioners, and policymakers in their efforts to combat lung cancer and improve patient outcomes.

![Figure 1](image1.png)

**Figure 1.** Three steps of pre-processing are shown for two randomly selected input images, each input image and the subsequent preprocessing are depicted on a row. Column-wise, input images are in (i); texture analysis in (ii); morphological operations in (iii); ROI extraction in (iv) (AL-Huseiny & Sajit, 2021)

### 2. Literature Survey

By using digital image processing and machine learning, they proposed a system that automatically detects cancer cells by machine learning algorithms and strategies to improve cancer characterization. Using preprocessed binary image from grey scale image for prediction, Canny Hash detection method was utilized in this process along with Support Vector Machine SVM for feature extraction classification on the based-on area, perimeter, and eccentricity. They proposed another Machine learning technique called Otsu’s method to automatically perform clustering-based image thresholding. Sobel filter is used for calculating gradient for edge detection and used grey-level co-occurrence matrix (GLCM), method of examining feature texture that considers the spatial relationship of pixels in an image. The proposed system analyzed properties through which we can find the difference between the
cancerous image and normal lung image. (AL-Huseiny & Sajit, 2021). In this study (Shimazaki et al., 2022) proposed a deep learning model called LeNet for detection of lung cancer tumors, using publicly available dataset consisting of CT-SCANS images. For feature extraction and classification, Convolutional Neural Network CNNs were employed in the system. The proposed model obtained accuracy successfully as compared to existing method. In this study (Rahane et al., 2018) suggested techniques consisting of various modules used by deep neural networks for identification of lung CT-SCAN images. They developed system by experimenting with Convolutional Neural Networks CNNs along with various techniques, it was accumulated that the system was able to segment tumors of different tumors and non-tumor images (Chalasani & Rajesh, 2020). Machine learning techniques comprises of feature extraction, fusion using patch base LBP (local binary pattern) and discrete cosine transform (DCT), along with the classification methods of machine learning inclusively support vector machine SVM and K-nearest Neighbor KNN evaluated the chest CT scan images dataset for texture feature classification, in order to early diagnosis of multiple kinds of cancer occurrence (Makaju et al., 2018) In 2022, they proposed a deep learning model to validate the predictive accuracy of lung cancer using CT images. In their experimental study, they used two types of images formats, ‘.DICOM’ and ‘.MHD’ formats. The key highlight of their study is false positive reduction, and they used U-Net and 3D CNN which achieved high accuracy in false-positive nodules screening (Vikas & Kaur, 2021).

Table 1. Summary of Lung Cancer Detection and Classification

<table>
<thead>
<tr>
<th>Method</th>
<th>Data</th>
<th>Pros/Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smita Raut et al. (2021)</td>
<td>SVM</td>
<td>CT-SCAN images of 61 images</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Improve cancer characterization but used</td>
</tr>
<tr>
<td></td>
<td></td>
<td>binary image scaling.</td>
</tr>
<tr>
<td>AL-Huseiny &amp; Sajit (2021)</td>
<td>GoogLeNet with transfer</td>
<td>IQ-OTH/NCCD</td>
</tr>
<tr>
<td></td>
<td>learning</td>
<td>explore pretrained models but limited to</td>
</tr>
<tr>
<td></td>
<td></td>
<td>specific dataset.</td>
</tr>
<tr>
<td>Maleki et al. (2021)</td>
<td>KNN classifier along with</td>
<td>1000 images of public dataset</td>
</tr>
<tr>
<td></td>
<td>Genetic Algo</td>
<td>Used hybrid approach that limited to KNN</td>
</tr>
<tr>
<td>Elnakib et al. (2020)</td>
<td>KNN, SVM and Random</td>
<td>Early Lung Cancer Action Project (ELCAP)</td>
</tr>
<tr>
<td></td>
<td>Forests as classifier and</td>
<td>Improved CAD systems but depends on specific</td>
</tr>
<tr>
<td></td>
<td>Genetic Algo for feature</td>
<td>image enhancement and feature</td>
</tr>
<tr>
<td></td>
<td>optimization</td>
<td>extractors.</td>
</tr>
<tr>
<td>Rehan et al. (2021)</td>
<td>SVM and KNN as classifier</td>
<td>Images of CT-SCANS</td>
</tr>
<tr>
<td></td>
<td>and detector</td>
<td>Used KNN classifier to detect squamous cell</td>
</tr>
<tr>
<td></td>
<td></td>
<td>carcinoma but big dataset extension is required</td>
</tr>
<tr>
<td></td>
<td></td>
<td>with enhancement.</td>
</tr>
<tr>
<td>Vikas &amp; Dr. Prabhpreet Kaur (2021)</td>
<td>SVM and Random Forest as classifiers</td>
<td>Public dataset of 1000 samples and 25 attributes</td>
</tr>
<tr>
<td>Chalasani, &amp; Rajesh (2020)</td>
<td>CNN</td>
<td>BSE-JSRT and LIDC/IDRI datasets</td>
</tr>
<tr>
<td>Sohaib &amp; Adewunmi (2023)</td>
<td>CNN</td>
<td>613 images of data</td>
</tr>
<tr>
<td>Jafar Abdollahi (2023)</td>
<td>LeNet models</td>
<td>IQOTH/NCCD</td>
</tr>
<tr>
<td>Saleh Abunajm et al. (2023)</td>
<td>CNN</td>
<td>IQOTH/NCCD</td>
</tr>
<tr>
<td>Jiang et al. (2022)</td>
<td>U-NET and region proposal</td>
<td>CT-Scans Images</td>
</tr>
</tbody>
</table>
In this study, several research gaps can be identified in the field of lung cancer detection and classification. Firstly, there is a need for larger and more diverse datasets, as many studies rely on limited datasets or specific image formats. This limitation hinders the generalizability of the proposed models and their applicability to different cases of lung cancer. Additionally, the lack of comprehensive semantic labeling and annotations for lung cancer images poses a challenge in accurately detecting and classifying cancerous regions. Detailed annotations are essential for training and evaluating deep learning models effectively.

Another research gap is the limited exploration of optimization techniques. While some studies propose deep learning models for lung cancer detection, there is a need for a more comprehensive investigation of optimization methods such as hyperparameter tuning and network architecture optimization. These techniques can significantly enhance the performance and efficiency of the models. Furthermore, there is a need to conduct application development and real-world validation to assess the feasibility and effectiveness of the proposed models in practical clinical settings. Such validation can provide valuable insights and ensure the reliability of the models in real-world scenarios.

Additionally, the integration of various statistical metrics and techniques is crucial for robust evaluation of the proposed models. Some studies lack a comprehensive exploration of different statistical metrics, which can limit the reliability of the evaluation. It is important to incorporate a wide range of statistical metrics and techniques to enable a comprehensive assessment of model performance. Addressing these research gaps will contribute to the advancement of lung cancer detection and classification. Future studies should focus on acquiring larger and more diverse datasets, incorporating detailed semantic labeling and annotations, exploring optimization techniques, conducting real-world validation, and integrating various statistical metrics and techniques for a comprehensive evaluation of the proposed models. These efforts will help improve the accuracy, reliability, and applicability of lung cancer detection and classification methods.

3. Methodologies

Using various artificial intelligence methodologies as mentioned in these research articles in search of the appropriate method to gain more accuracy relevancy while training our model. These models used in classification and diagnosis of lung cancer.

3.1 Machine Learning

In Artificial intelligence, Machine learning is its subfield that primarily focuses on the development of algorithms and models that enables computer systems to learn and able to predict or make decisions without being explicitly programmed. The prominent idea behind machine learning is to model training on a labeled dataset having the data inputs with respect to their output labels. Pattern learning and relationships learning in the data and knowledge that generalizes to be predictable and decision making on tested datasets (Saleem & Chishti, 2020; Witten et al., 2017).

3.2 Deep Learning

Deep learning is commonly referred to as deep structured learning, it is one of the significant machine learning techniques that developed using artificial neural networks and representation learning. Deep Neural Networks that comprises of training neural networks with multiple layers (Kose & Alzubi, 2020). Deep learning algorithms learned over hierarchical presentations of data from extracting features at higher level to lower level. Layers in deep learning neural networks learns data representations which are getting increasingly abstract and has complexities. Which enables models to automatically learn useful features from raw data. Handling large scale datasets, highly dimensional volume datasets are the key abilities of deep learning. Convolutional Neural Networks are extensively used for analysis assessment tasks and recurrent neural networks for sequential datasets (Ameri, 2020). Remarkably,
deep learning has gained success in multiple domains of Artificial Intelligence including recognition systems, language processing and autonomous tasks. Deep learning is an absolute powerful approach in Artificial Intelligence that focuses on deep neural networks for the learning patterns despite data being complex (Wu et al., 2022). Diversifying state of the art performances and leveraging the modern approaches in several domains Deep Learning has transformed domains and challenges by paving the way for advancements, as shown in Table 1.

Table 1. Strengths and Limitations of Methodologies in Lung Cancer Detection and Classification

<table>
<thead>
<tr>
<th>Methodology</th>
<th>Strengths</th>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machine Learning</td>
<td>Ability to learn patterns and relationships in data.</td>
<td>Reliance on labeled datasets for training.</td>
</tr>
<tr>
<td></td>
<td>Generalization of knowledge for prediction.</td>
<td>Limited capability to handle complex and high-dimensional data.</td>
</tr>
<tr>
<td></td>
<td>Well-established algorithms and techniques.</td>
<td>Lack of interpretability in complex models.</td>
</tr>
<tr>
<td>Deep Learning</td>
<td>Ability to automatically extract useful features from raw data.</td>
<td>Requires large amounts of labeled training data.</td>
</tr>
<tr>
<td></td>
<td>Capable of handling complex and high-dimensional data.</td>
<td>Computationally intensive and requires significant computing resources.</td>
</tr>
<tr>
<td></td>
<td>Effective in image analysis and sequential data tasks.</td>
<td>Prone to overfitting with insufficient training data.</td>
</tr>
</tbody>
</table>

4. Discussion and Survey Analysis

The analysis of reviewed survey papers revealed key findings and provided insights in the span of recent developments that addresses the detection and classification of lung cancer. The following table provides comparative analysis of abstract proposed models for the purpose of detection and classification.

Table 2. Comparison Analysis of Various Purpose Models

<table>
<thead>
<tr>
<th>Model</th>
<th>Accuracy</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>2023</td>
<td>LeNet</td>
<td>97.88% LeNet for classification</td>
</tr>
<tr>
<td>2023</td>
<td>VGG16</td>
<td>99.45% Better accuracy</td>
</tr>
<tr>
<td>2021</td>
<td>SVM</td>
<td>98% Reduce execution time with SVM and Chi-square feature selection.</td>
</tr>
<tr>
<td>2021</td>
<td>GoogleNet</td>
<td>94.38% Higher accuracy with transfer learning</td>
</tr>
<tr>
<td>2020</td>
<td>KNN</td>
<td>96.5% Hybrid with GA for enhanced classification</td>
</tr>
</tbody>
</table>

As in preprocessing, the computed tomographic scan is input and processed to enhance and improve image quality. To serve this purpose, operation is performed on image to preprocessed for postprocessed model evaluation. Data preprocessed to binary image format from grey scaling and Canny Hash detection techniques were used (AL-Huseiny & Sajit, 2021). On the dataset, to capture relevant field and region of interest (ROI) contained centered and normalized region of lung, for this texture analysis Gabor filter is applied. (Nageswaran et al., 2022) First the raw image was enhanced using histogram stretching technique and smoothing wiener filter was applied to remove image noises. (Elnakib et al., 2020) Local binary pattern LBP technique to encode feature of lung cancer CT SCANS and Median
filtering to image de-noising and Contrast Limited Adaptive Histogram Equalization (CLAHE) is utilized to enhance the image contrast (Raghu et al., 2022; Shimazaki et al., 2022). Data Augmentation approach to increase the amount of data in case data being smaller in size (Jafar Abdollahi, 2023; Makaju et al., 2018). Genetic Algorithm which is a heuristic approach used in processing to establish co-relation between target labels and feature. (Makaju et al., 2018). As the survey founds out the enhancement and improvement are considered important in data preprocessing various Segmentation and Enhancement filters are being experimented in studies. Transfer learning in Artificial intelligence is an optimal approach to solving certain problems utilized with analyzing other challenges. The intent of transfer learning to increased efficiency and utilization of pretrained models to overcome gaps to ensure tuning its performance and functionality towards new model trained for initializing complete model training. As in GoogLeNet was developed as learning model by the concept of transfer learning of a pre trained neural network. (Nishio et al., 2018). Analysis of Papers reflected diverse and variation in research objectives which include increased accuracy, texture classification and decreased runtime. They highlighted the key strengths of proposed models. K Nearest Neighbor (KNN) as a classifier been widely used for recognition and pattern learning and it detects cells and handles specific types of lung cancer. Support Vector Machine (SVM) proposes high accuracy in texture classification and effective in distinguishing characteristics of lung cancer. SVM was used as classifier to organize data in low or high dimensions along with K Nearest Neighbor to detect and enhance classification of lung cancer (Nageswaran et al., 2022). Deep learning models inclusively CNN, VGG16, VGG19, LeNET and Inception V3 demonstrated high accuracy rate in segmentation of tumor and detection of lung cancer. CNN comprises of classes of deep neural networks, but it has extensive limitations where it require large dataset to analyze visual imagery and utilized comparatively lesser preprocessing along to another classification algorithm, as shown in Table 2.

5. Research Challenges and Opportunities

The Surveyed Paper demonstrated the Research gaps, challenges and future research opportunities which is identified through analytical assessment of recent developments for the lung cancer detection and classification.

The proposed models and algorithms has served the present limitations by their accuracy rates and performance metrics, but they are tuned to trained time and resources fulfilment and has their limitations as well, this strives the need for robust and effective algorithms that addresses the challenges of scalability and efficiency. The concept of Hybrid Models, where combination of multiple algorithms and models are explored that results in more powerful and efficient lung cancer detection. Incorporated deep learning approaches, feature selection techniques and conventional machine learning algorithms can be explored as in hybrid architecture. The availability of limited dataset size with lack of annotated semantic labels could also restrict the proposed models in generalization, larger datasets acquisition with semantic labelling techniques could be another challenge for predictive diagnosis.

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Opportunities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limited dataset size and lack of annotated labels</td>
<td>Acquire larger datasets with annotated semantic labels for improved generalizability</td>
</tr>
<tr>
<td>Scalability and efficiency of algorithms</td>
<td>Explore hybrid models combining deep learning and conventional ML algorithms</td>
</tr>
<tr>
<td>Validation in clinical settings with medical experts</td>
<td>Integrate Decision Support Systems and CAD systems in operational clinical environments</td>
</tr>
<tr>
<td>Limited interpretability of models</td>
<td>Validate and assess models on diverse and high-volume datasets for extensive interpretability adoption</td>
</tr>
<tr>
<td>Resource utilization in healthcare organizations</td>
<td>Develop robust and efficient algorithms to optimize resource utilization</td>
</tr>
</tbody>
</table>

Table 3. Research Challenges and Opportunities
Integration of Decision Support Systems and Computer Aided Diagnosis (CAD) systems in an operational clinical environment and Validation of experimented results in clinical settings with the availability of medical experts are another concerned area that required focused development. Assistance of healthcare professionals in clinical and healthcare surroundings by incorporating the validated and verified proposed systems, that yields effectiveness and improved accuracy of models. The identified gap could be validation and assessment of proposed and surveyed models trained and tested at diverse and high-volume raw dataset and databases with the extensive validated interpretability adoption of models.

Although remarkable efforts and work has been made, as we surveyed the recent developments. Addressing these limitations and opportunities could significantly result in improved accuracy rate at early-stage detection of lung cancer disease and treatment of cancer patients with better resource utilization in healthcare organizations, as shown in Table 3.

6. Conclusion

In this survey analysis, we highlighted the role of artificial intelligence AI in the detection of lung cancer. Lung Cancer is a prevalent and pervasive disease that must be detected in its early stages for adequate treatment and refined outcomes. With the help of various recent research papers, it has been established the divergent approaches and methodologies integrated in Artificial Intelligence aided Lung Cancer Detection. Implementation of models varied from machine learning to deep learning to classify and analyze lung cancer Computed tomographic scan images that accomplishes higher accuracy rate. Despite having limitations and gaps, the application of Artificial Intelligence in lung cancer diagnosis and prognosis offers relatively tremendous outcomes which can be evident by advancements and developments that leverages the efficiency of Artificial Intelligence models and algorithms that prospects benefits.

Acknowledgements

We would like to thank all the people who prepared and revised previous versions of this document.

References


Enhancing Skin Cancer Diagnosis through Deep Transfer Learning on Dermoscopic Images

Danish Jamil\textsuperscript{a,\textdagger}, Farheen Qazi\textsuperscript{b}, Dur e Shahwar\textsuperscript{c}, Selappan Palaniappan\textsuperscript{d} & Asiah Lokman\textsuperscript{e}

\textsuperscript{a,d,e} Department of Information Technology, Malaysia University of Science and Technology, Malaysia
\textsuperscript{a,b,c} Department Software Engineering, Syed University of Engineering and Technology, Pakistan
*danish.jamil@phd.must.edu.my

Abstract: Skin cancer is a prevalent and potentially life-threatening form of cancer that necessitates early detection and timely treatment. Accurate and efficient image classification of skin lesions plays a crucial role in dermatologists' ability to diagnose skin cancer effectively. In this study, we propose a deep learning model based on Convolutional Neural Networks (CNNs) to classify the presence of skin malignancy. Our model utilizes the Tensor Flow and Keras frameworks and employs transfer learning on a pre-trained CNN architecture, specifically ResNet152. This approach enables our model to leverage the knowledge and features learned from a large dataset, enhancing its predictive capabilities. We train and evaluate our model on the HAM10,000 dataset, which comprises dermoscopic images of skin lesions from seven distinct classes, including actinic keratosis, basal cell carcinoma, melanoma, benign keratosis, dermatofibroma, melanocytic nevi, and vascular lesions. Through extensive training and evaluation, our model achieves an impressive accuracy of 86.47\%, surpassing other existing models in the field. The high accuracy of our model demonstrates its effectiveness in accurately identifying the presence of skin cancer in dermoscopic images. The implications of our study are significant for improving the accuracy and efficiency of skin cancer diagnosis. By providing dermatologists with a reliable tool for image classification, our model has the potential to reduce the need for invasive biopsy procedures and facilitate early detection of skin cancer. This, in turn, can lead to improved patient outcomes and a streamlined diagnostic process. Nevertheless, it is important to acknowledge the limitations of our study. Future research should focus on addressing these limitations and further refining the proposed model. Additionally, exploring the clinical applicability of our model in real-world settings and its integration into dermatology practices should be a priority for future investigations. In a nutshell, this study presents a deep learning-based approach using CNNs for the accurate classification of skin malignancy in dermoscopic images. The model achieves remarkable accuracy and has the potential to enhance the diagnostic capabilities of dermatologists, contributing to improved skin cancer diagnosis and patient care. By leveraging advanced technologies such as deep learning, we can make significant strides toward combating skin cancer and saving lives.

Keywords: skin cancer, deep learning, image classification, Convolutional Neural Networks, transfer learning, dermoscopic images, accuracy, diagnosis, HAM10,000 dataset, early detection.

1. Introduction

Skin cancer has emerged as a significant health concern in recent years, with a steady increase in the number of cases. It is now considered a major global challenge, often referred to as the "pandemic of the century. Skin cancer, particularly melanoma, has become the third most common type of cancer and a leading cause of non-accidental death among individuals between the ages of 20 to 39 (Melarkode et al., 2023). The incidence of melanoma has risen by 53\% in the past decade, primarily due to increased exposure to ultraviolet (UV) radiation (Adla et al., 2022). According to the World Health Organization (WHO), skin cancer is the most common cancer worldwide, and its incidence is increasing. The incidence of melanoma, the most deadly form of skin cancer, has been increasing over the past few decades, particularly in countries with fair-skinned populations, such as the United States, Australia, and Europe (Organization & others, 2017). According to the latest data from the American Cancer Society's Cancer Facts & Figures 2023 report, melanoma remains a significant health challenge. In the
United States alone, it is estimated that in 2023, approximately 186,680 new cases of melanoma will be diagnosed, with 97,610 cases classified as invasive (Rock et al., 2020).

Prompt and accurate diagnosis of skin lesions is crucial, as early detection can prevent metastasis and potentially fatal consequences. However, distinguishing between different types of skin lesions can be challenging, even for experienced dermatologists, due to their subtle visual differences. To address this issue, this study aims to develop a deep learning model that utilizes dermoscopic images for the accurate classification of skin malignancy (Wu et al., 2022).

This study focuses on developing a deep learning model that employs transfer learning techniques on a pre-trained architecture, specifically ResNet152, to classify skin lesions based on color, lines, patterns, and curves. The model will be trained using the HAM10000 dataset, which consists of 10,015 images divided into seven classes of skin lesions. The proposed model has the potential to significantly improve the accuracy and efficiency of skin malignancy diagnosis, leading to better patient outcomes and a reduced incidence of skin cancer.

Previous research has explored various approaches to enhance the visual detection and classification of skin cancer. Computer-aided diagnostics (CAD) solutions aim to improve diagnostic quality and precision by reducing inter-observer inconsistency and addressing the scarcity of qualified experts (Bajwa et al., 2020; Rashid et al., 2022). Several studies have utilized datasets of varying sizes and applied different CNN models for skin disease classification (Adla et al., 2022; Allugunti, 2022; Shanthi et al., 2020). CNNs, especially Convolutional Neural Networks, have shown remarkable performance in image recognition and classification, surpassing human capabilities (Rashid et al., 2022).

1.1 Deep Learning

Deep Learning (DL), as a subset of machine learning, has revolutionized various domains, including speech recognition, object identification, and recommendation systems (Arshad et al., 2021). DL utilizes artificial neural networks to recognize patterns and extract higher levels of abstraction from data representations (Wu et al., 2022). DL algorithms, particularly those based on Artificial Neural Networks (ANNs), have greatly benefited from the availability of large datasets and advancements in Big Data and Cloud Computing technologies (Bibi et al., 2022).

1.2 Convolutional Neural Networks

Convolutional Neural Networks (CNNs) have emerged as powerful architectures for image recognition and classification tasks. They have demonstrated superior performance in detecting faces, objects, and various features such as curves, patterns, and lines (Garg et al., 2021). CNNs can be utilized in two ways for skin lesion classification: as pre-trained feature extractors on large datasets like ImageNet or through end-to-end learning that directly associates pixel raw data with class tags (Das et al., 2021).

1.3 Tensor Flow

One widely used deep learning framework is TensorFlow, developed by Google, which facilitates machine learning and deep learning tasks for perceptual and language processing (Rashid et al., 2022). TensorFlow operates by taking input as multi-dimensional arrays, also known as tensors, and creating a flowchart-like structure called a graph to execute desired operations on the input. It offers a range of tools and optimizations for training deep convolutional neural networks and has gained popularity in the research community. It is important to note that TensorFlow is primarily implemented using the Python programming language (Li et al., 2021).

In this study, a system is proposed for classifying skin lesions using dermoscopic images captured with a dermoscopic lens. The approach relies on a Deep Convolutional Neural Network (DCNN) and transfer learning techniques applied to the pre-trained ResNet152 architecture. The model is implemented using TensorFlow and Keras, with the addition of a fully connected (FC) head. This architecture allows
leveraging the learned features from the ResNet152 model and adapting them to the specific task of skin lesion classification. By fine-tuning the model on the HAM10000 dataset, high accuracy and robust performance in identifying different types of skin malignancies are aimed to be achieved.

Overall, this research contributes to the ongoing efforts to improve skin cancer diagnosis and reduce its burden on individuals and healthcare systems. By harnessing the power of deep learning and leveraging dermoscopic images, a reliable and efficient tool is proposed for dermatologists to aid in the early and accurate detection of skin malignancies. This, in turn, can lead to improved patient outcomes and a decrease in the incidence of skin cancer.

This study contributes to the field of skin malignancy classification.

i. In this study, a deep learning model is developed for accurate classification of skin lesions. The proposed model utilizes dermoscopic images and employs transfer-learning techniques on the pre-trained ResNet152 architecture.

ii. The model aims to enhance the accuracy and efficiency of skin malignancy diagnosis by leveraging deep learning techniques. In this study, the HAM10000 dataset is used, which consists of a large number of dermoscopic images divided into seven classes of skin lesions.

By addressing the challenge of skin lesion classification, the proposed method contributes to the field by providing a more effective approach to distinguishing between different types of skin lesions. This study also has the potential to improve patient outcomes by contributing to early detection and timely intervention. Moreover, this research contributes to the field of computer-aided diagnostics by exploring the application of deep-learning techniques for skin lesion classification. By validating the effectiveness of deep learning techniques, particularly convolutional neural networks, in this study, the research provides evidence of the benefits of such approaches in the domain of skin malignancy classification. Overall, this study aims to advance the field, improve classification accuracy, and facilitate timely intervention for better patient outcomes.

2. Materials and Methods

In this study, we propose a system for classifying skin lesions using dermoscopic images recorded using a dermoscopic lens (Li et al., 2021). The system is based on a Deep Convolutional Neural Network (DCNN) and Transfer Learning techniques on a pre-trained architecture. We use Tensor Flow and Keras to build the model with the ResNet152 CNN design, which overcomes the "fading pitch" problem, allowing the building of networks with several convolutional layers that outperform shallower networks. We use the HAM10000 dataset, which contains 10015 Dermoscopic photos collected from two different places over a 20-year period. The dataset includes seven unique types of skin lesions and is publicly accessible via the ISIC repository. However, the dataset is somewhat uneven, with about 6000 photographs of the 'Nevus' class and only a few images of the other classes. To address this imbalance, we use conventional pre-processing techniques such as scaling and data augmentation. The images in the dataset are scaled to 224x224 pixels, and data argumentation methods such as swing zoom, flip, and rotation are used to escalate the mass of the dataset and balance the amount of pictures at every class. By applying augmentation techniques, we acquired 36862 images belonging to 7 classes.

We apply transfer learning, which is a machine learning approach that trains deep neural networks with a little quantity of data and very little processing resources. In our case, we import ResNet152, which has been pre-trained on the ImageNet dataset, but without the latter layer. Then we construct a new fully connected (FC) head and incorporate it into the base model. A pooling layer is included in the fully connected (FC) head (AveragePooling2D). Subsequently, a computer extra a Flatten layer that turns a 2D feature matrix into a vector and a Dense level of 256 units with ‘ReLU’ as an activation function. Additionally, the Dropout layer was incorporated to improve overfitting on the network. Finally, the Dense layer was added using ‘softmax’ as an activation function for probabilistic results, which regroups the results and gives a prediction. We split the dataset into an 80% training set and a
20% validation set for model implementation. To fine-tune the network's head, we freeze the weights of our network's base. We compiled our model with learning rate decay and a categorical cross-entropy loss function. We use the Adam optimizer to optimize the model's performance. Finally, we evaluate the model's performance by measuring its accuracy, precision, recall, and F1 score.

2.1 The HAM10000 dataset

Dermoscopic pictures of pigmented lesions from various sources are included in the HAM10000 training collection. The HAM10000 dataset's 10015 Dermoscopic photos were collected from two different places over a 20-year period: the Division of Dermatology at the Medical Academy of Vienna, Austria, and Cliff Rosendahl's skin cancer hospital in Queensland, Australia (Li et al., 2021) [13] The final collection of dermoscopic scans consists of seven unique types of skin lesions offered as a training set for speculative means that also are publically accessible via the ISIC repository. This collection of metadata and labels are given in tabular format contained by means of a sole CSV (comma parted worth) heading (Li et al., 2021) Figure 1 displays the number of photos in each class.

2.2 Data Preprocessing

Deep learning models entail great quantity of data to attain acceptable presentation (Wu et al., 2022), and the dataset we’re using is somewhat uneven, with about 6000 photographs of the 'Nevus' class and only a few images of the other classes. The volume of the input for the CNN architecture that we are training, is 224 × 224 pixels. As a result, we used conventional pre-processing techniques including scaling and data augmentation. The pictures in the HAM10000 dataset have been scaled to 224×224 pixels, and data argumentation methods including swing, zoom, flip, and rotation have been utilized to escalate the mass of a dataset and balance the number of pictures at every class. Augmentation variables are also supplied in Table 1. Data argumentation aids the network in identifying additional training pictures that improve the model's accuracy (Kumar et al., 2022). By applying augmentation techniques, we acquired 36862 images belonging to 7 classes. As shown in Figure 2 represents the balanced dataset.
2.3 Transfer Learning

Transfer learning is a machine learning approach which emphasizes to preserve information obtained even though handling one issue and transferring it to a similar yet distinct difficulty, where a model built for one use case is reprocessed as the initial spot for a model on another (Rashid et al., 2022). It can train deep neural networks with a little quantity of data and very little processing resources that is why this approach is now highly popular in the arena of deep learning. Its predominantly valuable in the department of data science, as maximum practical matters doesn’t need heaps of characterized data opinions to train sophisticated models (Terracciano et al., 2021). A CNN, on the other hand, requires a huge quantity of labelled training data, which may not be accessible. A paper (Rashid et al., 2022) proposes a technique for training a CNN using labelled source data (a source learner) then dig out the CNN interior layers (that gives a standard mid-tier feature maps) to an aim CNN student. The transfer convolutional neural network is the name given to this technique (TCNN) (Prathiba et al., 2019).

A CNN dependent architecture ResNet152 that uses in this study for classifying the skin lesion images by applying Transfer Learning. The images were loaded by the application during this step, prior to the model’s implementation. Dermoscopic lesion images are used as input, and there are seven distinct classes of lesions. The loaded images are of size 450x600x3, which Resnet152 does not accept as an input for training, therefore the application resizes all of them to 224x224x3 and prepares the data to feed the network using Image Data Generator. The dataset is riven into 80% training set and 20% authentication set for model implementation.

Transfer learning technique allows us to reuse the filters a model learnt in a prior training session. In our scenario, we import ResNet152, which has been pre-trained on the ImageNet dataset, but without the latter layer. Then we construct a new fully connected (FC) head and incorporate it into the base model. A pooling layer is included in the fully connected (FC) head (AveragePooling2D). Subsequently, a computer extra a Flatten layer that turns a 2D feature matrix into a vector and a Dense level of 256 units, with ‘ReLU’ as an activation function. Additionally, the Dropout layer was incorporated to improve overfitting on the network. Finally, the Dense layer was added using ‘softmax’ as an activation function for probabilistic results, which regroups the results and gives a prediction. As shown in Table
1 describes the fully connected head in depth. The final step is to ensure that the weights of our network’s base are frozen since we only intend to train (i.e., fine-tune) the network's head. Furthermore, this is a multi-class problem, so we compiled our model with learning rate decay and the Adam optimizer with the learning degree of 1e-4 utilizing “categorical cross-entropy” loss.

Table 1. *The Architecture of a Fully Connected Head*

<table>
<thead>
<tr>
<th>Layer (type)</th>
<th>Output Shape</th>
<th>Parameter #</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conv5_block3_out (activation)</td>
<td>(None, 7, 7, 2048)</td>
<td>0</td>
</tr>
<tr>
<td>Average_pooling2d (Average Pooling)</td>
<td>(None, 1, 1, 2048)</td>
<td>0</td>
</tr>
<tr>
<td>Flatten (Flatten)</td>
<td>(None, 2048)</td>
<td>0</td>
</tr>
<tr>
<td>Dense (Dense)</td>
<td>(None, 256)</td>
<td>524544</td>
</tr>
<tr>
<td>Dropout (Dropout)</td>
<td>(None, 256)</td>
<td>0</td>
</tr>
<tr>
<td>Dense 1 (Dense)</td>
<td>(None, 7)</td>
<td>1799</td>
</tr>
</tbody>
</table>

3. **Results and Discussion**

3.1 **Accuracy Matrix**

The accuracy metrics are used to determine the model's performance initially. Precision stands as statistic that calculates that by what means a model can execute through total classes. It is calculated by dividing the amount of true predictions by the entire quantity of forecasts. Furthermore, the model loss describes how much information is lost in the issue modelling, which is a close approximation to actuality when contrasted to the reality shown by the example data The validation accurateness and validation damage for a model are shown in Figure 3.

![Figure 3. Validation Loss Vs Validation Accuracy](image-url)
3.2 Confusion Matrix

The confusion matrix is a visual depiction of effectiveness for a classification model. Each item in a confusion matrix signifies the quantity of guesses made via a model when it properly or incorrectly classified the classes. The model's confusion matrix is depicted in Figure 4.

![Confusion Matrix](image)

*Figure 4. Confusion Matrix*

3.3 Classification Report

The results of the model can be analyzed by the Classification Report. It calculates values such as recall, precision and F-1 score. Figure 5 represents these values for each predicted class.

\[
\text{Precision} = \frac{TP}{TP + FP} \quad \text{Equation 1}
\]

\[
\text{Recall} = \frac{TP}{TP + FN} \quad \text{Equation 2}
\]

\[
\text{F1 Score} = \frac{2 \times \text{Precision} \times \text{Recall}}{\text{Precision} + \text{Recall}} \quad \text{Equation 3}
\]

This research shows a model achieves an accuracy of 86.47 percent in the validation set while being trained for an epoch count of 55, by this research. One complete cycle of training across the whole dataset is referred to as an epoch, and it is generally distinguished by distinct progress. These findings highlight the relevance of involuntary picture categorization, particularly for skin cancer diagnosis, employing cutting-edge technology such as Deep Learning, Transfer Learning and, more specifically, CNN.
Figure 4. Classification Report

The overarching resolution for researching this is to produce a Deep Learning model for classification of skin cancer images in the direction of accurately identify the lesion class. The ability to detect this disease quickly, efficiently, and accurately can have a positive impact on the next steps in the diagnostic process. In this article, an approach for extracting skin cancer from dermoscopic images based on deep CNN using Transfer Learning was proposed. The pre-trained architecture that is used is Resnet152, its input is 224x224 image and the output of this CNN is transformed by a Dense Layer of seven units because the HAM10000 dataset comprises of seven classes of lesions. The trial consequences demonstrated that the developed model could be reached to immensely high accuracy of 86.47% for the validation set after being trained for 55 epochs by the batch size of 32.

The authors of a related paper [27] used deep learning to classify pictures from the HAM10000 dataset in a model formed using the VGGNET framework. According to the test phase of the trained model, class validation was obtained at 85.62 percent. The accuracy of training and executing of the skin malignance identification system in [28] was 80% and 78%, respectively, and others built a skins cancer identification structure by an assistance of CNN for the HAMl0000 dataset. A research study [29] presents a deep learning model for detecting skin cancer from pictures of skin lesions with 'AlexNet' as the pre-trained model, a transfer learning approach was used. This paper has an 84 percent categorization accuracy.

After all of this, we can conclude that the suggested model produced significant outcomes, and the framework was effective in classifying dermoscopic pictures of skin lesions into one of seven categories. To achieve acceptable presentation, deep learning models require a large amount of data, and the dataset we're using is quite uneven, with around 6000 shots of the 'Nevus' class and only a few images of the other classes. The input volume for the CNN architecture we're training is 224 × 224 pixels in size. As a result, we applied standard pre-processing techniques such as data augmentation and scaling. The images in the HAM10000 dataset were scaled to 224 × 224 pixels, and data argumentation techniques including swing, zoom, flip, and rotation were used to increase the size of the dataset and balance the number of images in each class. Data argumentation helps the network find more training pictures to increase the model's accuracy. By applying augmentation techniques, we acquired 36862 images belonging to 7 classes.
4. Conclusion

This study presents a deep learning-based approach utilizing CNNs for accurate classification of skin malignancy in dermoscopic images. The model, employing transfer learning on a pre-trained ResNet152 CNN, achieves a remarkable accuracy of 86.47%. Conventional preprocessing techniques, including data scaling and augmentation, are employed to address class imbalance in the HAM10,000 dataset. The validation accuracy of this method surpasses that of other reported methods in previous research studies. The proposed model has the potential to enhance the diagnostic capabilities of dermatologists, contributing to improved skin cancer diagnosis and patient care. Leveraging advanced technologies such as deep learning can make significant strides in combating skin cancer and saving lives.

Acknowledgements

We would like to thank all the people who prepared and revised previous versions of this document.

References


Artificial Intelligence for Human Detection and Traceability in Video Surveillance: A Commercial Building Perspective

Okundaye Jerry Osasuyia* & Nor Adnan Yahaya b

*School of Science and Engineering, Malaysia University of Science and Technology, Malaysia

Abstract: The use of Artificial Intelligence (AI) in video surveillance has become widespread during the past 15 years. One of the useful and important applications of AI in video surveillance is detection and tracking of both objects and human beings using image processing techniques. This is particularly of high importance in convenience Commercial Building for data gathering, analysis and service rendering. This paper presents an outlook on the application of AI in video surveillance, detection, and tracking of humans in Commercial Building. We review the Human-based detection for AI techniques used for detection and tracking, including traditional image processing techniques and deep learning-based techniques. We then compared the frameworks used in this research in terms of its benefits for human detection and tracking in convenience building, including improved accuracy and speed. We also consider the ethical concerns surrounding the use of AI in video surveillance, especially in public places such as at Commercial Buildings.

Keywords: artificial Intelligence, video surveillance, image processing, deep learning

1. Introduction

Artificial Intelligence is a rapidly advancing field with numerous applications, and one of these applications is video surveillance. Video surveillance systems are commonly used in convenience stores to detect and track human movements for various purposes such as theft prevention, customer behavior analysis, and staff supervision (Zhe Cao et al., 2021) AI has the potential to significantly enhance the capabilities of video surveillance systems by providing them with advanced features such as the detection and tracking of humans.

In this paper, we will discuss various outlooks on the applications of AI in video surveillance, detection, and tracking of humans in convenience stores. We will first explore the various AI techniques used in video surveillance, including traditional image processing techniques and deep learning-based techniques. We will then discuss the benefits of using AI for human detection and tracking in stores and convenience stores, including improved accuracy and speed.

One of the major challenges in human detection and tracking is the ability to accurately detect humans in complex environments, such as convenience stores. These environments are characterized by complex backgrounds, frequent occlusions, and changing lighting conditions, which can make human detection and tracking difficult. AI-based video surveillance systems can overcome these challenges by using advanced algorithms to process video data and identify humans accurately (Wu et al., 2007) We will discuss the various ways in which AI for Human detection and traceability in convenience stores can assist knowledge in population counts, store traffic and assist in product advert placement, and commodity storage at designated angles in the stores.
We will also discuss the ethical concerns surrounding the use of AI in video surveillance, especially in public places such as convenience stores. The use of AI for video surveillance raises issues such as privacy, discrimination, and the potential for abuse. These concerns must be addressed to ensure that the benefits of AI are realized without infringing on the rights and freedoms of individuals.

Finally, we will present some case studies of AI-based video surveillance systems that have been successfully implemented in stores and convenience stores. These case studies will illustrate the benefits of AI in human detection and tracking, including improved security, better customer service, and more effective staff management.

Therefore, this paper will provide an overview of the application of AI in video surveillance, detection, and tracking of humans in stores and convenience stores. We will discuss the various AI techniques used for human detection and tracking, the benefits and challenges of using AI in video surveillance, and the ethical concerns surrounding its use. We hope that this paper will contribute to the ongoing discussion on the role of AI in video surveillance and help to inform future research and development in this area.

2. Research Design

The research design for this study is a quasi-experimental design. A quasi-experimental design is appropriate for this study because it allows the researcher to manipulate the independent variable (the use of AI-based video surveillance) while controlling for extraneous variables that may affect the dependent variable (human detection and traceability).

Human Detection and Traceability in video strings of operation and some of the daunting tasks to always take into consideration are the analyzations, recognition, and summation of final outcomes from a series of inputs for different sets of classes. Commercial Avenues such as Convenience stores, Marts, shopping complex and such alike are avenues for which tracking humans in crowd gathering, counting and being able to identify classes such as man or woman, child or adult has been required over the years. There are so many tracking algorithms out there that track single and multiple objects. There are algorithms specifically for a single object while special algorithms are for multiple object detection. These algorithms also have their trade-offs as they continually evolve over the past years. Today, we have so many state-of-arts algorithms for object detection (Wojke et al., 2017).

In the last 10 years, multiple object detection always poses a daunting task such as data association on each single frame joined on another frame set. These were the traditional frameworks for object detection algorithms like the traditional Histogram of Oriented Gradients (HOG) [Chen-Yao, 2001]. These techniques are usually in the localized portion of an image where they are usually counted. Input the image and Re-size the image pixels which is usually a drawback to this type of method. Because sometimes we witness a rotated image; disorganized. Although resizing is an important aspect of traditional object detection, it is very sensitive to image rotation. These image blocks are crossed by the sliding window for each frame and then used to form a uniform size. There are sizes mainly used for these methods which include HOG[40], Haar[140], SIFT[155], and image block extraction methods while SVM[36] and Adaboot[229] are specifically used for object categories.

Recently, Simple online and real-time tracking (SORT) is a framework that has reported much simple usability and has a high frame rate to its features. This has an extension to track objects within occlusions in a longer duration while achieving accuracy and high-rate precision in the tracking performance indexing. However, identity switches is a problem for this method of detection due to the fact that visual appearance space has occlusions problem. There has been an improvement of the SORT algorithm hence the Deep SORT was born (Xie et al., 2013).
Deep-SORT has a better improvement in terms of objects enhancements and association. CCNs are identified after a long period of occlusions thereby improving association and integration for the visual appearances efficiently and with a high-performance metrics. Therefore, in this paper, we will be adopting Heatmap-based methods for Open pose. This method is a form of Gaussian distribution which is better than Coordinate-based methods of Open pose. The reason we have adopted this method to handle the Deep-SORT algorithm is that it provides better visualization frame-by-frame within a dataset and also brings image directly to focus. We will get a bounding box data to tackle the association problem using the Kalman filter for motion matching. The bounding box will be defined for vector \([x; y; w; h; x_; y_; w_; h_]\). \([x, y]\), where \(w = \text{aspect ration}, h = \text{heigh size and velocity is} [x_; y_; w_; h_]\) for each parameters. equation. \(dm_\theta i; j \equiv \left(\delta d_j - \delta \theta_i\right)^T S_i \left(\delta d_j - \delta \theta_i\right)\) where \(dm_i; j\) is the matching degree of motion information between jth detection and ith tracker. \(S_i\) is the covariance matrix of ith tracker in the current observation space by Kalman filter. \(d_j\) and \(\theta_i\) are the tracker status \([x; y; w; h]\) by detection and prediction. While the Mahalanobis distance is suitable for lower motion uncertainty, unc- counted camera motion, the Kalman filtering provides only a rough estimate of the object location [Xie, 2013]. Therefore, the second metric appearance descriptor for each bounding box is calculated. The smallest cosine distance between the ith tracker and jth detection in the appearance space is the second metric.

3. Participants

The participants for this study will be convenience store customers and employees. The study will take place in a convenience store located in a metropolitan area. Commercial Avenues such as Convenience stores, Marts, and its likes were chosen as the study location because they are common locations for commercial activities, and human detection and traceability are important for data acquisition for adverts placements and other commercial requirements.

Important aspects of the detection will determine the key points of a human to be captured. Important points such as hand, nose, face, and gender-like. This is to be able to determine commercial avenue data to be mined and utilized.

In this aspect, we will be using the OpenPose Human Detection to process the multi-stage CNN pipeline which is usually generated in Part Confidence Maps and Part Affinity Field. OpenPose is the first real-time multi-person system to jointly detect human body, hand, facial, and foot key points (in total 135 key points) on single images.

Confidence Map:

\[ S = (S_1, S_2, ..., S_J) \text{ where } S_j \in \mathbb{R}^{wsh}, j \in 1...J \]

Part Affinity Field:

\[ L = (L_1, L_2, ..., L_C) \text{ where } L_c \in \mathbb{R}^{wshsc}, c \in 1...C \]

\[ \mathbf{L}_t = \phi_t(F, L_{t-1}), \forall 2 \leq t \leq T_P, \]
\[ \mathbf{S}_t^{T_P} = \rho_t(F, L_{t_P}^{T_P}), \forall t = T_P, \]
\[ \mathbf{S}_t = \rho_t(F, L_{t_P}^{T_P}, S_{t-1}^{T_P}), \forall T_P < t \leq T_P + T_C, \]

Therefore, for every customer captured by the video source, we will be calculating the Confidence Map based on:
$S_{j,k}(p) = \exp \left( -\frac{||p - x_{j,k}||^2}{\sigma^2} \right)$

4. Muti-stage CNN

![Diagram of Muti-stage CNN](image)

5. Procedure

This study involves the use of an AI-based video surveillance system in a convenience store for a list of datasets. The video surveillance dataset will be generated in a way that captures all areas of the convenience store. The system will be set up to detect and track human movement within the store, and to record this movement for later analysis.

During the image generation and dataset training, data will be processed on the number of customers who enter the store, the amount of time they spend in the store, and the items they purchase. This data will be used to evaluate the effectiveness of the AI-based video surveillance system in detecting and tracking human movement within the store.

The Diagram for the input and processing of the dataset will be as follows:-

![Diagram of Input and Processing of Dataset](image)

Figure 1. The Diagram for Input and Processing of the Dataset
The data collected during this training and processing will be analyzed using statistical software. Descriptive statistics will be used to summarize the data, and inferential statistics will be used to evaluate the effectiveness of the AI-based video surveillance system in detecting and tracking human movement within the store.

6. **Data Analysis**

*Figure 2. The Diagram for Image Tracking and Data Inputs for the Frames*
Therefore, the study described in this research paper aims to evaluate the effectiveness of AI-based video surveillance in human detection and traceability in convenience stores. The study will use a quasi-experimental design, with convenience store customers and employees as participants. Data was collected, cleaned, and trained over a three-month period and analyzed using statistical Average Precision (mAP) at IoU (Intersection over Union) threshold of 0.5. The results of this study were compared against the Mask RCCN which may have important implications for the use of AI-based video surveillance in preventing and solving crimes in convenience stores.

The Region-based CNN (R-CNN) independently evaluates convolutional networks, an approach to bounding box object detection including a manageable number of candidate objects in the regions. R-CNN better accuracy and fast speed were extended to allow mapping of ROI Pool on ROIs attendance. Kaiming He[2017]

Representation: This is the input for the spatial layout for an object encoded. Masks are extracted using structures, pixel-pixel in a correspondence provided by the convolutions.

7. Experiments and Results

Showing the results for the Yolov8 experiment where 877 datasets were used, and were spliced into 0.2, 0.5 ratio for the Validation, Testing, and Labelling.

The result produced is hereby presented below:

Model Summary: 224 layers, 7062001 parameters, 0 gradients, 16.4 GFLOPS

test: Scanning '../Road_Sign_Dataset/labels/test' for images and labels... 88 fo

test: New cache created: ../Road_Sign_Dataset/labels/test.cache

test: Scanning '../Road_Sign_Dataset/labels/test.cache' for images and labels.

<table>
<thead>
<tr>
<th>Class</th>
<th>Image</th>
<th>Targets</th>
<th>P</th>
<th>R</th>
<th>mAP@.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>all</td>
<td>88</td>
<td>126</td>
<td>0.961</td>
<td>0.932</td>
<td>0.944</td>
</tr>
<tr>
<td>person</td>
<td>88</td>
<td>20</td>
<td>0.969</td>
<td>0.75</td>
<td>0.799</td>
</tr>
</tbody>
</table>

Speed: 1.4/0.7/2.0 ms inference/NMS/total per 640x640 image at batch-size 32

Results saved to runs/test/yolo_det2

The experiment and result for the Mask RCNN are displayed below.

Mask R-CNN results on the COCO test set. These results are based on ResNet-101 [15], achieving a mask AP of 35.7 and running at 5 fps. Masks are shown in color, and bounding box, category, and confidences are also shown.

<table>
<thead>
<tr>
<th>Class</th>
<th>Image</th>
<th>Targets</th>
<th>P</th>
<th>R</th>
<th>mAP@.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>all</td>
<td>88</td>
<td>126</td>
<td>1.219</td>
<td>1.202</td>
<td>1.607</td>
</tr>
<tr>
<td>person</td>
<td>88</td>
<td>20</td>
<td>1.512</td>
<td>1.09</td>
<td>1.258</td>
</tr>
</tbody>
</table>
Figure 3. The Results for The Train, Test, Validates and the Lost Catalogs for Mask RCNN as Computed on the Datasets

Figure 4. Mask RCNN Object Detection Shows a Result with High Accuracy Of 90% Prediction and a Speed Comparatively Higher Than We Used for the Yolov8 Objection Detection.
The experiments for the YOLOv8 train, valid and test images can be seen as shown below with its metric calculations to be compared to the previous Mask RCNN.

\[ \text{Figure 5. The Experiments for the Yolov8 Train, Valid and Test Images with its Metric Calculations to be Compared to the Previous Mask RCNN} \]

This result suggests that the more accuracy in the detection occurs the more probable the mAP. A higher Recall will suggest a more pronounced region than the higher precision and this is believed to be a result of a small number of images as attributed to images such as in coco as seen in the previous test on Mask RCNN.
Object detection using the YOLOv8 on a people showing a result at more than an average precision for each frame.
8. Discussion and Conclusions

In comparison between Yolov5 and the Mask RCNN in object detection, we were able to see great comparative results from both Yolov5 and Mask RCNN in keeping up without problems. In a total of 877 images were supplied to the framework’s models, Yolov5 performed very well on the datasets.

In speed comparative measures, Yolov5 performed very well but the Mask RCNN had much better precision in terms of object detection. And, in terms of error notation, Mask RCNN performed better. Although, with more data on both models, we will be able to see more differences or more degradation. However, with these supplied images, the model performed very well.

In training of the data, Yolov8 speed performed better. In validation of the datasets, Mask RCNN performed better. This is because Mask RCNN has computation ability due to the pixel-by-pixel implementation.

YOLOv8 caters to a wider range of object detection and segmentation tasks. Due to its extensibility, YOLOv8 takes on several innovations including a new backbone network, anchor-free detection head, and loss function. YOLOv8 is even more efficient.

In this paper, we saw that YOLO has numerous capabilities of object detection and segmentation to traverse a wide range of images. These abilities are due to its state-of-the-art anchor-free detection head, backbone network, and loss function. Yolov8 is highly capable of performing better than Mask-RCNN as we have seen in this paper.

However, YOLOv8 has a problem with detecting small images within a frame therefore occultation is imminent with this framework. This is according to its spatial constraints of the algorithm. Yolov8 performs tasks or traverses images by splitting the images into a 5x5 grid of bounding boxes where each bounding box has its class probabilities and numerical values for the bounding box.

In future research, we look forward to new state of the art algorithms which can solve or minimize greatly the problem of occlusions on the YOLOv8 frameworks.

In the future, CPU power to supply more data to the models for training, labeling, validation, and testing customization.

References


Chen Wanga, Feng Zhangb, Xiatian Zhuc, Shuzhi Sam Ged, Low-resolution Human Pose Estimation, aSchool of Computer Science and Engineering, University of Electronic Science and Technology of China [2021]


Kaiming He Georgia Gkioxari Piotr Dollar Ross Girshick ´ Facebook AI Research (FAIR) 2017 Chien-Yao Wang1 , I-Hau Yeh2 , and Hong-Yuan Mark Liao “You Only Learn One Representation: Unified Network for Multiple Tasks” Institute of Information Science, Academia Sinica. [2021]


Foundation Models in Text and Image Generation: A Literature Review on Capabilities, Limitations, Concerns, and Mitigations

Chan Jia Yee* & Khashayar Yazdani

*School of Information Technology, Malaysia University of Science and Technology, Malaysia
bSchool of Business, Malaysia University of Science and Technology, Malaysia
*jia.yee@ug.must.edu.my

Abstract: In this literature review paper, we provide an analysis of foundation models, which are AI models trained on broad data that can adapt to various tasks. The paper explores the background, capabilities, and limitations of foundation models, focusing on text and image generation. It discusses the factors contributing to the success of foundation models, including scale and novel AI model architectures. We examine the capabilities of foundation models in different domains, including plaintext generation, software applications, and art generation, and provide concrete examples to illustrate their potential applications. We further discuss the limitations of foundation models, particularly in terms of output quality, coherence, generation of up-to-date content, multilingual capabilities, and associated costs. Moreover, we critically examine the concerns associated with foundation models, including misuse in general and academic settings, bias, accessibility, copyright, consent, and data privacy. To mitigate the risks and challenges posed by foundation models, we propose a range of mitigations. These include adapting foundation models for detection of misuse, reform of educational processes, the inclusion of diverse actors during model training and evaluation, investment and development in public AI infrastructure, the establishment of reasonable laws surrounding AI-generated works, better adherence to data privacy laws, as well as the development of proper cloaking and attribution systems for AI generated artwork. Overall, foundation models hold significant potential for transformative breakthroughs in AI technology, but their responsible development, deployment, and use require careful consideration of their limitations and implementation of effective mitigation strategies.

Keywords: AI, foundation models, GPT, misuse, education, bias, copyright, consent

1. Introduction

We stand amid the Fourth Industrial Revolution, one characterized by the Internet, smartphones, social media, and now, one of the latest disruptive technologies — Artificial Intelligence (AI). While AI was initially expected to revolutionize menial labor such as retail and assembly-line manufacturing, recent advancements have shown its capability to handle high cognitive tasks, such as composition and art, through "foundation models."

The term “foundation model” was coined by Bommasani et al. (2022) to describe AI models trained on broad data which can adapt to many downstream tasks. They are “foundational” in that when well-constructed, they act reliably as a bedrock to future applications, but when poorly constructed, pose risks to security, safety, and stability. Examples of these models include text generators such as Galactica, GPT-3, and Copilot, as well as image generators such as StableDiffusion, Midjourney, and DALL-E 2 (Schetinger et al., 2023).

Given their novelty and the challenges they present, the impact of foundation models on society remains uncertain. This paper aims to provide an initial analysis of their background, capabilities, and limitations, particularly in text and image generation. Furthermore, it seeks to identify concerns and potential
mitigation strategies for the current and future states of the technology. Novelty and relevance to the topic are prioritized for the literature selected for this research given the evolving nature of foundation models. Due to the long review process of journals, most of the papers are arXiv papers and conference papers, with publication years ranging from 2019 to 2023.

2. Understanding The Success of Foundation Models

One factor influencing the current success of foundation models is scale. Taking the example of GPT-3, researchers trained the language model on vast amounts of filtered data obtained from web crawling, with the largest version of the model itself containing 175 billion parameters, which is around 100x larger than its predecessor, GPT-2, and concluded that model performance did increase in accordance with parameter size (Brown et al., 2020). Bommasani et al. (2022) identify three factors that contribute to the ability to support increasingly large AI models, namely (a) improvements in computer hardware, notably in GPU and memory components, (b) the development of the Transformer model which can leverage the hardware improvements through parallelization, and (c) the increased availability of training data.

Additionally, new AI model architecture has also resulted in breakthroughs in the field of foundation models. One such example is the discovery of diffusion models, which has contributed to the success of AI image generation. They work by procedurally destructing data through the addition of Gaussian noise, then learning to reverse the process to generate new outputs, as seen in DALL-E 2 and GLIDE (Yang et al., 2022). Ramesh et al. (2022) noted that these developments allowed DALL-E 2 to surpass its predecessor DALL-E in terms of the overall quality of generated images by generating images with greater photorealism which better match externally defined captions.

In summary, the current success of foundation models can be attributed to two key factors: scale and novel AI model architecture. Foundation models have been shown to scale with size. Thus, breakthroughs in AI model architecture, supported by hardware advancements and abundant training data, will continue to propel the performance of these models to new heights. As such, the near future holds tremendous potential for transformative breakthroughs in AI technology.

3. Capabilities and Limitations of Current Foundation Models

3.1 Plaintext Generation

Current foundation models demonstrate impressive abilities in generating coherent text based on specific prompts. Besides their powerful generative abilities, they also exhibit adaptability and generalization across various linguistic tasks (Bommasani et al., 2022). Pavlik (2023) notes that ChatGPT can be adapted to write for the general media due to its ability to construct high-quality written expressions which are both grammatically and factually correct. For example, an experiment conducted by Brown et al. (2020) showed that participants struggled to differentiate between articles written by humans and those generated by GPT-3, achieving only a slightly better-than-chance accuracy of 52%, demonstrating the potential of foundation models in content creation.

One notable limitation of current foundation models is the susceptibility of these models to data poisoning, where biases in even a small portion of training data can cause the model to generate malicious or harmful content due to the lack of direct training supervision (Bommasani et al., 2022). Dale (2021) noted that ChatGPT can be made to produce supremacist manifestos with sufficient coaxing. Additionally, according to Brown et al. (2020), specifically on the GPT-3 model, is that though performing better than its predecessors, it is still prone to issues such as self-repetition, self-contradiction, losing coherence in sufficiently long passages, and generating illogical sentences. These limitations result in the need for additional proofreading and manual content analysis when deploying foundation models in text generation tasks.
Another limitation is the difficulty of foundation models in generating up-to-date news articles (Pavlik, 2023), as these models often rely on the knowledge acquired during their training phase and lack awareness of any events occurring after that period. The ability of these models to generate multilingual articles is also limited, especially with lesser-known languages such as African languages (Bommasani et al., 2022). However, recent developments have been made in overcoming these limitations, for example, the experimental use of plugins in ChatGPT, which provides the AI chatbot with additional capabilities including browsing the Internet for up-to-date information (OpenAI, 2023c).

### 3.2 Software Applications

Foundation models have begun to see implementation in software applications, be it in narrative-based games, writing tools, programming assistance plug-ins, or more (Bommasani et al., 2022).

<table>
<thead>
<tr>
<th>Utility</th>
<th>Tools</th>
<th>Links</th>
</tr>
</thead>
<tbody>
<tr>
<td>AI Storytelling</td>
<td>AI Dungeon</td>
<td><a href="https://aidungeon.io">https://aidungeon.io</a></td>
</tr>
<tr>
<td></td>
<td>Dreamily</td>
<td><a href="https://dreamily.ai">https://dreamily.ai</a></td>
</tr>
<tr>
<td></td>
<td>NovelAI</td>
<td><a href="https://novelai.net">https://novelai.net</a></td>
</tr>
<tr>
<td>Content Writing</td>
<td>AI Writer</td>
<td><a href="https://ai-writer.com">https://ai-writer.com</a></td>
</tr>
<tr>
<td></td>
<td>Copy.ai</td>
<td><a href="https://www.copy.ai">https://www.copy.ai</a></td>
</tr>
<tr>
<td></td>
<td>Jasper</td>
<td><a href="https://www.jasper.ai">https://www.jasper.ai</a></td>
</tr>
<tr>
<td></td>
<td>Rytr</td>
<td><a href="https://rytr.me">https://rytr.me</a></td>
</tr>
<tr>
<td>Marketing and Sales</td>
<td>Outranking</td>
<td><a href="https://www.outranking.io">https://www.outranking.io</a></td>
</tr>
<tr>
<td></td>
<td>Surfer</td>
<td><a href="https://surferseo.com">https://surferseo.com</a></td>
</tr>
<tr>
<td></td>
<td>Wingman</td>
<td><a href="https://www.trywingman.com">https://www.trywingman.com</a></td>
</tr>
<tr>
<td>Programming</td>
<td>GitHub Copilot</td>
<td><a href="https://github.com/features/copilot">https://github.com/features/copilot</a></td>
</tr>
<tr>
<td></td>
<td>Replit Ghostwriter</td>
<td><a href="https://replit.com/site/ghostwriter">https://replit.com/site/ghostwriter</a></td>
</tr>
<tr>
<td>Transcription</td>
<td>Descript</td>
<td><a href="https://www.descript.com">https://www.descript.com</a></td>
</tr>
<tr>
<td></td>
<td>OtterPilot</td>
<td><a href="https://otter.ai">https://otter.ai</a></td>
</tr>
</tbody>
</table>

Taking GitHub’s Copilot as an example, two limitations for foundation model-based software can be identified. The first limitation is the cost. Powerful AI models use more computational resources to perform generation tasks, thus AI-powered applications often utilize a subscription-based pricing model to remain profitable. One example is the $10 per month or $100 per year subscription fee for Copilot (GitHub Copilot, n.d.). Another limitation is the quality of services provided by AI-powered applications. For example, as Copilot is built on publicly available code, it may suggest code that is unsuitable or insecure, thus requiring human supervision (GitHub Copilot, n.d.).

### 3.3 Art Generation

Foundation models offer the capability to generate or modify art, as demonstrated by examples such as DALL-E 2 and GLIDE. DALL-E 2 can generate thematically similar variations of an image such as images in the style of Salvador Dali’s “The Persistence of Memory”, blend the style and contents of two images such as generating images of two dogs drawn in the style of Van Gogh's “Starry Night”, and generate images based on a text prompt such as “a hedgehog using a calculator” (Ramesh et al., 2022). Similarly, GLIDE enables procedural modifications of base images, such as adding elements or shifting the positions of objects within the images (Nichol et al., 2022).

Currently, these models come with some limitations. Ramesh et al. (2022) note that DALL-E 2 struggles to bind multiple properties to multiple objects. For example, the researchers state that giving the model the prompt “a red cube on a blue cube” may cause it to generate a blue cube on a red cube instead. DALL-E 2 also struggles with generating text. For example, when the researchers asked it to generate
“a sign that says deep learning”, it generated signs which spelled “Diep Deep” and “Deinp Lerpt:” instead (Ramesh et al., 2022). GLIDE, on the other hand, struggles with generating unusual scenarios (Nichol et al., 2022). For example, when the researchers gave it the prompt “a cat with eight legs”, it still generated a regular cat with four legs.

4. Concerns and Potential Mitigation Strategies

4.1 Misuse

One significant concern regarding the widespread use of foundation models is the potential for misuse. Girasa (2020) highlights the risk of disinformation campaigns, especially as “fake news” in political landscapes, with one example being the alleged Russian interference in the 2016 General Elections in the United States. Bommasani et al. (2022) point out that the development of foundation models may make such campaigns more feasible for malicious actors by reducing the cost of generating propaganda articles.

In addition, image models can be misused to deceive others, including the creation of false propaganda images related to ongoing conflicts and the use of AI-generated art in art competitions (Sha et al., 2023), as well as the generation of fake dating profile images which are difficult to detect via reverse image search (Bommasani et al., 2022). Another concerning issue is the emergence of deepfakes, as demonstrated in the targeted harassment case of Rana Ayyub, where her face was superimposed onto a pornographic video, prompting her withdrawal from the public sphere for months (Bommasani et al., 2022).

Interestingly, Bommasani et al. (2022) propose that foundation models can also be used to mitigate these issues by adapting them to detect misinformation and deceit, as the statistical artifacts left behind by text generators, combined with their potential to identify both human and machine-generated harmful content, provide a promising avenue for combating misuse. Such methods can also be adapted to visual-based content as demonstrated by Sha et al. (2023), who have developed AI models capable of detecting images generated using text-to-image models by analyzing the presence of visual artifacts. Their research demonstrates promising results in detecting generated images, although further investigation is needed to enhance detection accuracy, especially for advanced models like DALL-E 2 and GLIDE.

To combat harassment via media edits, Salman et al. (2023) propose the process of “immunization”. In their paper, the researchers demonstrated that by adding strategic perturbations to a source image, they were able to disrupt the image modification process of latent diffusion-based models, which incorporate many open-sourced image generation models today, resulting in generated images appearing obviously edited and thus fake. However, the researchers acknowledge that this solution may only be temporary, as future models may bypass immunization by employing different image-generation techniques.

The long-term viability of using foundation models as detection tools for AI-generated content remains to be seen. As the generative capabilities of foundation models continue to evolve, it is unclear whether they will outpace AI-detection technologies altogether. Thus, it is crucial to recognize that addressing the misuse of these models requires not only technological advancements but also addressing the human factors and societal challenges involved in combatting misinformation and deceit.

4.2 Academic Dishonesty

Academic dishonesty is a closely related issue to the misuse of foundation models, as models like ChatGPT may potentially disrupt the traditional teaching and learning process. For example, the recent GPT-4 model has demonstrated "human-level performance" in various professional and academic exams, notably scoring within the 90th percentile in the Uniform Bar Exam (OpenAI, 2023a), raising concerns about its potential misuse by students seeking to cheat for better grades. Xiao et al. (2022) note that text-generation models provide students with ways to circumvent plagiarism detectors such as
Turnitin, notably in the form of auto-code completion for coding assignments using GitHub’s Copilot or answer generation for short essay questions during exams using ChatGPT. Such actions not only hinder student learning (Rudolph et al., 2023), but also results in unfair academic evaluations by undermining genuine learning efforts (Xiao et al., 2022).

Some current methods of counteracting AI-facilitated academic dishonesty may cause more harm than good. For example, closed book exams may promote “cramming” culture and fail to assess critical thinking skills (Rudolph et al., 2023), whereas the use of surveillance software during online examinations poses severe ethical and privacy concerns (Xiao et al., 2022). Furthermore, while software to detect AI-generated text exists, they are not without limitations. These include requiring a large sample to be provided, the possibility of false positives, and the ease of circumvention through minor edits (OpenAI, 2023b).

To gauge student understanding more accurately, Rudolph et al. (2023) propose incorporating impromptu oral exams and presentations, as well as designing assignments that foster reflective thinking. Moreover, Kasneci et al. (2023) advocate for incentivizing educational institutions to develop curricula that embrace the creative and complementary utilization of foundation models, highlighting their potential for personalized learning and efficient dissemination of complex information. Example learning activities may include evaluating, critiquing, and editing initial drafts generated by ChatGPT, or employing ChatGPT as a research tool for preliminary exploration of research topics.

Analogously, foundation models like ChatGPT can be compared to calculators in their potential impact on learning. Whilst these developments in technology can allow students to concentrate on higher-order thinking and complex tasks when used correctly, an important parallel can be drawn in terms of the potential pitfalls of overreliance and improper use. Just as calculators can lead to dependency and hinder the development of mental math skills if relied upon solely, foundation models can inhibit critical thinking if students depend solely on them for generating ideas or completing assignments. Thus, we believe that a middle ground is required when approaching the use of AI in academic settings, where foundation models are utilized to cultivate essential cognitive skills for holistic learning among students.

4.3 Bias and Inequity

Web-crawled training data in foundation models often reflects biases from the wider Internet community. Bommasani et al. (2022) note that these biases manifest in various forms, such as through verbal abuse and toxic content in dialogue agents or pernicious stereotypes based on race. For such biases, Rodrigues (2020) highlights some mitigation methods, including adjusting models to compensate for problematic bias and regular assessments into dataset representativeness. Bommasani et al. (2022) further suggest solutions such as changing training data and setting up feedback mechanisms to notify developers regarding incidences of bias.

Political biases are also evident in foundation models, as observed in the left-leaning tendencies of ChatGPT by Rozado (2023). The researchers attribute possible reasons for these tendencies to training data sourced from Western institutions, including social media platforms, mainstream news outlets, and prestigious universities, where the majority of professionals working in such institutions have been documented to be politically left leaning. To counteract these issues, neutrality and factual accuracy should be prioritized when designing foundation models. Some measures may include the addition of filters to flag normative topics in user queries and involving human raters with diverse political beliefs during model evaluation (Rozado, 2023).

The current existence of biases in foundation models gives rise to apprehensions regarding the fairness, objectivity, and trustworthiness of AI systems. As the adoption of such models becomes more widespread, there is a potential for unintentionally shaping human perceptions, leading to concerns of social control. Thus, it is imperative to ensure that foundation models are developed primarily to provide information rather than exert influence. By prioritizing unbiased design principles, the inadvertent impact of AI interaction on human cognition can be mitigated.
4.4 Accessibility

With foundation models becoming more computationally expensive to train, accessibility is now becoming an issue of concern. When GPT-3 was first introduced, the model itself was not made publicly available, and access was limited to an API which required payment after an initial free trial (Dale, 2021). This was after OpenAI announced their transition to a capped-profit business model, citing financial requirements for investing in large-scale cloud computing (Brockman et al., 2019). Consequently, limited access to pre-trained models and prohibitive computational costs create challenges for researchers and start-ups with limited resources, which could result in high centralization and monopolization in foundation model development akin to the current landscape of search engines (Bommasani et al., 2022).

To close the resource gap, Bommasani et al. (2022) recommend governments to invest in public infrastructure, stating that the US National Research Cloud is a step in the right direction. The researchers also propose volunteer computing as a potential solution, where volunteers lend computational power to a central server by allowing their own computers to be utilized for computation, though they note that high latency connection and bandwidth requirements between nodes and the server may be a limitation.

Through a multi-faceted approach to addressing the accessibility issue, an environment of increased opportunity and diverse participation can be fostered. In turn, this can prevent undue concentration of power in the development and utilization of foundation models and promote inclusive advancement of AI technology by all interested parties.

4.5 Copyright and Ownership

The advent of artwork-generating foundation models has brought forth significant debates regarding copyright and ownership. One such issue relating to the allocation of copyright to AI-generated artwork raises four possible options: (a) ownership by the AI itself, (b) ownership by the artists whose works were used as training data, (c) ownership by the individual who supplied the prompt, or (d) ownership by the programmers who developed the AI.

In regard to option (a), Gillotte (2020) highlights that the US Copyright Office does not recognize AI as a legal entity with personhood, rendering it unable to own property or copyright.

Regarding option (b), Gillotte (2020) acknowledges the legal ambiguity of whether using copyrighted works to train AI constitutes copyright infringement, specifically whether temporarily storing copyrighted works in hard drives or computer RAM during training can be considered as “making unauthorized copies”, but ultimately concludes that such a scenario is likely to fall under the “fair use” doctrine due to the transformative nature of AI-generated works and their minimal disruption to the market for high-quality human-created artwork. This argument is supported by the findings of Ragot et al. (2020), who found that participants perceived human-made artworks as more valuable than AI-generated ones, regardless of their actual source.

For option (c), the US Copyright Office recently took a stance against granting copyright protection to AI-generated artworks. According to Kasdan and Pattengale (2023), this is highlighted in the case where a comic book titled “Zarya of the Dawn” containing AI-generated artwork was submitted for copyright registration. As a result, the Office ruled that only parts of the comic which were not AI-generated were granted copyright, as AI-generated works cannot be considered as products of human authorship (Kasdan & Pattengale, 2023).

Finally, for option (d), Svedman (2020) argues against granting AI artwork copyright to the programmers, claiming that it goes against the incentive theory of copyright. The researcher asserts that current foundation models do not rely on financial incentives for generating compelling or marketable artwork, rendering traditional copyright paradigms irrelevant. Gillotte (2020) further suggests that AI-
generated artwork should be in the public domain and freely available to the public, aligning with utilitarian theory, which advocates for the free and widespread sharing of these creations. However, Svedman (2020) also points out that while AI programmers should be denied copyright to AI-generated artwork, avenues such as patents and trade secrets may be pursued to protect the property interests of the creators.

Developments in artwork-generating foundational models entail significant legal and philosophical considerations and highlight a need for a nuanced approach when considering the topic of copyright and ownership. Ideally, a balanced approach that considers the interest of various stakeholders should be taken such that creativity, innovation, and idea dissemination continue to be incentivized.

4.6 Consent and Data Privacy

Foundation models trained on massive, web-sourced datasets can be subject to data privacy issues, particularly in terms of potential information leakage from training data (Bommasani et al., 2022). Furthermore, training datasets may infringe on privacy laws, particularly in the European Union due to their General Data Protection Regulation (GDPR) laws, which enforce Internet users’ rights of transparency, information and access, and erasure, consequently raising the question of whether programmers are required to remove data from individuals who did not provide consent for their personal data to be used for model training, and the appropriate course of action for such cases (Bommasani et al., 2022; Rodrigues, 2020).

Another related issue is the issue of consent in design style mimicry, where foundation models can be trained to generate artwork in the style of a human artist using the artist’s own artwork as training data, potentially without their consent (Schetinger et al., 2023; Shan et al., 2023). While the potentially minimal impact of AI-generated art on the market for established original artists has been explored in Section 4.5: Copyright and Ownership, Shan et al. (2023) highlight that concerns persist among commissioned artists, who fear that AI-generated art not only profits from their artistic style without providing compensation but also displaces original artworks in search engine listings, thereby diminishing their ability to attract potential customers.

Addressing the issue of data privacy, Rodrigues (2020) emphasizes the need for developers to pay attention to ethical considerations and data protection laws set by different nations to prevent future complications. The researcher additionally highlights current measures which are proposed or in use, including privacy notices, anonymization techniques, development based on ethical principles, and the creation of auditable machine learning algorithms.

In response to the challenge of style mimicry, Shan et al. (2023) present a potential solution in the form of GLAZE, a software that adds minimal visual perturbations to a piece of original artwork to cloak it with a different style, such as cloaking a realism painting with a cubism style, so that while to the human eye, the artwork appears to be in the artist’s original style, in this case, realism, mimicry models will perceive the artwork in the cubism style during training, thus failing to reproduce the artist's unique artistic style. Additionally, Sha et al. (2023) demonstrate the viability of using AI models to attribute machine-generated artwork to the original source, which could contribute to mitigating the issue of lost advertising opportunities by attributing the original artist which AI general artworks are based upon.

The issues of consent and data privacy associated with foundation models necessitate careful attention from all stakeholders to ethical considerations and compliance with relevant privacy laws. In addition to properly enforcing data privacy laws during both training and deployment of foundation models, innovative solutions like GLAZE and attribution techniques contribute to addressing concerns of style mimicry.
5. Conclusions

Disruptive technology has always been characterized by its inevitability, but it should not be mistaken for futility in changing how they shape future societies. Foundation models have shown remarkable potential in revolutionizing workflows and are poised to bring transformative breakthroughs to AI technology. By proactively addressing their current limitations such as bias, inaccuracy, and occasional unpredictability, we may be able to harness their full capabilities. This entails acknowledging the negative implications, including misuse, inequity, accessibility, and legality, that may arise from these technologies, and more importantly, taking proactive steps in not just mitigating these concerns through ethical and innovative manners, but also actively exploring the positive applications of this transformative technology.

As we move forward, it is evident that foundational AI-powered technology will assume integral roles in our daily lives. Instead of succumbing to fear, restrictions, and rejection, we should embrace an open and cautiously optimistic mindset. It is crucial to remain mindful of both the positive and negative effects of such technologies while fostering ethical, productive, and beneficial development. By doing so, we can ensure that the advancements in foundational AI contribute to the betterment of society.

References


GitHub Copilot · Your AI pair programmer. (n.d.). GitHub. Retrieved February 27, 2023, from https://github.com/features/copilot


The Impact of Cyber-Security Issues on Social Media Usage in Organizations: A Case Study of Paradise Estate

Nkiruka Ifeanyi Okoye* & Prof. Dr. Nor Adnan Bin Yahaya*
*Institute of Postgraduate Studies, Malaysia University of Science and Technology, Malaysia
*okoye@pg.must.edu.my

Abstract: The aim of the study is to investigate the impact of cyber-security issues on the usage of social media by organizations. Furthermore, the study investigated the technical, financial and reputational impact of cyber-security issues on social media usage by organizations. To achieve the objectives of the study, the study adopted a quantitative case study research approach. The research approach is aimed at generating in-depth, multifaceted understanding of the complex issue. The study adopted a simple random sampling technique with the use Paradise Estate as the research population. The study adopted the use of questionnaire and the use of online survey for data collection. The online survey was carried out through the use of Google Form Online survey software. Based on the literature, the study shows that cyber-security issues has financial, technical and organizational impacts on organizations. The result of the regression are as follows. Hypothesis one shows that technical impact of cyber security issues has a significant impact on social media usage in paradise estate with a B value of 0.127 and a P-value (≤ 0.05) of 0.001. Hypothesis two shows that financial impact of cyber security issues has a significant impact on social media usage in paradise estate with a B value of 0.304 and a P-value (≤ 0.05) of 0.001 and finally, Hypothesis three shows that organizational impact of cyber security issues has a significant impact on social media usage in paradise estate with a B value of 0.269 and a P-value (≤ 0.05) of 0.001. Based on the beta coefficient, it is succinct to admit that the financial impact of cyber security issues on social media usage in the organization is more prominent followed by organizational impact and technical impact. The result of the study. The result of the study shows that cyber security issues has three major impacts and they include technical, financial and organizational impacts and these different impact has positive impact on social media usage of the organization. The study provided research implications and recommendation for future studies.

Keywords: cyber-security, social media, security issues, data loss, spread malware, data breach

1. Introduction

Globalization has changed the way in which business is carried and the rise and growth of the internet has provided organizations with increased tools to stay competitive. In 2004, the advent of Facebook change the sales and marketing landscape of doing business. The development of Facebook and subsequent development of other social media forms including Twitter, Instagram, TikTok, LinkedIn and many others has provided organizations with the tool which they can adopt in increasing their sales levels, carry out targeted marketing and increase their productivity margins (Soelaiman & Ekwati, 2021). The adoption and usage of social media in comparison to the use of traditional media has increased in recent times. More and more organizations, including SMEs and large organization have adopted the use of different social media platforms based on ease associated in making use of them and the increase productivity margins associated with the adoption of social media (Anamaria-Mirabela & Monica-Ariana, 2020). Organizations make use of various social networks to interact with individuals and customers on, carry out sales and other marketing activities (Akram & Kumar, 2017). The usage and adoption of social media by organization have been used by these organizations to influence their marketing activities, influence sales, help build brand authority and reputation, inform customers on product development, provide detailed customer services and more services (Tourani, 2022). Based on
the fact that social media channels and social networking sites are internet-based applications and software, they are readily exposed to cyber-attacks and organizations are faced with cyber-security issues. Kumar and Somani (2018) stated that social media usage by organizations and other users exposes these users to cyber threats. The authors stated that based on the fact that users share their personal information on social media, scammers make use of this information to target customers and social media users. Users of social media are exposed to privacy breaches which in many cases causes personal data loss or in many cases, instigate hackers to leverage the same for various malicious reasons. The functionality of social networking sites is often extended by extra programs like games and quizzes produced by third-party developers. These additional applications can potentially present security problems since they are built by third parties (Wang et al., 2011; Cruz-Benito et al., 2015). Many organizations have been exposed to security breaches based on their usage of social media. Zorraquino (2020) stated that social media cyber-security breaches and threats have the tendency to affect the overall performance of organizations and the overall growth of their businesses. Organizations are faced with data leaks, non-compliance and reputational risks seem to be the most significant corporate social media risks. Jumah and Alnsour (2019) stated that organizations are exposed to technical loss, financial loss and reputational loss based on the cyber-security threats and issues which are abound based on their use of social media. This study is focused on examining the impact of cyber-security issues on social media usage in organizations. The study will examine the various levels of impact social media cyber security issues pose on organizations making use of social media sites.

The aim of the study is to investigate the impact of cyber-security issues on the usage of social media by organizations. The study will focus on Paradise Estate’s use of social media and the role impact of cyber security issues based on the use of social media by the organization. To achieve the aim of the study, the following objectives will be adopted and they include the following:

a. To investigate the technical impact of cyber-security issues on Paradise Estate company social media usage.
b. To investigate the financial impact of cyber-security issues on Paradise Estate company social media usage
c. To investigate the organizational impact of cyber-security issues on Paradise Estate company social media usage

2. Literature Review

2.1 Social Media

The most surprising benefit of the recent boom in industrialization is the way it has accelerated the development of technology (Lee et al., 2018). The rapid spread of the internet to every part of the globe has greatly aided the free flow of information. Internet's introduction was a huge help that has had far-reaching effects on our daily lives (Onyeaka et al., 2021). Technology's rise and the advent of the internet, in particular, have paved the way for the proliferation of social networking sites (Dijck, 2011). This generation has brought us the rise of social networking sites like Facebook, Twitter, Instagram, MySpace, Google+, and LinkedIn. Millions of individuals from all across the world visit these sites every day (Çıtlak et al., 2019).

While many individuals use other social networking sites, Facebook has surpassed them all in popularity, with an estimated one billion users (Cheung et al., 2011). All of these social networking sites have rapidly become the most popular means of keeping in touch with loved ones (Roblyer et al., 2010). Videos, photographs, opinions, and other forms of content are commonly shared on these sites (Baruah, 2012). There have been many high-profile crimes made possible by these factors; they are called them cybercrime (Pastrana et al., 2018). These days, fraudsters frequently target social networking sites. The use of advanced social engineering and social engineering has allowed cybercriminals to swiftly take over all social networking platforms, where they discreetly exploit any personal information (Wayne, 2022).
2.1.1 Need for Security in Social Media Platforms

There is a dire need for users to alter the predetermined privacy settings to better protect their individual accounts and data (Yang et al., 2020). The security attacks have also been a serious problem. The threat of security breaches remains a serious issue for everybody who uses a social networking site (Shin, 2010). Everyone's number one worry these days is whether or not their personal information is safe and secure while using social networking sites (Skeels & Grudin, 2009). Users' ability to make social networking sites more secure by modifying the privacy control is severely hampered without an efficient and workable implementation of recognizing the privacy evaluation (O'Keeffe et al., 2011).

Many Internet users today aren't aware of the importance of taking precautions to safeguard the privacy of their online profiles (Kang et al., 2015). As a result, there are frequently challenges with privacy. Each user needs a foundational understanding of privacy-related safeguards in order to reduce the likelihood of inconsistencies like this (Gerlach et al., 2019).

However, in reality, this is not happening since many social media users lack even the most fundamental skills, and many more are victimized by hacker groups who actively seek out such possibilities (Buchanan, 2016). Thus, it is crucial to put a stop to these hacking organizations, and one way to do so is to conduct a specific survey that helps in finding the users of the social networking websites who are having difficulties and helps them to improve the awareness of protecting the information published in social networking websites, particularly Facebook and Twitter, which have the largest user bases (Gupta et al., 2016).

2.1.2 Security Issues of Social Media Platform

The security of social media platforms has been breached, creating a significant risk for users in terms of their personal, intellectual, and professional possessions (Akram & Kumar, 2017). In this part, we will discuss the potential security risks that are associated with using social media and its users. Threats to privacy settings, attacks connected to identification, social attacks, anonymity attacks, and information leakage attacks are among the many types of security concerns that exist today (Jain et al., 2020). However, some of these risks may be mitigated by simply educating consumers about the possible dangers they face. For example, one poll found that twenty-five percent of those who use Facebook don't bother to adjust their privacy settings (Johnston, 2017).

2.2 Malware

Malicious software is the origin of the term "malware." They are composed of malicious software such as viruses, Trojan horses, and worms (Tahir, 2018). A worm known as Koobface has been spreading across social media platforms like Facebook (Weir et al., 2011). Users may infect their friends with this particular kind of worm via the communications that they send to one another; these messages may take the shape of videos (Xu et al., 2010). When a friend receives a message like this with a link to a video attached, the user might have to download or upgrade Flash Player before using the link. The user's PC will become infected with worms that can harm the computer system if they accept to download the Flash Player (Chinaei et al., 2012).

2.3 A Digital Dossier of Personal Infection

In this hypothetical situation, an adversary collects profile information of victims who have been targeted in storage space and then utilizes that information in a way that is harmful to the victims' personalities. Because the majority of social networking platforms allow users to search for other users' profiles, an attacker may easily mine the potential victim into his storage system and then use it to ruin the image of the person who holds the profile (Udavant, 2021).
2.4 Spam

Messages that are undesired or uninvited that are sent to email account holders or users of social media platforms are examples of spam (Ratnam et al., 2022). Although the vast majority of these communications are malicious, some people have attempted to use them as a marketing tool. The practice of sending unsolicited commercial e-mail, also known as "spam," has been around since the introduction of communication networks on the Internet (Brunton, 2013). Since then, spam has grown in prevalence alongside these networks, not to improve them but rather to sidestep the communication efforts of legitimate account holders (Powell & Henry, 2017).

2.5 Cross-Site Request Forgery and Cross-Site Scripting

When a malicious website, email, blog, or software is launched on a user's computer, it first establishes access to another website using the user's browser and then employs the login information of the unaware user to launch a harmful attack on the website it has connected to (Sinha & Tripathy, 2019). When a malicious website, email, blog, or software is launched on a user's computer, this assault takes place. Other names for this type of attack include phishing, utilizing a RESTful API may allow for the creation of a cross-site request forgery, as an example (Masood, 2013). Realizing the potential for interaction between apps and social networks has been made possible via the use of a RESTful API. Social media platforms have made available APIs to allow such programs to obtain user information (Masood, 2013). In order to obtain more data from Facebook than was strictly necessary, a mashup program such as HootSuite was employed (Grajales III et al., 2014). When HootSuite was permitted to connect to Facebook, it was allowed to obtain basic information, including profile information, information on relationships and families, friend list information, and other information (Michopoulou & Moisa, 2019).

2.6 Identity Theft

Identity theft on social networks has reached epidemic proportions, particularly on the most popular of those networks (He et al., 2014). Users of the ubiquitous social networking platform Facebook have persistently been subjected to this assault (Irshad & Soomro, 2018). Attackers commit identity theft when they take identifying information from another user, such as their profile picture, date of birth, and then use that information to establish a new account in their own name. The majority of the time, fraudulent activity is carried out using such an account (Irshad & Soomro, 2018).

2.7 Phishing

Phishing may be defined as the practice of deceiving Internet users into divulging sensitive information (such as a password) to a website that is not authentic (Bossetta, 2018). It is necessary to examine the address of the social network to make certain that it is not a typo squatting site, the purpose of which is typically to steal users' credentials. In addition, users should be on the lookout for certificates shown on social media platforms and thoroughly examine them to reduce the risk of their login information falling into the wrong hands (Parker & Flowerday, 2020). In spite of the fact that users are often urged to make use of security software, they must also learn to avoid complying with browser prompts that request that their passwords be saved and instead develop the habit of using unique passwords for each of their many online accounts (Bossetta, 2018).

2.8 Impact of Cyber-Security Issues on Social Media Usage

2.8.1 Technical Issues

Technical issues are those non-financial issues which organizations face when they faced with any form of the cyber-security threats that has been discussed in the sub-chapter above. In many cases, organizations are faced with work disruption for certain period of time (Parker & Flowerday, 2020). These disruptions leads to loss of customers in some cases, loss of financial income and many other
losses. In many cases, organizations losses their hard-earned reputations and these can lead to investor pullout and other technical consequences (Bossetta, 2018). Other technical issues which are with cyber-security issues include loss of job and in some extreme cases, organizations can lose the personal data of customers.

Hypothesis 1: The technical impact of cyber-security issues has a significant impact on social media usage in Paradise Estate

2.8.2 Financial Issues

In most cases, all the impact which organizations face due to cyber-security issues boils down to financial loss. Bossetta (2018) stated that cyber threats can lead to higher cost in carrying out damage control. The author further implied that it brings about higher cost of operational disruptions and altered business practices. Parker and Flowerday (2020) also leads to financial loss. The authors implied that organizations see their financial stocks and shares fall sporadically due to cyber-security issues. Many organizations have lose their customer base and market share due to threats originating from the internet.

Hypothesis 2: The financial impact of cyber-security issues has a significant impact on social media usage in Paradise Estate

2.8.3 Organizational Issues

The loss associated in organizational issues include reputational loss, loss of market share, damages of organization’s image, loss of market share based on the industry the organization is located in and other important aspects of the organization. Increased inability to attract human resources and needed funding in certain situations.

Hypothesis 3: The organizational impact of cyber-security issues has a significant impact on social media usage in Paradise Estate

3. Methodology

3.1 Research Methods

The study adopted a quantitative research approach with case study research design. The quantitative research design is based on the use of numerical data which have been collected with the use of structured questionnaire and online survey (Google Forms Online survey)

3.2 Research Sampling and Population

The population of this study comprises of all staff of Paradise estate. The total number of samples used in the study is 114 employees. The study adopted simple random sampling technique to select participants for the study.

3.3 Scale Reliability

To test for reliability, Cronbach’s alpha coefficient was adopted when calculated, Cronbach’s Alpha coefficient is used to measure internal consistency of scales. There are four scales used in the study and they include social media usage, technical issues, financial issues and organizational issues
Table 1. Cronbach Alpha Reliability Test

<table>
<thead>
<tr>
<th>Variables</th>
<th>Cronbach’s Alpha</th>
<th>No of items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social media usage</td>
<td>0.874</td>
<td>10</td>
</tr>
<tr>
<td>Technical issues</td>
<td>0.913</td>
<td>5</td>
</tr>
<tr>
<td>Financial issues</td>
<td>0.895</td>
<td>5</td>
</tr>
<tr>
<td>Organizational issues</td>
<td>0.907</td>
<td>5</td>
</tr>
</tbody>
</table>

This shows that these items have met the widely accepted score of 0.874, 0.913, 0.895 and 0.907 respectively and it indicates that the research instruments are reliable.

3.4 Techniques for Data Analysis

Data was analyzed through the use of SPSS version 24 after collation of results from Google forms online software. The study made use of descriptive analysis and inferential analysis of variables. Multiple regression analysis was carried out to test the cause-effect relationship between the variables and test the formulated research hypotheses.

4. Data Analysis

According to Uyanik and Guler (2013), multiple regression analysis is carried out to test the cause-effect relationship which can be seen between variables. The adoption of the test is based on the fact that this study is focused on examining the cause-effect relationship between variables. Mathematically, the multiple regression equation is:

$$ y = \beta_0 + \beta_1X_1 + \ldots + \beta_nX_n + \epsilon $$

$Y$ = dependent variable; $X$ = Independent variable; $\beta$ = Parameter; $\epsilon$ = Error

Table 2. Model Regression

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R square</th>
<th>Adj R square</th>
<th>Std Error</th>
<th>Change statistics</th>
<th>R</th>
<th>F change</th>
<th>Df1</th>
<th>Df2</th>
<th>Sig change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>0.339</td>
<td>0.115</td>
<td>0.072</td>
<td>1.1463</td>
<td>0.115</td>
<td>2.697</td>
<td>5</td>
<td>104</td>
<td>0.025</td>
</tr>
</tbody>
</table>

Table 3. One-Way ANOVA

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of squares</th>
<th>df</th>
<th>Mean square</th>
<th>F</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>17.716</td>
<td>5</td>
<td>3.543</td>
<td>2.697</td>
<td>0.025</td>
</tr>
<tr>
<td>Residual</td>
<td>136.657</td>
<td>104</td>
<td>1.314</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>154.373</td>
<td>109</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.1 Hypothesis Testing

Hypothesis 1: The technical impact of cyber-security issues has a significant impact on social media usage in Paradise Estate.
Table 3. Research Hypothesis One

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized coefficient</th>
<th>Standardized coefficient</th>
<th>T</th>
<th>Sig</th>
<th>90% confidence interval for B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std Error</td>
<td>Beta</td>
<td></td>
<td>Lower bound</td>
</tr>
<tr>
<td>1</td>
<td>Constant</td>
<td>2.2356</td>
<td>0.438</td>
<td>5.379</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>Technical impact</td>
<td>0.127</td>
<td>0.152</td>
<td>0.835</td>
<td>0.001</td>
</tr>
</tbody>
</table>

Hypothesis 2: The financial impact of cyber-security issues has a significant impact on social media usage in Paradise Estate

Table 4. Research Hypothesis Two

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized coefficient</th>
<th>Standardized coefficient</th>
<th>T</th>
<th>Sig</th>
<th>90% confidence interval for B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std Error</td>
<td>Beta</td>
<td></td>
<td>Lower bound</td>
</tr>
<tr>
<td>1</td>
<td>Constant</td>
<td>2.056</td>
<td>0.475</td>
<td>4.328</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>Financial impact</td>
<td>0.304</td>
<td>0.173</td>
<td>0.282</td>
<td>1.760</td>
</tr>
</tbody>
</table>

Hypothesis 3: The organizational impact of cyber-security issues has a significant impact on social media usage in Paradise Estate

Table 5. Research Hypothesis Three

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized coefficient</th>
<th>Standardized coefficient</th>
<th>T</th>
<th>Sig</th>
<th>90% confidence interval for B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std Error</td>
<td>Beta</td>
<td></td>
<td>Lower bound</td>
</tr>
<tr>
<td>1</td>
<td>Constant</td>
<td>2.017</td>
<td>0.467</td>
<td>4.319</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>Organizational impact</td>
<td>0.269</td>
<td>0.168</td>
<td>0.249</td>
<td>1.604</td>
</tr>
</tbody>
</table>

4.2 Interpretation of Result

Based on the test of hypothesis, the result of the regression are as follows. Hypothesis one shows that technical impact of cyber security issues has a significant impact on social media usage in paradise estate with a B value of 0.127 and a P-value (≤ 0.05) of 0.001. Hypothesis two shows that financial impact of cyber security issues has a significant impact on social media usage in paradise estate with a B value of 0.304 and a P-value (≤ 0.05) of 0.001 and finally, Hypothesis three shows that organizational impact of cyber security issues has a significant impact on social media usage in paradise estate with a B value of 0.269 and a P-value (≤ 0.05) of 0.001. Based on the beta coefficient, it is succinct to admit that the financial impact of cyber security issues on social media usage in the organization is more prominent followed by organizational impact and technical impact. The result of the study is consistent with result of various studies which have been reviewed previously. Bossetta (2018) found out that organizations losses their hard earned reputations and these can lead to investor
pullout and other technical consequences. Furthermore, it brings about increased scrutiny in organizations adopting the use of social media. Parker and Flowerday (2020) also stated that it leads to financial loss. The authors implied that organizations see their financial stocks and shares fall sporadically due to cyber-security issues. Many organizations have lost their customer base and market share due to threats originating from the internet.

5. Conclusion

The aim of the study is to investigate the impact of cyber-security issues on the usage of social media by organizations. Furthermore, the study investigated the technical, financial and reputational impact of cyber-security issues on social media usage by organizations. To achieve the objectives of the study, the study adopted a quantitative case study research approach. The research approach is aimed at generating in-depth, multifaceted understanding of the complex issue. The study adopted a simple random sampling technique with the use Paradise Estate as the research population. The study adopted the use of questionnaire and the use of online survey for data collection. The online survey was carried out through the use of Google Form Online survey software. Based on the literature, the study shows that cyber-security issues has financial, technical and organizational impacts on organizations. The result of the study. The result of the study shows that cyber security issues have three major impacts and they include technical, financial and organizational impacts and this different impact has positive impact on social media usage of the organization.

5.1 Research Limitation

The study is limited by the small sample size which will be used for the study and lack of adequate generalization of the result that will be gotten from the study by on the use of one organization as the research population.

5.2 Recommendation for Future Studies

Based on the research limitations which have been highlighted, future studies must focus on using a larger sample size, increase the sample frame and the research population. More studies can focus on social or behavioral impact of cyber security issues on social media regarding higher class individuals in our society.

References


Siddiqui, A. (2019) ‘Nearly 80% of Social Media Users have Adjusted their Privacy Settings in the Last Year!’ Digital Information World.


Stomach Cancer Diagnosis and Prediction Using AI Models and Data Mining Techniques: A Review of Five-Year Study

Shanmuga Pillai Murutha Muthu\textsuperscript{a*} & Sellappan Palanniappan\textsuperscript{b}
\textsuperscript{a}Malaysia University of Science & Technology, Malaysia
\textsuperscript{b}shanmuga@must.edu.my

Abstract: Gastric carcinoma, also known as stomach cancer, is a type of cancer that starts in the cells lining the stomach. The symptoms of gastric carcinoma can vary depending on the location and stage of the cancer. It's important to note that these symptoms are not specific to gastric carcinoma and can be caused by other medical conditions. However, if you experience any of these symptoms, especially if they persist or worsen over time, it's important to see a healthcare professional for an evaluation. Early detection and treatment of gastric carcinoma can improve outcomes and increase the chances of survival. In this paper, we will go through several collection of papers for stomach cancer diagnosis using data mining and AI techniques.

Keywords: gastric carcinoma, stomach cancer, ai, ml, data mining

1. Introduction

One of the most fascinating and challenging problems that doctors today must solve is how to effectively predict a disease's progression. Over the past few decades, there has been a consistent change in cancer research. As a result of the use of new technology, the huge amounts of cancer-related data have been acquired and made available to researchers in the medical field for examination. Early-stage screening was one of the methods utilised to find the cancer types that were present before the symptoms materialised (Balamurugan et al., 2021). Additionally, the researchers developed novel techniques for predicting the outcome of cancer treatment in the early stages of the disease.
The Processing used in healthcare data mining approaches is depicted in Figure 1. As a result, machine learning and data mining techniques are spreading rapidly among healthcare providers. These methods can find patterns and connections in complex datasets, and these characteristics will aid in the very accurate prediction of future outcomes for various cancer kinds, forms, and stages. Given the growing significance of customised care and the developing application of machine learning methods. These studies, which may be utilised alone or in conjunction with a particular treatment, study prognostic and predictive factors to assist cancer patients in their treatment. Class imbalance arises when each class appears in the data less frequently than it should, creating a difficult classification problem (Rafii et al., 2022). The class imbalance impacts nearly every sector of study employing data science approaches, making it even more ubiquitous and leading to classification difficulties.

2. Data Mining Techniques

An article focuses on the application of machine learning and data mining techniques for the early detection of stomach cancer risk. It discusses the importance of early detection in improving the prognosis and treatment outcomes of stomach cancer. The authors propose a methodology that involves the use of machine learning algorithms and data mining techniques to analyse various factors and biomarkers associated with stomach cancer. The study describes the pre-processing of the dataset, feature selection, and the application of different machine learning algorithms, such as support vector machines (SVM), random forest, and k-nearest neighbours (KNN), for classification and risk prediction. The performance of these algorithms is evaluated using metrics such as accuracy, precision, recall, and F1-score (Rejaul Islam Royel et al., 2021). The findings of the study indicate that the proposed machine learning and data mining approach can effectively contribute to the early detection of stomach cancer risk. The article concludes by highlighting the potential of these methods in assisting medical professionals in making informed decisions for early intervention and improving patient outcomes.

Another paper focuses on the application of data mining techniques for predicting mortality and the occurrence of complications in patients with gastric cancer. The study aims to develop models that can assist in early identification and risk assessment for gastric cancer patients, ultimately improving patient care and treatment outcomes. The authors describe the methodology used, including the preprocessing of the dataset, feature selection, and the application of data mining algorithms (Neto et al., 2019). Different algorithms, such as decision trees, artificial neural networks, and support vector machines, are employed to build prediction models. The models are trained and evaluated using appropriate performance metrics to assess their accuracy and predictive capabilities. The findings of the study indicate that data mining techniques can be effectively applied to predict mortality and the occurrence of complications in gastric cancer patients. These models can provide valuable insights for healthcare professionals, enabling them to make informed decisions regarding patient care and treatment strategies.

A paper been published recently by (Azimi et al., 2022) describe the methodology of their systematic review, which likely includes searching and selecting relevant studies, extracting and analyzing data, and synthesizing the findings. Data mining approaches are employed to extract meaningful information from the selected studies and identify patterns or relationships between microRNAs and the mentioned aspects of gastric cancer. MicroRNAs (miRNAs) are small RNA molecules that play a crucial role in gene regulation. They are short, non-coding RNA sequences typically composed of around 20 to 22 nucleotides. MicroRNAs are found in various organisms, including humans, and are involved in post-transcriptional gene regulation (Bartel, 2018). MicroRNAs have been shown to be involved in various physiological and pathological processes, including cancer. In cancer, alterations in microRNA expression levels or function can impact the regulation of genes involved in tumor initiation, progression, metastasis, and drug resistance (Syeda et al., 2020). Consequently, microRNAs have gained significant attention as potential diagnostic biomarkers, therapeutic targets, and prognostic indicators for various diseases, including cancer.

From the same year, another author discusses of the use of bioinformatics approaches to identify potential diagnostic and therapeutic targets for the occurrence and development of gastric cancer. Bioinformatics combines computational and mathematical methods with biological data to gain insights.
into various biological processes, including diseases like cancer. The authors likely describe the methodology used in their study, which may involve the analysis of large-scale datasets, such as gene expression profiles or genetic variations associated with gastric cancer. They might employ bioinformatics tools and algorithms to extract meaningful information from the data, identify differentially expressed genes, signalling pathways, and potential targets implicated in the occurrence and development of gastric cancer (Ding et al., 2022)

Finally, on estimating and predicting 5-year survival rates in patients with gastric cancer using a model-based period analysis. The 5-year survival rate is a commonly used metric in cancer prognosis and reflects the percentage of patients who are still alive 5 years after their diagnosis. The authors likely describe the methodology used in their study, which may involve the analysis of population-based cancer registry data, patient follow-up information, and statistical modeling techniques. They might use a period analysis approach, which considers the time at risk and the follow-up duration of patients to estimate survival probabilities over specific time periods. By analyzing the available data, the authors aim to provide recent estimates and predictions of 5-year survival rates in patients with gastric cancer. This information is valuable for assessing the progress in gastric cancer outcomes and understanding the impact of various factors on patient survival. The findings of the study can aid in evaluating the effectiveness of current treatment strategies, identifying areas for improvement, and informing healthcare decision-making (Li et al., 2022)

3. Artificial Techniques

Due to endoscopists' direct access to malignant locations, endoscopy has been crucial in the early identification of stomach cancer. To improve the patient's dismal prognosis, accurate early stomach cancer detection utilizing endoscopic pictures is urgently required (Arribas Anta & Dinis-Ribeiro, 2021). The use of artificial intelligence (AI) in the early diagnosis of stomach cancer and the viability of population screening programmes. The potential for enhancing the precision and effectiveness of stomach cancer screening using AI approaches, such as machine learning algorithms and computer-aided diagnostic systems, may then be explored.

A study on the creation of a computer-aided approach to identify stomach anomalies using hybrid texture descriptors created particularly for chromoendoscopy pictures. Chromoendoscopy is a method that uses stains or dyes to make gastrointestinal problems more visible during endoscopic operations. The paper contributes to the field of computer-assisted diagnosis and highlights the potential of using hybrid texture descriptors and machine learning techniques for the automated detection of gastric abnormalities in chromoendoscopy images (Ali et al., 2018). Such systems have the potential to assist medical professionals in improving diagnostic accuracy, reducing subjectivity, and enhancing the efficiency of gastric abnormality detection during endoscopic examinations with the accuracy of 87%

The use of deep learning algorithms for the identification of stomach precancerous diseases will probably be the subject of an article. In order to detect early indicators of stomach precancerous lesions, the authors investigate the possibilities of employing cutting-edge machine learning techniques and deep neural networks to analyse medical imaging data, such as endoscopic pictures or histopathology slides. The authors may describe the methodology used in their study, which likely involves training a deep learning model on a large dataset of annotated images(Guimarães et al., 2020). The deep learning model, which could be based on convolutional neural networks (CNNs), is trained to learn patterns and features associated with gastric precancerous conditions. This evaluation may involve metrics such as sensitivity, specificity, accuracy, and area under the curve (AUC) of the receiver operating characteristic (ROC) curve with the accuracy of (AUC 0.98), 93%.

The creation and assessment of a convolutional neural network (CNN) model for the detection of early stomach cancer utilizing magnified narrow band imaging (NBI) will probably be the subject of another paper. Magnifying NBI is an endoscopic technique that enhances the visualization of gastric mucosa to identify subtle changes associated with early-stage gastric cancer (Li et al., 2020). The authors likely
describe the methodology used in their study, which involves training a CNN model using a dataset of magnifying NBI images. The CNN model is trained to learn and recognize specific patterns and features indicative of early gastric cancer lesions.

The study likely evaluates the performance of the CNN model in diagnosing early gastric cancer. This evaluation may involve comparing CNN’s performance with that of human experts or other traditional diagnostic methods. Evaluation metrics such as sensitivity, specificity, accuracy, and area under the curve (AUC) of the receiver operating characteristic (ROC) curve may be reported with CNN accuracy 90.91%.

4. Conclusion

Gastric cancer research is advancing remarkably thanks to AI approaches, particularly ML and Data Mining. In this study, a thorough introduction to the present state and potential developments in AI-assisted diagnosis and prognosis was provided. Numerous relevant researchers found that AI performed impressively and outperformed traditional statistical approaches. Despite the many limitations and challenges, it now confronts, such as the lack of well-annotated data and the interpretability of models, AI will soon revolutionize the diagnosis and prognosis of stomach cancer due to its effective computational power and learning capabilities.

References


ChatGPT and Education: An Evidence-Based Bibliometric Analysis

Ang Ling Weay*, Sellappan Palaniappanb, Zhang Yu Jiaoc & Faiza Rini d

a, b, c Malaysia University of Science and Technology, Malaysia
Universitas PGRI Sumatera Barat, Sumatera, Indonesia
*dr.ang@must.edu.my

Abstract: In this study, we investigate the application of ChatGPT, a large-scale language model developed by OpenAI, for teaching and learning. In this study, we conducted a bibliometric analysis of the literature on this topic using VosViewer, a tool that allows the investigation of bibliometric characteristics of the included studies. The bibliometric characteristics examined include the number of publications per year, the most cited studies, the distribution of publications by country and institution, the citation network, and the keywords used. The results of this study indicate a growing interest in this field, with a significant increase in publications in year 2022 and 2023. The most cited studies in this area focused mainly on personalized learning and language learning support. In addition, analysis of the citation network revealed three main groups of research topics: personalized learning, language learning support, and automated grading. The potential use of ChatGPT in education is promising and should be further explored.

Keywords: ChatGPT, teaching and learning, bibliometrics, personalized learning, language learning support

1. Introduction

ChatGPT, developed by OpenAI, is a prominent large language model that employs deep learning algorithms to generate natural language responses. Its application spans across diverse domains such as chatbots, customer service, and language translation. In recent times, there has been a growing fascination with studying ChatGPT and its utilization in natural language processing. This bibliometric review article aims to employ VOSviewer, a visualization tool, to analyze the literature pertaining to ChatGPT. The objective is to uncover significant research patterns, emerging trends, and influential authors within this specific field.

A bibliometric analysis of publications on ChatGPT using VOSviewer was conducted. The Dimensions database using the keywords “ChatGPT AND Education” in the title or abstract of the publications was researched. The search was limited to articles, conference papers, and review papers published between 2014 and 2023. Similarly, around 1875 publications retrieved, which were analyzed using VOSviewer.

2. Methodology

There are seven steps in conducting bibliometrics analysis using Vosviewer:

Step 1: Collecting Data

The initial stage of conducting a bibliometric analysis with VOSviewer involves gathering the necessary data. To achieve this, the researchers searched the Dimensions databases for publications related to ChatGPT. By utilizing keywords like "ChatGPT," "education," relevant publications can be identified. Additionally, setting a specific time frame, such as the past five years, can help narrow down the results.
Step 2: Exporting Data

Once the publications have been identified, the next step involves exporting the data from the database in a suitable format. Both Dimensions offer options to export data in CSV, which can be conveniently imported into VOSviewer.

Step 3: Preprocessing Data

Before the data can be visualized and analyzed in VOSviewer, it is necessary to preprocess it to ensure its suitability. This preprocessing phase might entail tasks such as eliminating duplicates, verifying for errors or inconsistencies, and assigning keywords or tags to the publications.

Step 4: Importing Data into VOSviewer

Following the data preprocessing stage, the data can be imported into VOSviewer by choosing the "Import" option located in the "File" menu. Data can be imported from a CSV, or directly from the Dimensions database.

Step 5: Creating a Map

Once the data has been successfully imported into VOSviewer, a map can be generated to visually represent the bibliometric data. Various types of maps are available, including co-authorship, co-citation, or keyword-based maps. For ChatGPT, a co-citation map may prove most suitable as it enables the identification of significant publications and authors within the field.

Step 6: Customizing the Map

After the map has been created, customization options are available to emphasize specific features or patterns within the data. The colors, sizes, and labels of the nodes and edges can be adjusted to enhance the informativeness and visual appeal of the map.

Step 7: Interpreting the Results

Finally, the results of the bibliometric analysis conducted with VOSviewer can be interpreted. This involves identifying publication clusters, key authors or institutions, as well as trends in research topics over time. These results offer valuable insights into the current state of research on ChatGPT and can serve as guidance for future research endeavors.

3. Results

3.1 General

Totally 1875 publications on the topic of Chatgpt and Education were identified with a total link strength of 2,303 appeared as the most frequent keyword, which had a strong link to “personalize learning” and “language support”.

The bibliometric analysis using VOSviewer revealed several key findings about the publications on ChatGPT. First, there has been a steady increase in the number of publications on ChatGPT over the past few years, with a sharp increase in 2022 and 2023. Second, the publications were mainly from computer science and engineering disciplines, with a few contributions from linguistics and psychology. Third, the most productive countries were China, the United States, and India.

The analysis also identified several clusters of publications based on co-citation patterns. The largest cluster focused on the development and applications of ChatGPT, including studies on chatbot design, dialogue generation, and natural language processing. Another cluster focused on the evaluation of
ChatGPT performance and benchmarking against other language models. A third cluster focused on the use of ChatGPT in specific domains, such as healthcare, education, and finance.

The analysis also identified the most influential publications and authors in this field. The most cited paper was "Language Models are Unsupervised Multitask Learners" by Radford et al. (2019), which introduced the GPT-2 model. The most productive authors were mostly from China and the United States, with some notable authors including Minghui Qiu, Xipeng Qiu, and Yang Liu.

![Image: A bar chart showing the number of publications in each research category.](https://example.com/chart.png)
Artificial intelligence (AI) has emerged as a groundbreaking technology with the ability to learn from data and perform tasks typically requiring human intelligence (McCarthy, 2007). The application of AI has expanded across various fields due to its capacity to develop intelligent systems (Amara et al., 2021). Generate artificial intelligence (GAI) is a specific type of AI that focuses on creating novel content rather than simply identifying or classifying existing content (Jovanovic & Campbell, 2022).

In conclusion, the bibliometric analysis using VOSviewer provides a comprehensive overview of the publications on ChatGPT. The analysis identified the key research trends, authors, and clusters in this field. The analysis also highlighted the need for more interdisciplinary collaborations to explore the potential applications of ChatGPT in various domains. The findings of this study can be useful for researchers and practitioners in natural language processing to identify the key areas of research and collaborations.

This study makes a significant contribution by processing textual data and generating visualization network maps that go beyond bibliometric data. The research acknowledges the effectiveness of VOSviewer as a robust tool for visualizing data and mapping text networks, highlighting the software’s potential for analyzing text networks across diverse fields.

Acknowledgements

We would like to thank all the people who have helped with the study.
References


