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Get Ahead using Future-Proof Supply Chain Technology

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Preface

The 5th International Conference on Digital Innovation – Supply Chain (ICDI- SC 2022) aimed at presenting current research and innovative ideas.

This conference aims to provide a platform for experts, researchers, enterprises, and lecturers who are eager to share knowledge in the capacity of Digital Innovation - Supply Chain. Simultaneously, this conference provides opportunities for the delegates to exchange new ideas and gain experiences physically, to establish business or research relations and to find global partners for future collaboration. It also serves to foster communication among researchers and practitioners working in a wide variety of academic areas with a common interest in improving science, innovation, and management-related techniques.

The 5th International Conference on Digital Innovation – Supply Chain (ICDI- SC2022) is jointly organized by Nguyen-Thanh Tat University (NTTU), Vietnam and Malaysia University of Science and Technology (MUST), Malaysia with a mutual aim to work together towards strengthening educational advantages to educate and nurture professional growths among experts, researchers, enterprises, and lecturers.

The conference focuses on the following areas:

- Crisis management in logistics and supply chain during and post COVID-19;
- Innovative logistics and supply chain solutions leveraging on Artificial Intelligence and 5G;
- Coping with rapid disruption in global logistics systems;
- Breakthroughs in international supply chain management;
- Sustainable supply chain; and
- Impact of Industry 4.0 on supply chain and its benefit.

The conference also focuses on emergent issues related to the evolutionary trajectories in the following clusters:

- Management, marketing, international business, and e-commerce;
- Corporate governance, accounting, and finance;
- Transportation and logistics; and
- Information technology and telecommunication.

With the gathering of some of the brightest brain in supply chain from all over the world, this conference undoubtedly shed some light to both the industry as well as academia.

Ms. Nguyen Mai Lan
Honourable Chairwoman
Nguyen Tat Thanh University

Nguyen Tat Thanh University embraces the mission to train highly qualified human resources that are locally and internationally competent, with solid entrepreneurial knowledge and skills and spirit of innovation, through training, applied research, technology transfer, and community services based on its strategic alliance with the enterprises and research institutes meeting the local and international standards, demands, and the strict requirement of the Industry 4.0. Driven by the direction of high-quality workforce provision and research orientation towards the everchanging challenges all over the world, we are fully aware of the unpredictable and pressing scenarios influencing the international economic integration and the higher education development, especially in such the unforeseeable epidemic as Covid-19 pandemic. One of the urgent solutions to these challenges is to deal with the congestion of commercial cooperation and the activities of regional and international goods export and import, drawing the renovation and innovation in logistics and supply chains system around the world into great attention. Given that, an international conference on Digital Innovation - Supply Chain (ICDI-SC2022) to be taken place at Nguyen Tat Thanh University where experts, researchers, enterprises, and lecturers share their expertise, research results, analysis, forecasts, and best practices in this industry will be considered as amongst significant contributors to the normalization of the post Covid-19 global economies, providing the universal readiness for the world's uncertainty and unpredictability.



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**SUPPLY CHAIN,
TRANSPORTATION,
&
LOGISTICS**

Smart Logistics Implementation Status Among Malaysian Logistics Companies

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Abstract: Globally, all industrial sectors have been digitalized because of the Industrial 4.0 revolution's use of smart technologies. Similarly, this digital change has ushered the logistics Industry to a new era of Smart Logistics. The year 2018 Logistics Performance Index results indicate that Malaysia is already losing its competitiveness against Indonesia, Thailand, and Vietnam. Malaysia's weakness is seen in term of political instability and rising businesses costs relative to Vietnam, Cambodia, and Myanmar, inefficient seaports, and a lack of labour and talent. Given that the country's digital infrastructure and network readiness is a strength therefore utilizing Industry 4.0 technologies can be an opportunity and a game-changer for Malaysia to regain its competitiveness in the region. The purpose of this study is to explore the current state of Malaysia logistics firms in implementing the Smart Logistics or nine pillars of Industry 4.0 in their business. The data for this study was gathered using quantitative method and analyzed using survey method and Statistical Package for the Social Sciences (SPSS). The findings indicates that Malaysia logistics organizations have recognized the benefits of Smart Technologies however the current level of acceptance in Malaysia is quite low, Accordingly, the study contributes to theoretical knowledge and has practical implications for organizations, managers and governments concerned with the adoption of Smart Logistics.

Keywords: Industry 4.0, logistics industry, Smart Industry 4.0, smart logistics

1. Introduction

The world is currently undergoing the 4th Industrial Revolution (Industry 4.0), which will drastically change how we work (Patrucco et al., 2020). Many people perceive these shifts as heralding a new age of growth, progress, and opportunity. The consequences for manufacturing organizations are captivating, and governments should reconsider how the manufacturing industry and its related industries operate and contribute to economic growth. Nations are putting more emphasis on creating sophisticated manufacturing capabilities and facilitating the support industries by introducing new policies.

In the year 2016, Professor Klaus Schwab, Founder and Executive Chairman of the World Economic Forum (WEF), referred to the Fourth Industrial Revolution as how technologies like artificial intelligence, autonomous vehicles, and the internet of things are merging with humans' physical lives. Think of voice-activated assistants, facial ID recognition, or digital health-care sensors. He argued that the Fourth Industrial Revolution has the potential to raise global income levels and improve the quality of life for populations around the world. (Schwab, 2016). According to Michael et al. (2015), Industry 4.0 entails the development and dissemination of new computerised mechanical innovations. Particularly embedded sensors, that enable smart products and gadgets to communicate and connect (the Internet of Things, or IoT); the accumulation and continuous assessment of data to improve the cost and nature of creation (Big Data Analysis, or BDA); robots with increased independence and flexibility; and propelled fabrication (Three-Dimensional Printing, or 3D printing). Additionally, Industry 4.0 digitises and integrates processes vertically and horizontally across an organisation's supply chain, beginning with the product design stage, material procurement, manufacturing, logistics, and end-user service. The corporation will become more adaptive, dynamic, agile, and responsive, generating an exceptional amount of value across the business ecosystem (Bahrin et al., 2016).

Malaysia's logistics industry has expanded significantly. Companies across the country are making preparations to capitalise on the growing popularity of online shopping. The transport and storage sector

accounted for 3.8% of GDP in 2019, with a gross value added of MYR 57.2 billion. In 2019, the sector employed 667 600 people, accounting for approximately 4.4% of the employed population (OECD, 2021). In the past, Malaysia's strategic location made it one of the most important logistics hubs in the region. All the country's major cities and economic hubs are linked by thirty highways, five international airports, and seven international seaports. In addition to its location other favourable characteristics include the availability of assets and incentives, a modern infrastructure, a lower cost of doing business, a vast regional market, and digital readiness was favourable for foreign investors. However, the year 2018 LPI results indicate that Malaysia is already losing its competitiveness against Thailand and Vietnam, and Indonesia will soon surpass Malaysia in terms of overall performance (OECD, 2021).

Malaysia dropped 15 places to 41st out of 160 in the 2018 World Bank Logistics Performance Index (LPI). This is a drop from its previous rankings of 24th in 2014 and 32nd in 2016, when it was the second-best performing ASEAN nation behind Singapore (Makmur et al., 2018). Singapore is now ranked seventh in the 2018 LPI, followed by Thailand at 32 and Vietnam at 39. Given that the country's digital infrastructure and networks readiness is a strength therefore utilizing Industry 4.0 technologies can be an opportunity and a game-changer for Malaysia to regain its competitiveness in the region. In addition to that according to the Solidiance survey, Malaysia's logistics industry has the greatest expectations for Industry 4.0's influence. Regrettably, the industry comes last in terms of present and future preparedness or adoption of new technologies. Therefore, this study aims to explore the current state of Malaysia logistics firms in implementing Smart Logistics or nine pillars of Industry 4.0 in their business.

2. Literature Review

In this section, background for Industry 4.0 and Smart Logistics are provided. It also has a thorough knowledge of the terminology and the nine pillars of Industry 4.0. Furthermore, the principles and particular ideas of Industry 4.0 that are applied throughout the globe were given.

2.1 Industry 4.0

The term "Industry 4.0" was first coined by the German government, and it was officially introduced at the Hannover Fair in April 2011 (Kinzel, 2016). The German Federal Ministry of Education and Research defines Industry 4.0 as “the flexibility that exists in value-creating networks is increased by the application of Cyber-Physical Production Systems (CPPS)”. This enables machines and plants to adapt their behavior to orders and operating conditions through self-optimization and reconfiguration. The focus is on the ability of the systems to perceive information, derive findings from it, change their behavior, and store knowledge gained from experience. Intelligent production systems and processes, as well as suitable engineering methods and tools, will be a key factor in implementing distributed and interconnected production facilities in future smart factories. According to Chouha et al. (2017) and Michael et al. (2015), the evolution in industrial products associated with Industry 4.0 are driven by nine pillars of disruptive innovation and technological advancement is known as:

- a. Big Data Analytics
- b. Internet of Things
- c. Horizontal and Vertical Systems Integration
- d. Simulation
- e. Cybersecurity
- f. The Cloud
- g. Additive Manufacturing
- h. Augmented Reality
- i. Autonomous Robots

These nine components of Industry 4.0 envision increased operational productivity via the collaboration of machines and people through digitized or automated decisions and continuous activity (Sandner et al., 2020). Industry 4.0 will enable the collection and analysis of data across completed machines,

allowing more efficient, adaptable, and useful techniques for producing higher-quality goods and services at reduced prices (Choi et al., 2021). Industry 4.0 predicts increased operational efficiency in linked settings of cooperating people, machines, and services (Gua et al., 2021; Schuh et al., 2015) via the automation of decision-making and real-time action. Industry 4.0 will enable the collection and examination of data crosswise across equipment, enabling faster, more flexible, and more productive processes to generate higher-quality goods at a reduced cost. Thus, it will increase manufacturing efficiency, induce an economic shift, foster industrial growth, and alter the demographic composition of the workforce, thus altering the intensity of organizations and regions (Michael et al., 2015).

2.2 *Smart Logistics*

Recently, "Smart Logistics" has been gaining popularity and evolving (Ding et al., 2021; Tang, 2020). According to Kauf (2019), smart logistics refers to the application of new intelligent technologies, defined as those integrated into intelligent computer support systems, that enable the complete automation of activities. Additionally, Ding et al. (2021) define Smart Logistics as a collection of logistics operations, such as transportation, warehousing, and customer service, that are more intelligently planned, managed, and controlled than conventional solutions.

Smart logistics is an efficient method to address the problems of rapidly changing customer expectations, capitalize on new technology opportunities, and enable new business models. The internet of things (IoT) plays a significant role in business, from automating warehouses to tracking couriers and parcels. Many time-consuming logistics procedures are being continuously automated through artificial intelligence (AI) enabled platforms and solutions to begin automating formerly manual jobs. Drone regulations and use are expected to be relaxed, promoting not only last-mile delivery but also robotic applications for the business.

2.3 *Impact of Smart Logistics*

The ground-breaking of Smart Logistics is the utilization of Cyber-Physical Systems that screen and control the physical procedures with feedback circles where physical processes influence computations and the other way around. This CPS uses Radio-Frequency Identification (RFID) technology with a specific end goal of recognizing, detecting, and finding things, and sending the information to a computer that can gather and examine this significant data. This system can speak with different systems or with people using the internet as a means of communications, so information can be shared continuously, and procedures can be coordinated (Hermann et al., 2016).

In recent years, mobile robots are creating meaning to new extents and the value of robots in many areas have been recognized. Semi-or fully self-directed mobile robots assist humans with loading, unloading, sorting, picking, transportation, storage, delivery, and audits. The utilization of an automated mobile platform such as a drone, driverless car, or autonomous truck will benefit and improve the efficiency of logistics tasks, such as collection and distribution (Calderon & Asadollah, 2015). Another new way of optimizing processes is emerging for the company: IoT. The business opportunities with IoT are proliferating. The Internet of Things (IoT) phenomenon is expected to usher in 25 billion devices by the year 2020.

Many multinational companies in the logistics industry have implemented the essentials of Industry 4.0 in their processes and production. Table 1 shows the organisations that have used Industry 4.0 technology in their business and also the benefits enjoyed by them. Most companies have experienced drastic increases in their production, enhanced visibility across the organisation, and also real-time tracking right from raw material to final consumption. The power of real-time information availability together with real-time analytics associated with the internet of things can be a game-changer in the logistics industry.

Table 1. *Organisations that have used Industry 4.0 Technology and its Benefits*

Organization	Technology Used	Benefits
Port of Hamburg	Connected cameras, heat sensors, and alarm systems	Sensors identify underutilised capacity so it can be used effectively. They prevent theft and inform security upgrades.
DHL's SmartSensor	RFID/Smart sensor	This sensor monitors temperature, humidity, shock, and light to assure transportation integrity.
Nissan	Automation, robots, and machine learning	It's greatly improved manufacturing efficiency.
Postybell42	Proximity sensors	A sensor detects mail delivery and alerts the recipient's phone. The sensor monitor the mailbox's dampness to determine if it was dropped off at a post office.
Maersk Line	Remote Container Management System	It provides real-time information and increases port employee safety by requiring less human examination of containers supply, via satellite.
Volvo	Cloud-based services and IoT technologies	It's utilised to order parts from other nations to transport autos to global vendors. These services offer more flexibility than on-premise installations.
Decathlon	Track and trace with IoT elements	It is using IoT technologies, such as RFID from Checkpoint Systems, in over 400 stores and expects to tag millions of products with RFID globally.
Amazon	Wi-Fi connected Kiva Systems	Sensors and machine intelligence help prioritise Amazon Prime orders. Humans can package orders or refill shelves during this time.

2.4 *Smart Logistics in Malaysia*

Over the past few years, Malaysia's logistics industry has seen significant growth. Companies around the country are making moves to take advantage of the growing popularity of online shopping. Because of the high margins and increasing demand, more and more businesses are beginning to take an interest in developing markets. Some examples of these developing markets are cold chain logistics and last-mile delivery services. The expansion of the country's economy is anticipated to range between 5 and 6 percent, which will contribute significantly to the expansion of the logistics industry.

There is room for improvement in the logistics sector, and with the sector's growth expected to be positive in the future, there is room for improvement. Several improvements are required to allow the logistics sector to manage higher volumes of freight, reduce the time it takes to transfer goods across supply chains, and lower the cost of this delivery. While the country's logistics infrastructure is improving, there is still a need for ongoing infrastructure investment in areas such as port upgrades and expansion, road networks, and advanced information technology (IT) systems. Solidiance, an Asia-focused corporate strategy consulting firm published a white paper called "Is Malaysia Ready for Industry 4.0?" and conducted a screening of over 200 companies across selected industries in Malaysia on the expected effects of Industry 4.0, focusing on three sectors: manufacturing, logistics, and healthcare. Out of these three sectors, the logistics sector shows the highest scores for the expected impact of Industry 4.0. The logistics industry gives itself the lowest score in terms of current and future readiness among the three focus sectors. The sector expects significant requirements coming from this to have to serve faster and cheaper processes, yet also sees an opportunity in being able to operate better.

3. Methodology

This study employs a combination of descriptive and explanatory methodologies. This type of study is referred to as a descriptor-explanatory. The researcher's objective was to characterize the current condition of Malaysian logistics firms' implementation of smart logistics and then to explain the relationship between Smart Logistics. The units of analysis are individuals who work in the Malaysian logistics industry. The country Malaysia was chosen as the study location. The target population of the research is the individuals that work in logistics firms. The logistics firms were identified by getting a population frame from the Malaysian Logistics Directory. According to the Department of Statistics Malaysia (DOSM, 2019), it is estimated that around 437,926 people are engaged in the transportation and storage service sector. The questionnaires were distributed to individuals working in the logistics service sector. In this study, judgmental or purposive sampling was used as the sample members were chosen only based on the researcher's knowledge and judgment. The researchers select the samples based merely on the researcher's knowledge and credibility. Based on Daniel (1999), for sample size calculation, a minimum sample size of 186 will be required for this study. This study used the quantitative method as well as questionnaire surveys.

4. Results

In this study, there were 199 (75%) male respondents, 61 (23%) female respondents, and 9 (3%) other category respondents. The percentage shows that the male respondents are much higher than the female respondents. It is indirectly supported because the logistics industry is male dominated. In this study, over one-third of the respondents are from the age group 21–30 years, with 102 respondents (38.2%), followed by the age group of 31–40 years, with 64 respondents representing 24.34% of the study. Almost the same proportion of respondents representing the age group 41–50 years had 72 respondents (26.97%). Respondents from the age group of 51–60 comprised 7.87%, which is 21 respondents. One of the most important qualities that may influence people's attitudes toward smart technologies is their educational or academic status. People's responses are likely to be influenced by their educational and/or academic background. Hence, the variable "academic level" was investigated. In this study, most respondents held a bachelor's degree, with 107 respondents (40.07%). This is followed by a diploma holder, comprised of 73 respondents (27.72%), and a master's degree with 67 respondents (25.09%). This shows most of the respondents are degree holders. The designation of the respondents shows a mixed figure. The study was mainly taken part by higher-level position respondents with 32 (11.99%) Executive Board members, 35 (13.48%) Top Level Managers, and 77 (28.84%) Senior Managers. It is followed by; the Middle Manager, which comprises 52 respondents (19.48%). An employee with managerial responsibility representing 41 respondents (15.36) and an employee with non-managerial responsibility representing 29 (10.86%). This shows that almost 90% of the respondents that took part in this study are holding managerial positions in their organisation. One-third of the participants, which comprises 105 respondents (39.33%), have less than 5 years of experience in the logistics field. 31 respondents (11.99%) have 6–10 years' experience, 42 respondents (15.73%) have 11–15 years' experience, and 37 (13.86%) respondents have 16–20 years' experience. As the logistics industry is one of the more mature industries in Malaysia, they also took part in respondents who have been working for over 20 years.

In terms of organisation type or their sub sectoral in logistics industry, it noticed 25.47 percentage of the respondents are working in the third-party logistics service provider. The organisation that manages the logistics process of a manufacturer, including inventory management, warehousing, and fulfilment, is known as a third-party logistics provider. It will pick, pack, and ship products from manufacturers. 3PL is the indispensable link for all industrial operations. The freight forwarding companies come in second with 22.85 percent of the responds. This type of organisation oversees transferring commodities from one location to another. Typically, they serve as agents for freight ships or airliners. Approximately 12.36 percent of respondents work for a warehouse service provider, while 11.99 percent work for a sea transport service provider. Even though the study included every type of subsector of logistics there were no responders representing rail service providers. Next, the survey also collected data in terms of the organisation corporation type. It is revealed that 56.55% respondents are

working in Multi-National Corporation. Whereas 43.45% are working in the local companies. Most of the logistics companies that operating in Malaysia are from overseas therefore there is no doubt that most of the respondents are from Multi-National Corporation.

Approximately 28.84 percent of respondents work in a company with more than 500 employees. This could be respondents that working with multi-national corporation or ports. Following that, 25.09 percent of respondents work for a company with a workforce of 20 to 99 employees. 13.86 percent of responders are from organisations with up to 19 employees. When asked about the adoption of smart logistics in their organisation, 55.43 percent of respondents said they had adopted some type of smart logistics technologies. The Cloud, IoT, and big data are examples of technology that they have implemented. In the negative, 44.19 percent of respondents stated that their organisation has yet to install or adopt any form of smart logistics technology. Finally, when asked about their organization's Smart Logistics strategy, 32.21 percent stated that their organisation has implemented a Smart Logistics adoption strategy. 27.34% stated that their organisation is currently formulating strategy. 19.87 percent of respondents confessed that their organisation doesn't have any strategy. 14.23 percent stated that a strategy had been developed, while 6.37 percent stated that pilot activities had begun.

Table 2. Summary of the Respondent's Organisations.

Details	Description	Frequency, N	Percentage, %
Organisation	3rd Party Logistics (3PL) Service Provider	68	25.47
Subsector	Freight Forwarder	61	22.85
	Warehouse Service Provider	33	12.36
	Sea Transport Service Provider	32	11.99
	Road Transport Service Provider	24	8.99
	Air Transport Service Provider	18	6.74
	Courier, Express and Parcel Service Provider	12	4.49
	Port / Terminal Operator Service Provider	10	3.75
	Others	9	3.37
Type of Corporation	Rail Transport Service Provider	0	0
	Local - Malaysian Corporation	116	43.45
	Foreign - Multinational Corporation	151	56.55
Numbers of Employee	Up to 19 employees	37	13.86
	20 to 99 employees	67	25.09
	100 to 249 employees	48	17.98
	250 to 499 employees	38	14.23
	500 or more employees	77	28.84
Implementation	Yes	148	55.43
	No	118	44.19
Smart Logistics Adoption Strategy Status	No strategy exists	53	19.85
	Pilot initiatives launched	17	6.37
	Strategy in development	73	27.34
	Strategy formulated in adopting Smart Logistics	38	14.23
	Strategy in implementation in adopting Smart Logistics	86	32.21

5. Discussion

The study enlisted the participation of 267 persons. According to the data, 149 (56 percent) of respondents' organisations have adopted Smart Logistics technology in the last two years, while 118 (44 percent) have not yet begun. Companies that have adopted Smart Logistics have indicated that they have integrated technical improvements such as IoT, Big Data, and the Cloud into their operations. According to the study's findings, 149 Malaysian enterprises have implemented smart logistics. To acquire a more in-depth look at the adoption rate based on organisation ownership, it was discovered that 36% of the organisations that have embraced Smart Logistics are foreign-based or international organisations. Local firms account for 21% of the total. This illustrates that firms with headquarters in other countries are paving the path for smart logistics adoption in Malaysia. This is likely due to these companies' strong financial positions and streamlined cross-country organisational operations. Around 23% of local businesses and 20% of foreign corporations said that their organisations had not implemented any type of technological adoption.

Third-party logistics (3PL) providers make up the largest percentage of the top list of firms that have been adopted, according to the list of companies that have been adopted. Manufacturers usually use third-party logistics companies to outsource logistical tasks such as warehousing, shipping, warehousing, picking, and packing, and inventory forecasting. This will allow manufacturers to focus on their core business. A strong 3PL provider has considerable logistics knowledge and a wide range of resources to help a company discover and fix any evident gaps. Smart Logistics technology enables organisations to create value by reacting to unique client needs in a timely and cost-effective manner. Because 3PL companies must work directly with their clients, there is an inescapable necessity for them to automate their processes in order to provide real-time information and insight to their consumers. Following 3PL, another logistics subsector known as freight forwarders is ranked second in terms of adoption rate at 16.67 percent. A freight forwarder is responsible for transporting goods from one location to another. Freight forwarding companies frequently handle the entire shipping process for their clients, from products storage in a warehouse to international transportation. As most organisations function on a global scale, a connected environment and system are required to reduce the number of manual communications and information sharing. Warehouse providers have the third highest adoption rate in Malaysia, at 11.33 percent. Warehouse operators typically store items and manage inventories on behalf of their clients. Their services include loading, packaging, sorting, stacking, wrapping, distribution, and delivery. Because this subsector provides end-to-end management in the form of distribution, storage, and fulfilment services, it may be argued that these firms are not forerunners in Malaysia's embrace of smart logistics.

Furthermore, the survey revealed the types of technologies being accepted by the organisation, and it is shown that the Internet of Things (IoT) (67.33 percent) is widely embraced among the respondent's enterprises. The Internet of Things (IoT) enables access to information about physical items while also promoting novel services with great efficiency and productivity (Luo et al., 2016). Because the logistics business deals with movements or freight, it is critical for the organisation to track and transmit real-time information about the physical thing with stakeholders. The second technology employed by Logistics Firm in Malaysia is big data. Big Data Analytics (BDA) applications (41.33 percent) include Vehicle & Equipment Diagnostics, Driver Driving Patterns, Traffic & Weather Forecast, and Sales Forecast systems. Big data enhances logistics optimization by offering an instant choice for every bottleneck in the logistics chain. The Cloud (40 percent) and Cybersecurity (40 percent) are the third and fourth technologies that have already been used in Malaysian logistics organisations (39.33 percent). In the logistics industry, where a large number of stakeholders must collaborate, the Cloud can keep all stakeholders connected at a low cost. The logistics industry's interconnection makes it an appealing target for cyber-attacks. The more organisations in a supply chain, the more vulnerable it becomes, emphasising the significance of safe data management and preservation. Without a question, Malaysian logistics companies are prioritising cybersecurity before moving on to other technology. The adoption of the other technologies, such as simulation, autonomous, virtual, and augmented reality, additive manufacturing, and horizontal and vertical integration, is still in its early stages.

6. Conclusion

In realizing the dream of Malaysia to be a regional hub for logistics in Southeast Asia requiring many considerations. The country current logistics competitiveness in the eye of foreign investor is deeming. This is proved by the Logistics Performance Index which shows Malaysia is far behind compared to its nearing countries. The only surviving factors for Malaysia will be harnessing the Smart Logistics technologies as the country's digital readiness are categorized as leader by World Economic Forum. Smart Logistics presents many exciting opportunities for a logistics firm. As investments in Smart Logistics technologies increase in developed countries, understanding the organizational adoption of Smart Logistics technology from Malaysia perspective is critical and timely. Therefore, organizations can form a working committee, such as the Smart Technologies Implementation Working Group (STIWG), to assist leadership in decision-making by providing necessary information about new technologies in terms of compatibility and complexity. This committee should conduct internal technology research and look for new opportunities provided by all innovative smart logistics technologies on the market.

The committee should consult with service providers on how to simplify the process and find ways to integrate with existing technologies. In addition, the working group must provide a comprehensive report to the organization's decision makers on how to incorporate emerging technologies into their day-to-day operations. Furthermore, to avoid being swamped by the Industry 4.0 wave, businesses may begin by implementing the one smart technology and then gradually transition to other technologies. Furthermore, a stage-by-stage deployment of smart logistics will allow organizations to avoid a large capital investment. Investing in the new system or completely adopting the new system will be costly for local firm and this creates a perceived risk for the local firm in adopting Smart Logistics. Thus, the intervention or support from government agencies and authorities will speed up the adoption process. Although there are budgets and grants allocated by the government, specific fund allocation is required by logistics firms to hasten and speed up the adoption process.

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Human Risk-taking Behavior as Road Accident Causation among Motorcyclists in Selangor, Malaysia

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Abstract: Road accidents has become an alarming problem in most countries with the burden of injury disproportionately borne by pedestrians and motor riders involving the loss of millions of lives and property damage annually. Compared to other types of vehicles, motorcyclists topped the list. The huge spike in motorcycle accidents is well explained by several factors including demographic factors, non-rider's fault and rider's risk-taking behaviour. Factors related to risk-taking behaviour is indirectly related to vehicle condition, road condition, weather and enforcement of traffic regulation. Although several road safety programmes are in place in Malaysia, much of the cause of motorcycle accidents arise from rider themselves. Based on the past studies, there are not much research papers written about rider reasons compared to other accident-causing factors. Therefore, this study aims to identify the risk-taking behaviour that increase accidents involving motorcyclist in Selangor, Malaysia. This descriptive quantitative study identifies all the factors that contributed to accidents among respondents and the pattern of their risk-taking riding behaviour. This study was conducted in Selangor, the state with the greatest number of accidents in Malaysia. Around 350 motorcyclists were recruited based on convenience sampling on a voluntary participation basis. The result reveals that factors of risk-taking behaviour among respondents was tiredness, sleepy, riding long distance, distracted by the usage of the telephone and ignorance of traffic regulations. Importantly, respondents are practicing risk-taking behaviour that violates traffic rules and regulations and the behaviour that topped the list were speeding, ignoring red light, overtaking, and the use of drugs or alcohol. Thus, in order to reduce the involvement in accidents among motorcyclist, education, strict rules and regulation enforcement are required.

Keywords: accident, behavioural factor, road traffic, motorcyclist, risk taking

1. Introduction

Road accidents have become an alarming problem in most of countries. The lives of almost 1.3 million people are brought to an end annually because of road accidents. Road crashes result in significant financial damages for victims, their families, and entire countries. Financial losses are incurred from medical care expenses, loss of income from individuals who are killed or handicapped from their injuries and caregiving expenses for family members who take time off from work or school to look after the injured (WHO, 2022).

According to the global status report on road safety 2018 by World Health Organization, Malaysia was ranked third worldwide in terms of the rate of road traffic fatality at 23.6 per 100,000 population, which is the highest rate recorded by The Association of Southeast Asian Nations (ASEAN). According to the National Transport Policy (NTP 2019-2030), there were 6,740 fatalities caused by traffic accidents in 2017, with motorbikes accounting for 63 percent of all fatalities in that year. The country suffered losses totalling RM8.8 billion because of traffic accidents in that year (MOT, 2019). More than 60% of those affected were motorcyclists.

Thus, vulnerable road users, especially motorcyclists, become a major area of focus that should be considered in the reduction of road traffic accidents. The highest road fatalities are recorded in 2016 with 7,152 deaths with an increase of 6.65% compared to the previous year (Gan, 2022). Road accidents involving motorcyclists are among the highest death contributors in the country and this figure is not showing any declining sign for the previous years and predicted to increase (Harun et al., 2022;

Jamaluddin et al., 2015). Over the previous years, major concerns have arisen from motorcyclists and understanding rider’s behaviour is considered an important step towards ensuring road safety.

2. Literature Review

There are numerous factors that lead to accidents as shown in Figure 1. Studies have found that human behavioural factors or negligence alone contributed approximately 80% of road crash (Lee, 2016).

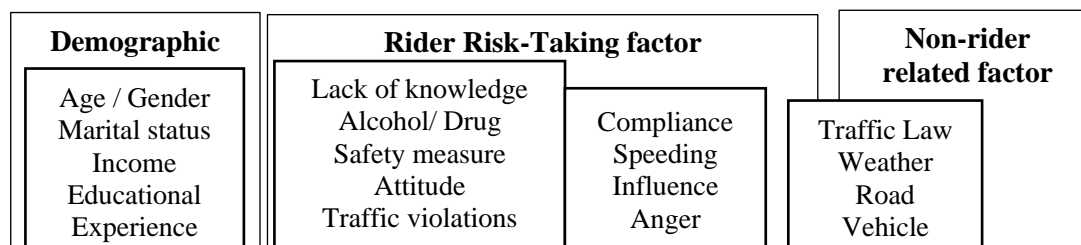


Figure 1. Accident-causing Factors among Motorcyclists

2.1 Risk-taking Behaviour

Human behaviour is the term for the broad array of acts and responses that people show, which are manipulated by their culture, attitudes, and emotions. The phrase "violation behaviour" implies to motorists who wilfully violate traffic laws and regulations by breaking them on purpose. The rapid rise in the number of motorcycles on the road, as well as the rising rates of motorcycle casualties and fatalities, are all tied to rider behaviour (Shajith et al., 2019).

Attitude and Traffic Regulation. When compared to other road users, Malaysians show negligence towards traffic regulation such as red-light running, lack of knowledge and awareness on traffic rules. They love to do what is not right or forbidden without even considering the risk to them and others. The number of motorcycle riders who run red lights is three times greater than the number of other vehicles, according to recent Malaysian research (Manan, 2020). Riders’ knowledge on road traffic regulations were generally low (Konlan & Hayford, 2022).

Safety Measures. According to the findings of a Cochrane study completed in 2008, helmets lower the risk of mortality by 42 percent and the risk of major head injury by 69 percent. Most severe road accident causes traumatic brain injury known as Maximum Abbreviated Injury Scale (MAIS) level 5 critical injury that leads to brain damage (Ramli et al., 2014). The fatality cases involving motorcyclist and pillion are due to major head injuries because of improper way of wearing the helmet, because of not tightening the helmet strap. Ramli and Oxley (2016), in the study concluded that wearing helmets in proper way is very important to provide better protection to the motorcyclist compared to the type of the helmets used such as full face, half head or open head type of helmets.

Speeding. Manan et al. (2017) observed that more than 50% of motorcyclist were speeding more than speeding limit stipulated for all road categories and sometime faster than other vehicle. Speeding causes motorcyclist and pillion rider to be more vulnerable to road accidents because higher speed will cause high-level degree of injuries or impact if involved in road accidents. At high speed, motorcyclists will have less control of their motorcycle due to failing of human to control the motorcycle and will increase the risk involved in road accidents. Extremely cautious and careless drivers both considerably raise the risk to other road users when driving in poor weather conditions (Pines Solomon, 2021).

Influential Factors. Important aspect of risk-taking behaviour is influence. It can further be described as distraction or lack of focus, under influence of alcohol or drug and influence of peer. Split second distractions can lead to catastrophic results, even though motorcyclists may view small distractions as insignificant. With today's advances in technology, the most common distraction is switching between radio stations. Distractions also comes from the use of mobile phones, Global Positioning System

(GPS), and other navigation devices which are constantly being checked by drivers. Passengers eating, drinking coffee, or partaking in any other beverage while driving can cause the driver to become distracted too (NST, 2017). Other related distraction factors that are associated with accidents were the use of alcohol and drugs by riders (Ndwiga et al., 2010). It was noted that 12.6% of riders are smokers and 68% typically use alcohol. Alcohol use was common among road users as 24% were tested for alcohol and result show 14% were positive (Reardon et al., 2017). Peer influence is persuading or challenging a friend to exceed the speed or ignore traffic regulations (Wankie et al., 2021).

Vehicle condition. Compared to other important safety measures, the riders reported that correctly positioning the motorcycle according to road conditions, making himself visible to other road users and properly maintaining the motorcycle were most important. Despite their awareness, only 52.4 % were properly maintaining their motorcycle (Shaker et al., 2014).

3. Methodology

This section discusses the method adopted in this study. The subsection discusses site location, followed by sample and data collection and data analysis.

3.1 Location and Population

The geographical area selected for this study was Selangor, Malaysia owing to the high frequency of road accidents, specifically motorcycle accidents. Respondents selected were motorcyclists with minimum age of 16 years as this was the eligible age to obtain a driving licence. An additional criterion to be eligible for the survey was that they had been involved in a motorcycle accident within the last one year. This is a descriptive quantitative study involving one-time sampling, aimed to identify the human behaviour risk that may influence the occurrence and severity of accidents. A total of 350 self-administered questionnaires were delivered to research respondents (voluntary participation) throughout the data collection period (January 2022 to June 2022) based on a convenience sampling technique.

All data were obtained through standardised and verified set of online questionnaires, adapted and developed based on few research related to motorcyclist behaviour conducted worldwide (Borhan et al., 2018; Leong et al., 2021; World Health Organization, 2019). The questionnaire comprised of two sections: a) sociodemographic questions and b) risk taking behaviours. Section A consist of 7 sociodemographic questions. Section B with 61 questions on behaviours related to attitude, safety measures, speeding, weather, influence, road, and vehicle conditions. Close ended question with three options: always, sometimes, and never were constructed to measure the trend of the risk-taking behaviour. Data were analysed using SPSS 26 software. Research was conducted in a manner that was respectful to participant. Participants data was kept confidential to prevent any threats to data privacy.

4. Result

Descriptive results were reported as two different subcategories: sociodemographic and risk-taking behaviour.

4.1 Socio-demographic Characteristics

Based on the 350 returned questionnaires, the respondents' demographic characteristics are presented in Table 1. Most of the motorcyclist were between 16 to 25 years old (65.5%). Around half of our respondents attended university (59.1%). Our study reveals that most of the riders are male (81.1%). Interestingly, 86.9% own permanent licence while 72% own licence for more than five years. More than half of the respondents graduated from university (59.1%). Around 72.9% of the respondents were still single while the rest is married (27.1%).

Table 1. *Sociodemographic Characteristics*

Age	Frequency (n)	Percent (%)
16 – 25 years	229	65.5
26 – 55 years	102	29.1
More than 55 years	19	5.4
Education		
Illiterate	21	6.0
Primary / secondary	122	34.9
University Level	207	59.1
Gender		
Female	66	18.9
Male	284	81.1
Marital status		
Single	255	72.9
Married	95	27.1
Employment status		
Employed /Self employed	190	82.8
Student	43	12.3
Non employed	17	4.9
Type of licence		
Permanent	304	86.9
Temporary	6	1.7
Without license	40	11.4
Duration of licence		
Less than a year	6	1.7
1 - 2 year	29	8.3
3 - 4 year	73	21.0
More than 5 years	252	72.0

4.2 Risk-taking Behaviour

Figure 2 illustrated the risk-taking behaviour related to attitudes. Most of the motorcyclists showed poor attitude that can lead to severe accidents. This table is quite revealing in several ways as most of them never stop at a stop sign or intersections (65.7%). Although the motorcyclist justifies their action by reporting that there were no vehicles on the other side, it's still against the law and increase the risk of crash. Some even continue riding at red light. Furthermore, most respondent claimed that they always ride in tiredness (53.4%), pass two or more vehicles at the same time when overtaking (47.1%), always ride as desired without following rules (28%) and always ignore rules as Malaysian police don't enforce law (50.3%). Sadly, only 6.5% of the respondents admit that they never ride when the traffic light is red.

Almost half of the respondents revealed that following traffic rules and regulation is disturbing the pleasure of their ride.

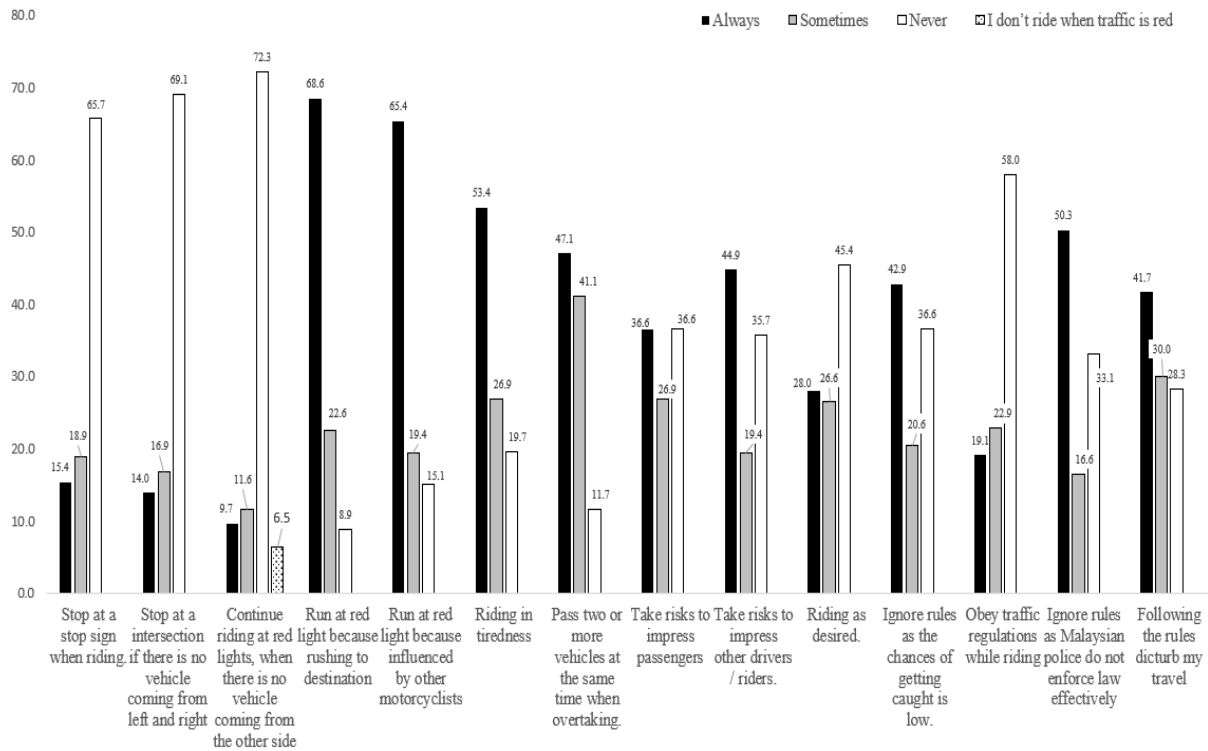


Figure 2. Risk Taking Behaviour related to Attitude and Traffic Regulations (%)

The number of respondents who follow the necessary safety measures while riding is still very low as reported in Figure 3 especially related to helmet usage. Most of them do not wear proper clothes to keep them safe or to minimize accident.

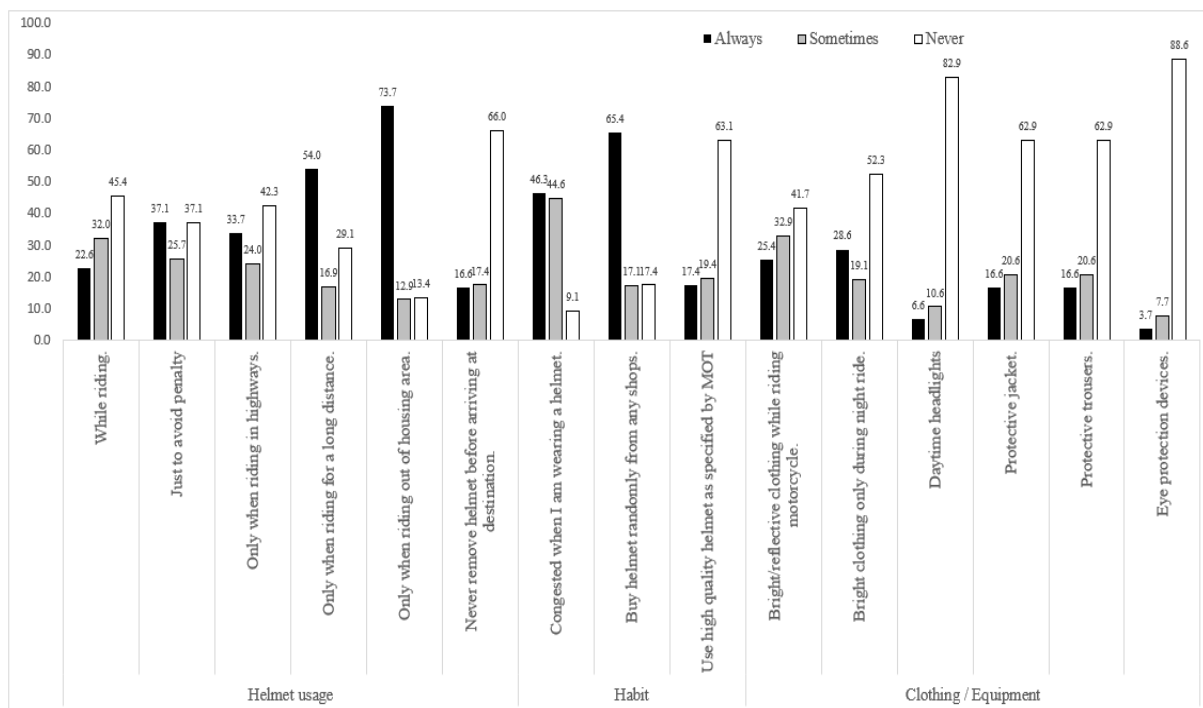


Figure 3: Risk Taking Behaviour related to Safety measures (%)

As reported in Figure 4, 90.6% of respondents ride above the speed limit when overtaking, 53.4% speed even when not in a rush as 42.3% assume exceeding speed limit is part of their everyday ride as 31.7%

use their own judgement to decide the riding speed. It is apparent from this table that half of our respondents don't follow the speed limit. What is interesting in this data is the different perception of the respondents. They assume it is acceptable to speed if traffic conditions allow (28.3%). It was found that if the rider owned a high-performance superbike (16.6%), they felt it was fine to break the speed limit, with a condition the rider could control their vehicle (6.9%).

If rider own high-performance superbike (16.6%), fine to break speed limit if the rider can control the vehicle (6.9%). Around 75.7% of individual stated that it's hard to stick to the speed limit while 70.9% commented penalties that for speeding should be more severe and only 33.4% reported that breaking the speed limit is not an acceptable behaviour.

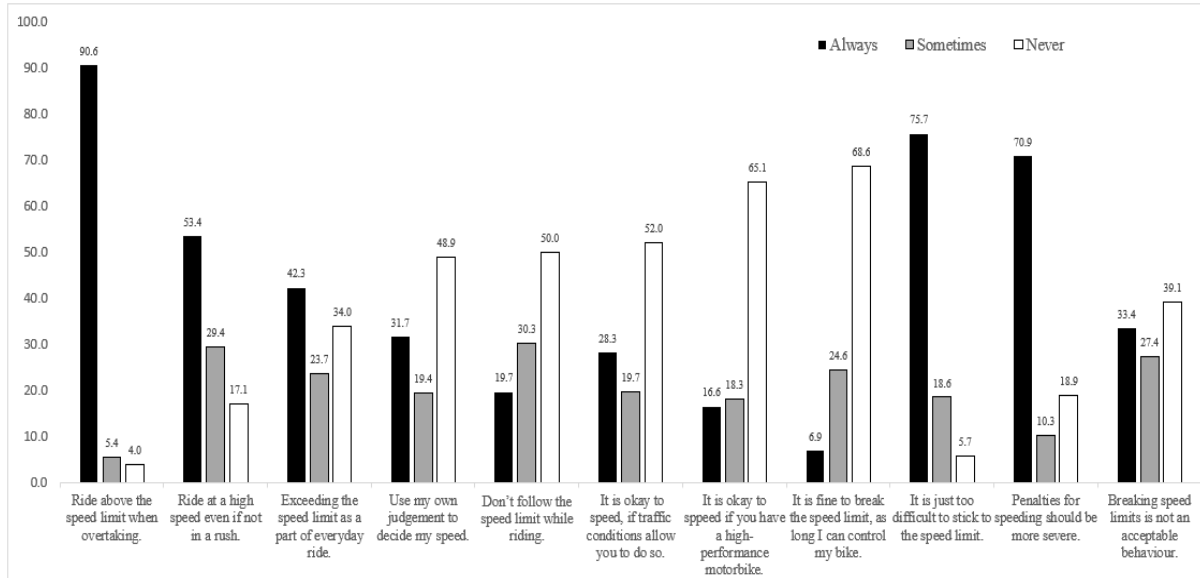


Figure 4. Risk Taking Behaviour related to Speeding (%)

The clustered graph as per Figure 5 shows that Motorcyclist's risk-taking behaviour can be influenced by external distraction, alcohol/drug, and peer. Most of them are distracted when adjusting mirror (27.1%), listening to music (26.9%), answering phone via hands-free (41.4%), answering phone bare hand (26.9%), reading text message while riding (10.3%) and eating or drinking (13.7%). Despite the numerous warnings regarding alcohol consumption behaviour, 33.4% of the riders do ride under the influence of alcohol, 66.3% ride after drinking when they think they can hold control of themselves and 24% drink and ride because they think will never get caught. Peer influence plays a vital role.

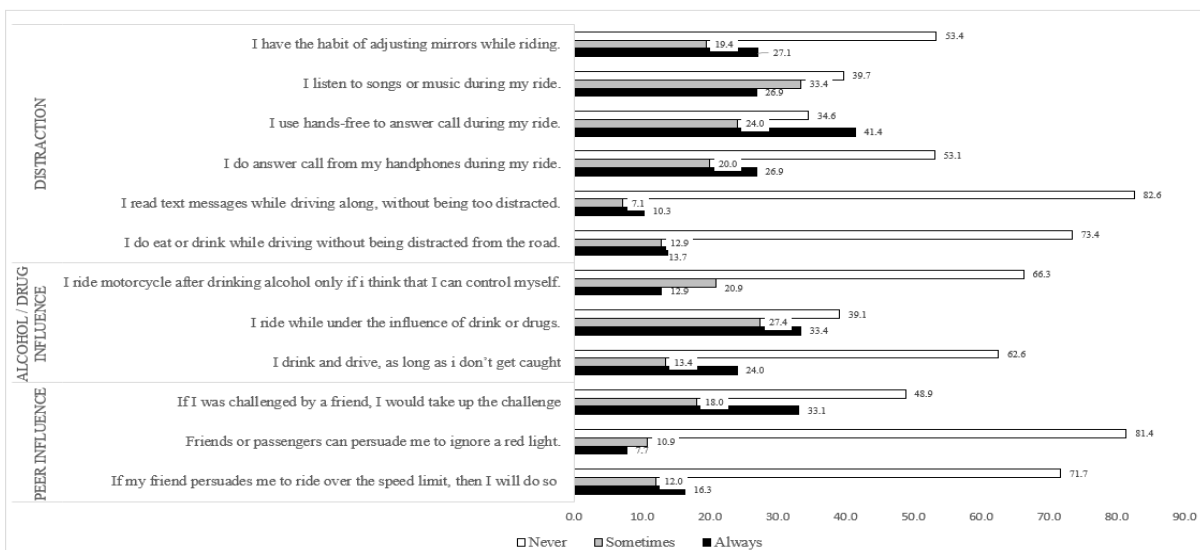


Figure 5. Risk Taking Behaviour related to Influences (%)

Positive risk-taking behaviour during unfavourable weather can be stopping at a pit until rain stops, not riding in rain, ride carefully and ride within safe limit. Besides, looking into rider's behaviour related to road condition, most of the motorcyclist avoid unfeasible load that's lack of safety and maintenance. Those sending bike for regular service are 27.1% and around 50.3% are ensuring their bike is in good condition before starting their ride s shown in Figure 6.

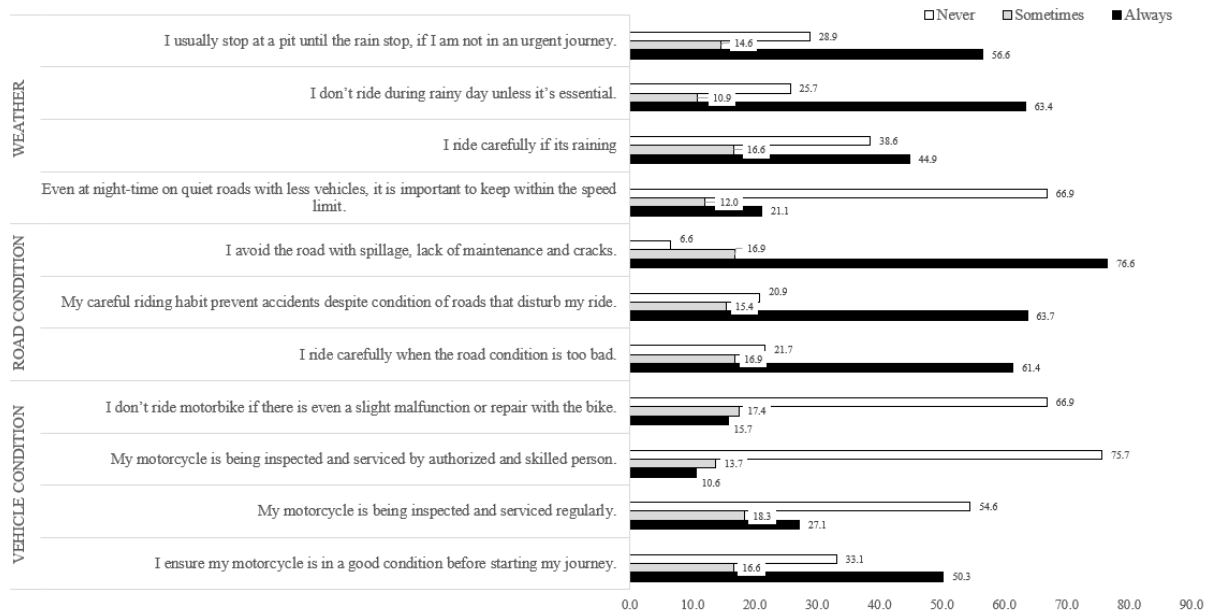


Figure 6. Risk Taking Behaviour related to External conditions (%)

5. Discussion

Research finding were compared with the finding from different studies related to motorcycle crash and behaviours associated as follows:

5.1 Socio-demographic Characteristics

Independent factors associated with road accidents included younger adults, male and single as they ride more recklessly (Reardon et al., 2017; Tumwesigye et al., 2016; Vaca et al., 2020). This is further supported by the fact that Malaysia has more male population and most of the riders are male, therefore the chances for them to involve in accidents are higher compared to female. Riders in singlehood marital status were almost twice as likely to experience an accident compared to those married as they are more concerned about their family and need to support them. The family depend on them financially (Bazargan et al., 2016; Ngari et al., 2019).

5.2 Human Risk-taking Behaviour

Behaviour is considered the most critical factor affecting road safety. Riders' behaviour can be defined as concepts related to a rider's driving mannerisms and actions. Thus, analysing and understanding riders' behaviour is the key factor in preventing or reducing traffic accidents (Meiring & Myburgh, 2015; Yousif et al., 2020). The most critical issue contributing to road accidents is human behaviour/negligence. Surprisingly, the negligence level is very high among Selangor motorcyclist as they tend to endanger themselves with risk taking behaviour, ignore rules and regulation, and even think that it is perfectly alright to neglect the law as the chances to get caught is low. They are not aware that these laws are enforced to keep them self-safe.

Beating red traffic lights or completing a journey without a break or stop is like an achievement for many riders. Red traffic lights are often seen as a major obstacle that delays their journey. Many choose

to ignore this important sign. According to Jensupakarn and Kanitpong (2018), cases of beating the red light in an intersection tend to occur on weekdays because most of the motorcyclists rush to travel to work on weekdays. Running a red light exerts an impact on crash chance and severity of motorcycle crashes. Riding without a helmet seems to be a pleasure for the motorcyclist. Although the riders have sufficient awareness regarding the importance of wearing a helmet during a ride, they tend to neglect it due to personal convenience. Not only that, but safety prevention such as wearing protective clothing, helmets, trousers and boots are equally important. Previous studies proves that this is a significant factor that influence injury severity during motorcycle crashes (Champahom et al., 2022; Shaker et al., 2014).

The risk of accident does increase with acute tiredness, sleepiness, and psychoactive substance use. Riding above the speed limit while feeling tired makes the condition even worse. Numerous warnings from governments on awareness campaign, laws and regulation have not been successful (Agarwal et al., 2020; Peng et al., 2017). Government investment in the strict implementation of current road traffic regulations, and penalties awarded against anyone riding under the influence of alcohol, non-usage of helmets, laws against speeding and negligence must be made compulsory. The stricter the government and the heavier the punishment, better behaviour can be established among motorcyclists (Konlan et al., 2020; Nickenig et al., 2020). Speeding on road is very common among new era motorcyclists as they tend to rush for everything.

Factors under visual conditions are grouped into daytime and night-time crashes with and without lighting. The literature indicates that crashes on dark roads are more likely severe. Moreover, drivers cannot reduce speeds during crashes due to the downward sight distance in dark areas. Many studies found that roads with four lanes are more favourable than roads with fewer lanes (Champahom et al., 2022). There are many types of distractions that can lead to impaired driving. Risk taking behaviour among motorcyclist do shock us as they tend to answer call, text, listen to music and even eat or drink during riding. The distraction caused by mobile phones is a growing concern for road safety despite the many warnings and law enforcement. Riders using mobile phones are approximately 4 times more likely to be involved in a crash than riders not using a mobile phone. Specifically, more frequent use of a mobile phone for texting or searching for information while riding is associated with a higher chance of being involved in a crash/fall (Truong et al., 2019).

The use of a mobile phone will interfere with four processes: visual, auditory, cognitive and kinaesthetic (Ojstersek & Topolsek, 2019). Using a phone while driving slows reaction times (notably braking reaction time, but also reaction to traffic signals), and makes it difficult to keep in the correct lane, and to keep the correct following distances. Hands-free phones are not much safer than hand-held phone sets, and texting considerably increases the risk of a crash (WHO, 2019).

6. Conclusion

The number of road accident cases and fatality cases involving motorcyclist are amongst the highest compared to other vehicles and the indicator become more significant if compared to any other country. The cause of accidents can be summarised into two main categories, namely non-behaviour factor and risky human behaviour or negligence. Human behaviour factor needs to be given due attention as it is seen as the highest percentage of causes of road accident compared to other cause identified. A comprehensive study is required to determine the root cause and plan the mitigation measures to overcome the issue and reduce the number of road accident and fatalities involving motorcyclist and pillion riders. Collaboration between policy makers and academician/researcher together with assistance from all stake holders will enable workable mitigation measures. This can be executed with proper monitoring to ensure objectives that has been targeted is accomplished. An adequate surveillance system may support policy decision makers tracking the risk factors and the health consequences and establishing evaluation of prevention interventions.

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The Study of Efficiency and Effectiveness of Logistic 4.0: A Systematic Review

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Abstract: Logistic 4.0 engulf three most important elements such as integration of networks, digitization of *commodities* and new market models. In order to combine the processes, equipment, personnel, and even products into a single blended network for overall firm performance improvement and to increase the effectiveness of their processes, more businesses are actively investing in tools and solutions with no exception to Logistic industry. The inevitable advancement of technology has caused a divergence in the way that logistical businesses operate. The purpose of this paper is to explore the numerous effectiveness and efficiency involving digitalization by the logistics service provider and autonomy monitoring by the customer. The study performs a systematic literature review search flow method; thereafter, content analysis is carried out based on the six-stage approach to identify key elements and effectiveness and efficiencies of Logistic 4.0. The study further benefits from a comprehensive content analysis of the 33 documents identified manually, advanced for text analysis. Logistic 4.0 is a consolidated system of value creation that is comprised of a total of 42 effectiveness and efficiencies that enhances the efficiency and effectiveness of top to the bottom process of the logistic sector. It evolves together the system, service provider and customer for mutual benefits. This study may not have enabled a complete coverage of all existing peer-reviewed articles in the field associated with Logistic 4.0. Yet, it illustrates a visible transition of Industry 4.0 into the logistic sector that promote numerous benefits. The authors believe that these findings will encourage more uptake of technologies to increase the effectiveness and efficiency of the entire regime. This paper's uniqueness is to identify the effectiveness and efficiencies related to Logistic 4.0 for value co-creation in the context of the entire logistic services system.

Keywords: effectiveness, efficiencies digital, industry 4.0, logistic, logistic 4.0, smart service

1. Introduction

Technology has been the engine for human society's advancement since the dawn of civilization. Technologies from around the world have been embraced to aid human life, from the most basic creations to complex techniques that function independently from the human experience (Sutherland et al., 2016). Technology has revolutionized civilization in numerous ways; technology allowed early humans to cultivate their own food, steer the open oceans, tell time, and hook society on a global scale. The history of technology is the history of the invention of devices and techniques (Sima et al., 2020). The technology itself comprises three major aspects: goods or services, human creativity that leads to invention, and capabilities that enable technical activities. These aspects are interconnected and equally reinforcing. Rapid technology growth also enhances digital transformation. The development of the technology from Industry 1.0 to 4.0 is monumental from the machine, steam power and manual production to the current collaborative, automated and interconnected network (Osmundsen et al., 2018; Ustundag & Cevikcan, 2017).

Through the use of steam power and the mechanisation of industry, the First Industrial Revolution got underway in the 18th century. The invention of electricity and the introduction of the assembly line marked the start of the Second Industrial Revolution in the 19th century. In the 1970s of the 20th centuries, partial automation employing computers and memory-programmable controls led to the start of the Third Industrial Revolution. Industry 4.0 is the current iteration of the industrial revolution in the modern world (Industrial Revolution - From Industry 1.0 to Industry 4.0, 2022).

According to i-scoop (2020), industry 4.0 involves information-concentrated transformation in which extremely large data, consumer, processes, services, systems and internet-enabled industrial assets are connected under a single roof. The term “Industry 4.0” also incorporates the increasing digitization of the entire supply chain, which makes it possible to connect objects, actors, and systems based on real-time data exchange. Experts do believe that Industry 4.0 is an unpredictable forthcoming circumstance, whether it is wanted or not in a similar way to the internet that challenged the consumer world with uncertainty in the 1990s. Industry 4.0 is a potential strike that does not even need advertisement (Horvath & Szabo, 2019; Kagermann et al., 2013; Mogos et al., 2019; Nagy et al., 2018). Zezulka (2016) reported three main elements about the Industry 4.0 such as integration and digitization of networks, digitization of products and services, and new market models. These elements are interlinked. Furthermore, according to Hermann (2015), four key factors of Industry 4.0 are cyber-physical systems, Internet of Things (IoT), Internet of Services (IoS) and smart factories. Where else, Roblek (2016) defined the three premier key elements of Industry 4.0 as automation and adaptation, automatic data exchange and communication and human-machine interaction.

Logistics entails activities of supplies that involve planning and management that enable the most effective translocation from the point of dispatch to the point of reception as defined by Pfohl and Kurnaz (2015). On other hand, Bozarth & Handfield (2007) additionally simplified it as information and service circulation. The definitions of logistics have evolved because its functions and interest areas got changed. In logistics, there are significant trends that determine its new development stages such as Big Data, Internet of Things, Industry 4.0, Cloud Logistics, machine to machine (M2M) communication, Radio frequency identification (RFID) technology, Cloud Computing, Autonomous Logistics, 3D printing, Robotics & Automation, Low-cost sensor technology, Cloud computing, and Real-Time Data applications. These trends are mostly being applied into various industries such as manufacturing, commerce, software logistics, transport management and shipping (Ballot et al., 2014; Ehrhardt & Partner, 2016; Jager et al., 2016; Wang et al., 2016).

2. Methodology

The purpose of this paper is to identify the efficiency and effectiveness of Logistic 4.0 based on digitalization aspect by conducting a literature review. In order to achieve this goal, the systematic literature review (SLR) methodology derived from Cronin (2018) was used. This involves comprehensive and transparent search step conducted over multiple databases including the following aspects: outline research questions, select Web sources, shortlist the number of articles, identify the main research directions, define a methodology to analyse the chosen articles, discuss the main scientific results and identify the scientific gaps and restriction.

The research question outlined was:

RQ: What are the efficiency and effectiveness of Industry 4.0 in logistic sector.

2.1 Search Strategy

Figure 1 summarizes the search strategy used for article selection. The search was done for all published abstracts and manuscripts related to effectiveness and efficiencies Of Industry 4.0 in Logistic. Initial searches were conducted using Emerald Insight, Research Gate, Science Direct (1995–2021) and Google Scholar up to the first 20 pages. Articles involving other sectors other than logistic was excluded. The search included an iterative process to refine the search strategy by testing several search terms and incorporating new search terms as new relevant citations were identified. Additionally, based on the extensive literature review, search terms connected to Industry 4.0 were selected and a list of phrases that are the most related to and commonly used together with Industry 4.0 were presented (Liao et al., 2017).

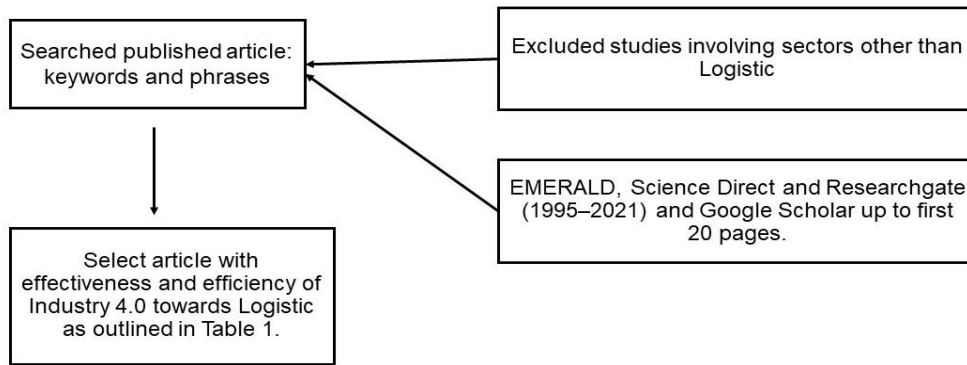


Figure 1. Search Strategy for Article Selection

Based on these keywords and the operational definition, a comprehensive list of Industry 4.0 search terms was established. Multiple combinations of keywords and phrases were used to assess article eligibility, including: (1) "Industry 4.0", "smart manufacturing", "smart production", "smart factory", "cyber physical system", "cyber physical production system", "internet of things", "industrial internet", "big data" and "digitalization", (2) logistic domains: 'logistic', 'warehouse', 'transportation' and 'supply chain'. Articles with significant result to be rated as relevant were selected and outlined in Figure 2.

2.2 Report Screening and Eligibility Criteria

Titles and abstracts were screened; primary reports with data associated with Logistic, Internet of Things and Industry 4.0 with at least a substantial abstract in English. Reviews were embraced at this level to search reference lists and duplicate removed. Articles identified through the original search keywords were distinguished based on eligibility criteria; from studies that did not involve logistics or technologies associated with Industry 4.0 as illustrated in Figure 2.

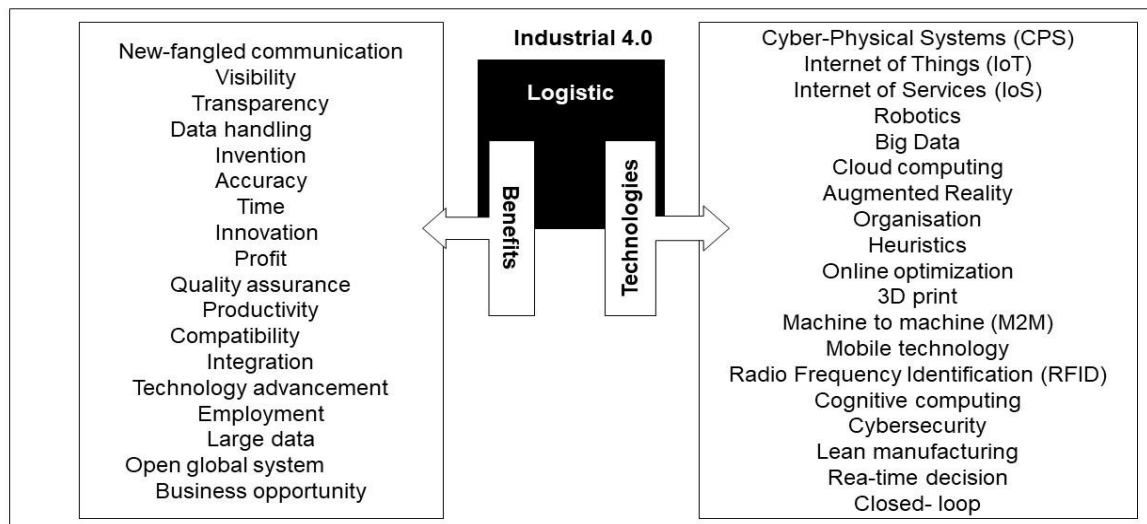


Figure 2. Keyword/Phrase Selection

Later, studies were independently screened for inclusion and exclusion, extracted, and verified data. At this stage, the studies included were (1) instigated recruitment sector – logistic, warehouse, supply chain, and transportation (2) assessed effectiveness and efficiencies of Industry 4.0 and (3) involvement of Internet of Things. The exclusion criteria were: (1) non-English papers (2) not peer-reviewed academic literature, (3) no interconnection between Industry 4.0 and Logistic (4) no full text and (5) vaguely related to Industry 4.0 and Logistic (not mentioned any effectiveness and efficiencies).

A master table in Microsoft Word was created to store the extracted key information from each of the studies; (1) benefits; (2) description; and (3) authors. The flow chart of article selection is depicted in Figure 3.

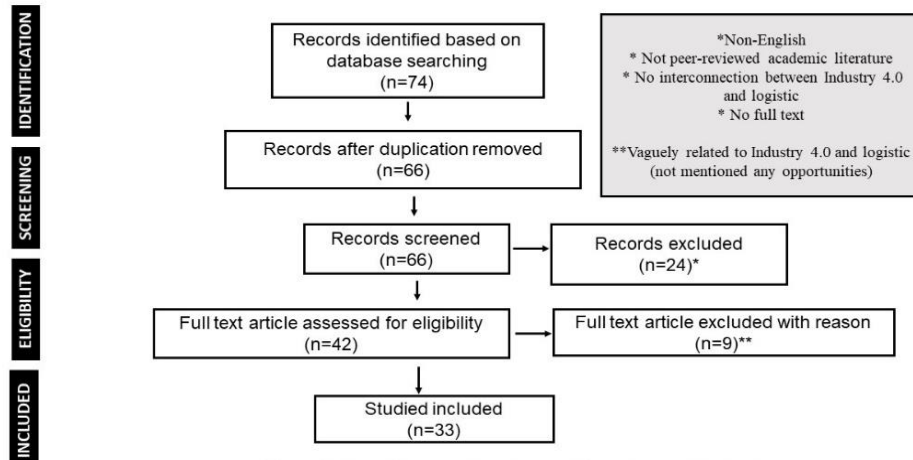


Figure 3. Flow chart of Evidence (Searches and Inclusion)

3. Result

Out of the 33 papers reviewed, 42 effectiveness and efficiencies of Logistic 4.0 were outlined. Table 1 displays the summary of Logistic 4.0 effectiveness and efficiencies. Integration of Industry 4.0 into Logistic sectors such as supply chain and warehouse had incorporated a decentralized open global logistics system that enables real-time involvement. It is well perceived that the data handling process is further simplified with increased capability. Much large and various data can be handled. Thus, this new-fangled communication gives room for optimization of product usage, time saving, visibility and transparency, innovation and smart performance and virtualization. Importantly it complies with cybersecurity and safety against violation or void of any information. Also, Logistic 4.0 is competent enough to avoid inaccuracies and reduce error rates that lead to shorter lead times of the entire process.

Table 1. *Effectiveness and Efficiency of Industry 4.0 in Logistic*

Effectiveness and efficiency	Description	Author
Visibility & transparency	Increase synchronization	Szlapka & Lubinski, 2017
Data handling	Conduct and analyse a variety of data in large amounts	Witkowski, 2017; Patil, 2020
Advanced invention	Inventing important multipurpose technologies: refurbishment, remanufacturing.	Bressanelli et al., 2018
Accuracy	Information accuracy can cut unnecessary cost and improves the agility	Wang et al., 2016; Patil, 2020
Save time	Real-time communication minimizes the time taken for information transfer.	Wang et al., 2016
Optimizing the usage	Provide customers the personalized advice to optimize the usage phase.	Bressanelli et al., 2018
Innovation and smart performance	Provide operational data with a standard speed which also boosts the flexibility and brings the company closer to customer needs.	Witkowski, 2017
Open system	Hyperconnected logistics network enhance the efficiency.	Crainic, & Montreuil, 2016
Increase the profit	Support preventive and predictive maintenance - reduction of cost	Szlapka & Lubinski, 2017
New-fangled communication	Intensify customer benefit with real-time communication involving smart networking, mobility and the flexibility.	Bukova et al., 2018
Linkage of information	The coordinated approach as a whole sector of services in a single system.	Oleskow-szlapka et al., 2018
Shorter lead times	Satisfy customer's need and develop more business opportunities.	Witkowski, 2017
Reduced error rate	No more paper-based documentation that may cause human error	I-scoop, 2018
Record keeping & tracing	Data storing and accessing is easy and available to all engaging party	Patil, 2020; Liao et al., 2017
Technical support	Information collected assist to provide technical support and other services required	Bressanelli et al., 2018
Increase of productivity	Machine-to-machine communications and integrated systems cause manufacturing process optimization.	Patil, 2020; Jager et al., 2016; Sima et al., 2020
Increased compatibility	Enhance congruency between customer base and demand.	Patil, 2020
Integration of reality & virtual	Increases co-operation between companies and across transport modes.	Szlapka & Lubinski, 2017
Availability of advanced technologies	Make use of fast developed technology and be in trend for benefits and greater opportunities.	Facchini et al., 2020; Szlapka & Lubinski, 2017
Employment opportunity	Establishing technological oriented job and employment of qualified labour force.	Bal & Erkan, 2019
Improving product design	Improve the design of their products to better respond to customers' needs.	
Complementary resources	Integrating complementary resources enables sustainability for a period of time.	Hein et al., 2019; Saarikko et al., 2017
Information sharing & exchanges	The system facilitates information sharing and exchanges to everyone involved within the service ecosystem.	Zheng et al., 2017
Enables co-novation	The usage of new technologies enables co-novation among partners.	Lozada et al., 2019

Continuation of Table 1

Accelerates union	Enhances opportunities for union of companies that offer customizable products	Torn & Vaneker, 2019
Allow collaboration	Enable economic value creation and appropriation in a network across organizational boundaries rather than in a single firm.	Camarinha-Matos et al., 2014
Ease interaction	System integration ease the interaction between customers and business partners which add business value.	Ghobakhloo, 2018
Connection of several service	Allow connection of several service: enterprises, customers, products and services and multi-individual in a single system.	Vaancza & Monostori, 2017; Ikavalko et al., 2018
Mutual benefits	Services implies a process of utilizing resources of providers and customers to produce mutual benefits.	Sun et al., 2016; Demir et al., 2020
Business opportunities	Cooperation broadening the services and increases the company's market share.	Surajbali et al., 2013; Beverungen et al., 2019
Useful information	Provides companies useful information, that can be used to create new services	Ghobakhloo, 2018
Customer demand	Identifying customer needs makes us outstand compared to competitors.	Zheng et al., 2017
Create new products or services	Information on required product and service helps us to advance a step forward to boost innovation in services.	Camarinha-Matos et al., 2014
Services with products	Internet and cloud computing enable new ways to remotely deliver services associated with products.	Camarinha-Matos et al., 2014
Feasible customization	Customization of products and services according to costumers needs add higher value to the customer.	Ghobakhloo, 2018
Competitive advantage	Suppliers gain a competitive advantage by offering smart customized services.	Torn & Vaneker, 2019 Zheng et al., 2017; Lim & Maglio, 2018
Faster data transfer	Quick data transfer decrease waiting time and gives business satisfaction.	Chia et al., 2019
Efficient	More efficient in productivity and delivering service.	Mamrot et al., 2016
Real-time data tracking	Able to capture the accurate service, process, and data instantly.	Ju et al., 2016
Internal services performance	Smooth performance minimizes occurrence of any internal error.	Herterich et al., 2015
Improve quality control	A device-system oriented standard enhances the quality of entire process.	Korhonen, 2014

4. Discussion

Logistics is an efficient growth of the storage flow of raw materials, semi-finished and finished products in order to satisfy the customer. In order for it to be always useful, as industrial processes change, it will have to shift accordingly. Since the idea of industry 4.0 gained popularity in 2011, a gradual but unstoppable shift towards logistics that satisfy the requirements of this new method of production has started.

The first practical applications of 4.0 logistics have occurred in the production environment. Later, the 4.0 philosophy was extended to distribution logistics. From the very beginning, however, it was possible to see the benefits of 4.0 logistics. Essentially there are four areas in which it can be improved through this approach. The first concerns productivity: it is clear that a more efficient handling of raw materials, semi-finished and finished products also leads to an improvement in production. Secondly, the wide availability of data offers an improvement in the traceability of each element. This, among other things, means an increase in safety, thus reducing the risk of litigation with customers. Ultimately, the sum of all these benefits leads to a concrete cost reduction.

The future success or failure of logistics organizations will, to a large extent, depend upon how well they exploit emerging technology. The root cause that enhances the development of Industry 4.0 and contribute to the effectiveness of Logistic 4.0 are failure or errors found in the Logistic – related sector. Identified errors was human error, environment factors such as weathers, technical, demand, competition, customer service, cost, economy, drivers, regulation, and sustainability (Demir et al., 2020; Saarikko et al., 2017). These factors boost the underpinning technology further in order to provide numerous effectiveness and efficiencies for service advances.

Technology proliferation of Industry 4.0 was mainly due to the development trends of numerous system such as Cyber-Physical Systems (CPS), Internet of Things (IoT), Internet of Services (IoS), Robotics, Big Data, Cloud computing, Augmented Reality, Heuristics, Online optimization, 3D print, Machine to machine (M2M), Mobile technology, Radio Frequency Identification (RFID), Cognitive computing, Cybersecurity, Lean manufacturing, Real-time decision and Closed- loop system that invented Smart service (Ehrhardt & Partner, 2016; Valencia et al., 2015; Wang et al., 2016). “Smart Services” describe data-based, physically delivered services with integration of digital service and physical products. It performed in complex ecosystems with collaboration between technology, software as well as service specialists and users. Smart service is basically the package of Smart work, Smart supply chain, Smart manufacturing, Smart product, Smart transportation, Smart facility, Smart building, Smart environment, Smart industry and Smart technology that is based on monitoring, optimization, remote control, and autonomous adaptation of products. These incorporated smart systems that can be beneficial to both service provider as well as customer (Beverungen et al., 2019; Bukova et al., 2018; Lim & Maglio, 2018).

The speed of digital technologies, which are already revolutionizing every industrial sector, inevitably has also affected the logistics. Spread of logistics 4.0, which is sometimes called supply chain 4.0, now become important to respond to an increasingly demand in products and services. This paper provides a broader understanding of the benefits of Industry 4.0 to logistic sector. Industry 4.0 has revolutionized the logistics sector by introduction of digital technologies supported by Internet of Things, Cyber Physical System, Artificial Intelligent and embedded systems.

The first benefit is shipment tracking systems: With the immense rise in online purchases, there comes the demand for an accurate and steady delivery system. Any delivery system without a proper tracker is useless. A tracking system enabled with industry 4.0 technology is a must to achieve the ultimate customer delight. It is very crucial to have a suitable delivery tracking system to improvise the overall delivery system for a product. A logistics 4.0 tracking system will ensure service providers with a proper management of parcels and fleet productivity in logistics operation. Secondly, the widely availability of data through the Internet of Things (IoT) offers an improvement in the traceability of each touch point. The connectivity of objects

(smart devices) is one of the main drivers of digital transformation. IoT creates competitive advantages for products and services while intertwining the physical and digital worlds through the generation of real-time data. With the possibilities of IoT, a logistics digital platform and the use of blockchain technology, the logistics process can be made considerably more efficient. Latency can be avoided and the availability of current data in real time allows the process to be controlled to the benefit of all upstream and downstream parties involved.

Means, with adoption of cloud computing, the efficient of logistics operation can be improved. Due to the nature of logistics, where many stakeholders need to interact, the cloud computing has the capability where “all channel members” can be connected without must cost involved. Essentially, by using a Web browser, anyone can be connected to cloud computing which is very easy to learn and able to generate high adoption rates and this includes small and medium size logistics intermediaries. Cloud computing also enables cost optimization for infrastructure, communication, and data storage. The primary benefits of implementing this technology lie in scalability and mobility, as they facilitate the deployment of strategic platforms from logistics service providers. It also enables logistics business to scale up without much initial cost (Camarinha-Matos et al., 2014).

Ultimately, the logistics 4.0 significantly contributes to the new digital value to the whole supply chain network, enhancing employee productivity, automation, and connectivity. In future, traditional line of pick, process, pack and ship in logistics sequences will be complemented by workstation-based logistics systems, if the volume per model further decreases. The automated guided vehicles (AGVs) also sometimes called self-guided vehicles or autonomous guided vehicles, are material handling systems or load carriers that travel autonomously throughout a warehouse or distribution centre, without an onboard operator or driver, primary use the IOT (Facchini et al., 2020). Most importantly they are used in transporting materials from receiving section to the warehouse and then delivering the materials directly to production lines. The recent technology used in smart logistics is the drone, the air delivery drones can ship out packages directly to the customer from the warehouse. Commercial drone market is expanding, and last mile logistics operators and small package delivery companies may be the perfect logistics business segment for drones to take off. By adopting drones, logistics service providers will drastically reduce transportation expenses related to truck capital expenditures such as maintenance costs, fuel, insurance, and more.

5. Conclusion

With the wide spread of the concept of industry 4.0, logistics 4.0 is gaining ground. Recently the digitization of logistics processes has been leading to an epoch-making transformation that will lead to a new way of understanding logistics. The evolution of logistics 4.0 is also pushing the boundaries and changing how the logistics industry is taking a new landscape in the business world. To remain competitive and enhance responsiveness, keeping up with the latest logistics 4.0 technology is a must. This breakthroughs in logistics 4.0 will continue to push the boundaries for years to come.

This paper clearly explored the proliferation of industry 4.0 in Logistic sector, highlighting its numerous effectiveness and efficiencies through the enhancement of shipment tracking system, IOT, cloud computing and smart logistics, but still there are many areas which remained untouched or needs to be explored with altogether different dimensions and perspective. For example, future research should focus on longitudinal studies of logistics 4.0 to measure the degree of cost efficiency and responsiveness over a period of time.

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Servitization as the Mediator Role in Intermodality and Freight Transport Operations

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Abstract: The term "servitization" refers to a method used by industrial businesses to generate value by focusing on improving service capabilities. It is more than providing services – it involves the processes and systems to provide services. The objective of this concept paper is to outline the research to investigate servitization as the mediator role in the factors affecting intermodality (within a mode) and freight transport operations. It is proposed that qualitative approach be adapted by gathering information via focus group from both the providers and the customers. The study involves the examination of a case of servitization involving both parties. To facilitate this process, we the TOE (Technology, Organization, and Environment) framework will be used. TOE is a theoretical framework that explains technology adoption in organizations and describes how the process of adopting and implementing technological innovations is influenced by the technological context, organizational context, and environmental context. In summary, it can be concluded that customers are less concerned with technological factors than providers. Both parties have acknowledged that with institutional barriers, it is difficult to establish a servitization culture. It has also been identified that the state of the national economy is a significant environmental factor in determining whether servitization is implemented.

Keywords: servitization, intermodality, cost-efficiency, service capabilities

1. Introduction

A single bill of lading is used to transport goods across multiple modes of transportation without the need to change load units, and this is known as intermodal freight transport (IFT) (Hanssen & Mathisen, 2014). For the transportation system to run smoothly, intermodal transportation involves many decision makers who must work together. A review of the most recent research on intermodal freight transportation planning issues is provided by Sun et al. (2022) where they mention that intermodal transportation is an efficient mode of transportation where it combines several different modes of transportation into a single mode of transportation. When the chain is fully integrated and can be seen as a complete door-to-door service, intermodal transportation emerges as a new mode of transportation (Babic et al., 2022). The intermodal transport flow requires a higher level of coordination. In intermodal operations, decision-making support tools can help the actors and stakeholders involved.

To remain competitive and better serve their customers, industry has been increasingly utilizing services since the 1980's. As the emphasis has shifted away from tangible goods to intangible services, this is known as "servitization."

2. Literature Review

To implement servitization, one must move away from the conventional model of a product to a products and services system (PSS). PSS is an integrated system that combines products and services for the benefit of customers, and it can help reduce environmental impacts (Vezzoli et al., 2021). An entirely new business model is needed to implement PSS, which focuses on creating a system that can meet specific customer needs through the combination of product and service offerings. Organizational structure, processes, and

cultures can change because of the model's implementation. Also, material consumption is clearly linked to climate change, so the impact of various industries may vary. Changing from linear to circular material flows, which is now referred to as a "circular economy" by the European Commission, may help reduce this environmental impact. The European Commission (2016) defines a "circular economy" as an economic system that preserves the value of products, resources, and materials in the economy for as long as possible.

Furthermore, Roll Royce, a manufacturer of aircraft turbines, and Xerox, a photocopier manufacturer, are just a few examples of companies that have been successful in the service economy. Despite this, servitization has the potential to spread to a variety of different industries. The road transport sector is an example of this, where the traditional sale of a truck is replaced with the sale of a transportation service. For road cargo haulage customers, the concept of purchasing vehicles is being replaced by the concept of purchasing operational capabilities. Rather than simply selling trucks, truck manufacturers are now being compelled to provide customers with product-service solutions

The anticipated outcome of the emerging Transportation as a Service (TaaS) model is expected to be more users but fewer vehicles on the road. Mobility as a Service (MaaS), also interchangeably known as TaaS, is the term used to describe the widespread shift away from personal vehicles and toward service-based transportation. This includes bike sharing, e-scooters, and ride-sharing services like Uber and Lyft, among other things. TaaS will greatly reduce transportation expenses, improve mobility, and increase access to employment, education, and healthcare, and assist in making cities more livable, safe, and clean (Litman, 2022). The logistics services industry's performance outcomes are frequently recognized from the perspective of service emphasis (Richey et al., 2022).

As transporters seek better value propositions from logistic service provider (LSP), they are increasingly competing on the services they offer. According to Amonkar et al. (2021), a few perspectives place service intensiveness as the key enabler of logistics performance in this context. When it comes to creating value-added services for shippers, Khakdaman et al. (2022) outline service flexibility, service reliability, and service efficiency. A limited view of the service emphasis is provided by these viewpoints; however, the intrinsic mechanisms by which LSPs maximize their logistics performance outcomes are not detailed. When it comes to generating value for LPS, intermodal freight operations are becoming increasingly important. Consequently, intermodality enhances the service emphasis of logistics by facilitating the transit of goods through the optimal deployment of modes and routings to gain time and cost advantages (Khakdaman et al., 2022).

As a result, many LSPs are required to form an intermodal service supply chain to provide LPS with a comprehensive service offering (Kim et al., 2020). Since interorganizational capacity, resources, and processes are critical to generating value added services through the supply chain, from this vantage point, a freight service supply chain can be managed by a larger LSP that coordinates and collaborates with multiple LSPs to provide transporters with value-adding services (Connor et al., 2020). While this view also captures the role of an LSP in the service supply chain to indirectly fulfil the transporter's service expectations.

3. Methodology

To unlock the full potential of intermodality, it is necessary to conduct in-depth research into how to improve the freight industry's servitization level. It is also an inevitable decision to follow the global industrial development trend toward service. The role of servitization as a mediator in intermodality and freight transport operations is explored in this paper. For this reason, semi-structured interviews with two top companies that were both parties to a servitization contract but were playing different roles (provider and customer) were conducted. The intention was to document various viewpoints on the experience. The analysis of the data was supported by the TOE framework. The introduction of a new business model like

PSS can be examined using TOE because it offers a useful method for examining organizational innovation and acts as a mediator for understanding the enabling factors.

There are two parts to the methodological approach: When it comes to Servitization, the first step is to conduct a thorough literature search and definition review. Separation into these parts allows for a more in-depth analysis of the literature and corresponding explanations. As a result, it is possible to draw conclusions about attitudes and intentions. In addition to scientific papers, definitions found in reports or on the websites of MaaS companies and projects are examined. Searches for "Servitization" and "Intermodality" in the title, abstract, or keywords of scientific publications using Google Scholar, Scopus, and JSTOR were conducted.

Second, focus groups are held to discuss the derived components considering the findings of the literature review. For gaining a comprehensive understanding of a particular research topic, this qualitative research method involves holding discussions with a predetermined group of people about specific topics. Focus groups, according to some researchers, provide more candid responses than interviews or surveys (Luke & Goodrich, 2019). The dynamic group interactions are at the heart of the focus group discussion (Yu-Lun et al., 2021). Instead of asking one question at a time to each participant, it is beneficial to have them interact with one another. The moderator's job is to encourage and guide the participants in an interactive discussion. The number of participants in a focus group has not been agreed upon by researchers. A group of four people is ideal because of the subject matter's complexity, which Greenbaum (1998) refers to as a "mini group". A heterogeneous group of participants is to be chosen for this study, despite the claims of some researchers that a homogeneous social-cultural background is necessary to foster discussion (Kindsiko & Poltimäe, 2019). End-users, on the other hand, must have a fondness for smartphones to produce useful results. A set of questions and a guideline would be created in advance to keep the discussion moving and allow for comparisons between the various groups. Preliminary testing of this guideline found it to be understandable and consistent. To ensure the highest level of accuracy, the meeting will be videotaped and transcribed verbatim. The conversation will also be documented by a second moderator who listens in on the proceedings. Servitization is a new concept, so the moderator uses a presentation, a video, and examples of Servitization in real operations to explain the concept to the participants who are being polled.

4. Summary and Conclusion

From the foregoing, it is clear that Logistic Service Providers need to adopt the new model of intermodal transportation and provide an encompassing end to end service. This is called Servitization. The study using focus group described above will bring to surface the level of understanding of this concept and its prevalence in the current practice in the industry. Analysis can then be carried out to determine Servitization as the moderator role in intermodality and freight transport operations.

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Green Shipyards: A Panacea to Ship Breaking and Ailing Shipyards in Ghana

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Abstract: This conceptual paper seeks to explore the prospects and challenges of ship breaking in Ghana through the concept of Green Shipyards. The shipyards within sub-Saharan African (SSA) countries have been struggling for many years and have been unattractive to ship owners. Shipyards in Ghana are riddled with various weaknesses ranging from the lack of finance, expertise, technology, and reputation to be less competitive than more established shipyards from South Asia. Ship breaking is a significant step in the end of the lifecycle of ships. Ship breaking is essential; but it is considered a nuisance to the environment and presents various issues of social injustice. Nonetheless, it provides an attractive business prospect to Ghana since it not targeted by many shipyards in the SSA region. Ship breaking does not require huge financial outlay and technology, whilst there are ready markets for steel products which are a major by-product of scrapping. Therefore, the emerging ship breaking industry along coastlines of Ghana provides an opportunity for shipyards. Literature review of publications; search and appraisal of related documents found that, in Ghana, ship breaking is unregulated and straddled with weaknesses of law and governance; policy and procedures; and enforcement. In addition, the management of ship breaking is riddled with poor working practices, low environmental standards and human resource abuse that leave much to be desired. In line with the research objective of regulating the industry, Delphi technique will be employed to obtain an impartial provision of feedback from experts to predict and set the future direction of the ship breaking industry. This approach was selected due to its flexibility to obtain expert information from a wide range of fields within this study. The findings are expected to provide insight into the opportunity for regulation, legalization, and enforcement, thereby creating an environment for a Green Shipyard. It is also expected to propose public-private partnerships that create economic opportunity for Ghana.

Keywords: ship breaking, shipyards, ailing shipyards, environment, green shipyard concept

1. Introduction

Shipping is a vital aspect of international trade which involves moving large tracts of goods over long distances; however, shipping may not be possible without the role of shipyards. Shipyards are vital in the building and maintenance of ships as well as playing a role when ships are finally laid off although most shipyards are focused on the birth of ships and the maintenance aspects of ships rather than the end cycle of ships.

Shipyards are vital for the economic growth for a maritime nation through the provision of jobs, raw materials, and revenue. Vakili et al. (2021) highlights the four cycles of shipping namely the design, construction, operation, and ship breaking. Shipyards occupy the aspects of construction, repairs (part of operational cost) and to some extent ship breaking within the life cycle of ships. Ship breaking is described as complete or partial dismantling of a ship to recover components such as scrap iron; steel and its related components for the purpose of recycle and reuse (Rabbi & Rahman, 2017).

Badrus et al. (2019) solidifies the importance of shipyards by stating that ship repairs are high up the list of the budget of ship owners and covers about 40% of their operational cost. In supporting the importance of shipyards to an economy Soh et al. (2019) in their research postulate ship building as the prime mover in driving shipping in their study focused on Malaysia. Bodul and Jakovac (2020) view shipyards as a

useful tool in reducing unemployment in a country where a broad spectrum of professionals can be employed due to its unique characteristics. Chao and Yeh (2020) provides information on how shipyards in China, Japan and South Korea are contributing foreign exchange to their respective economy. Ashari et al. (2019) points to shipyards as vital for a nation's defence systems while further highlighting its relevance for transportation promotion and economic development.

Shipyards are industrial production facility where ships are designed, developed, built, repaired, and dismantled (Vakili et al., 2021). Shipyards are thus equipped to carryout various industrial processes such as cutting, surface treatment, bending, welding, blasting, painting, and coating as well as other relevant industrial processes related to ship building, repairs, and dismantling. However, these activities have the potential to adversely affect the maritime environment (Ashari et al., 2019). Ship repairs and ship breaking can produce all sorts of waste and are exposed to various degrees of harmful substances such as asbestos which is detrimental to the environment. Work at shipyards, if not regulated are also prone to industrial accident and injuries. A study conducted at Genoa Shipyard revealed a higher mortality rate from effects of asbestos (Merlo et al., 2018).

Like any other industrial production business, shipyards are subject to both internal and external forces which if managed well can make them profitable. Key challenges of a shipyard include competition, governmental regulations (or the lack of it), resource mobilization, management capability, technological revolution, as well as natural disasters. Strandhagen et al. (2020) observed that the significant reduction of oil prices created economic stress on shipyards leading to the search of more efficient practices to mitigate the financial strains. This highlights how shipyards are greatly affected by external forces. Operating shipyards is capital intensive and thus developing processes and systems to make shipyards efficient is vital. Poulsen et al. (2017) provided insight into the strategies shipyard used to remain competitive and highlighted the role of adaptation of global strategies to the changing environment. Thus, prescribing adaptability and being dynamic with strategies based on the ever-changing economic landscape.

1.1 Ship Breaking as an Adaptive Business Strategy for Shipyards

An adaptive strategy that a struggling shipyard can adopt is to look at the life cycles of ships. Shipyards can target the end life and specialize in Ship breaking to survive and increase their profitability. The end life of ships may be well targeted since the technology, and cost implications in dealing with that area are much less than that of the ship construction and maintenance stage. Furthermore, many shipyards are much focused on the ship construction and repair, therefore ship breaking remains a niche.

Ship breaking is a very important activity on the coastline of South Asian countries such as Pakistan, China, India, and Bangladesh, with these nations accounting for about 96% of the world's ship breaking volume (Andrikopoulos et al., 2020). South Asian countries have become the destination of choice for most ship owners seeking to break vessels due to slack regulation and the cost of ship breaking being far cheaper in these areas than western countries which have stringent regulations with a higher cost comparatively (Ali & Pearce, 2020). Ship breaking has its advantages in job provision, revenue generation and providing of steel for various allied industries.

However, a lot of debate has been generated over ship breaking for some time now, with various proponents calling for stricter regulations. NGOs such as Shipbreakingplatform.org highlighted that the methodologies used in the South Asia countries as the major challenge. There have been concerns raised about the competitiveness of these shipyards which embark on beaching which is relatively a cheaper method of ship breaking. Ship breaking using beaching is riddled with various associated challenges such as pollution, destruction of maritime habitat, damage of potential tourist beaches as well as issues of poor working conditions. As a panacea to the challenges faced by ship breaking it is recommended to adopt Green Ship Breaking policies and developing Green Shipyards. Green Shipyards are yards built with environmentally friendly focus and processes (Surnayo, 2015). The role of the regulators cannot be

emphasized more in ensuring that responsible methodologies are adopted. The government could further support by providing incentives to make shipyards competitive in the ship breaking market. This is observed in the case of China where governmental focus, policy and strategy have benefited the economy with little detriment to the society.

This paper will focus on the preliminary investigation of ship breaking as a catalyst to revive the ailing Tema shipyard within Ghana. The Tema shipyard was established with the aim of ship building and ship repairs but has over the years gone through all sorts of challenges and is currently struggling for a share in the ship repair market and virtually is non-existent in the building of Conventional vessels. Global Issues, corruption and mismanagement are described as the major issues plaguing the shipyard in Yawson's view (2017.) The Ghana Ministry of Finance report (2016) speaks of the debt stoke of the yard eroding its profits. The lack of capital has also been an enemy to the shipyard as captured by Coomson (2019). Kambose (2020) further shed light into the shipyards challenges by stating that lack of infrastructure and skilled labour has been detrimental to the progress of the shipyard.

1.2 Problem Statement

The focus of this paper is to investigate the prospects for ailing shipyard industry in Ghana in light of setting Green Shipyards to capture the opportunities in ship breaking. At the same time be cognizant of the negative impacts of this industry and find ways to regulate and mitigate associated risks. The Tema Penang Shipbuilding Construction Corporation (PSC) Shipyard in Ghana is the focal object of this study. This shipyard is currently plagued with a myriad of problems mentioned earlier. Although the steps taken earlier have not resulted in a sustainable solution, this paper plans to propose a strategic and holistic approach to regain its competitive position. The paper explores the challenges of ship breaking from a regulatory, economic, and sustainability dimension and proposes appropriate policy framework and incentives which can be implemented to rejuvenate the industry in Ghana. The authors' suggestive proposition would be seen as the introduction on Green Shipyards for the country.

1.3 Objective of this Research Paper

Shipyards are useful contributors of a national economy. Hence the country loses a great deal of revenue if its shipyard is under performing. Therefore, the development of an adaptive approach is necessary to cure the challenges of the shipyard. Developed countries have taken the lead in ship building and repair market due to their superior financial strength, reputation, governmental backing, expertise, and technology. However, opportunities remain in managing end of life of ships where countries such as Ghana could capitalize and benefit from it. It is assumed that ship breaking needs far less technology and the financial capital as compared with ship building.

To identify opportunities and challenges to ship breaking as an industry opportunity for Ghana, particularly, the PSC Tema Shipyard, the objective of this paper is to:

- a. Determine the potential of ship breaking being a strategic market to focus on in helping cure the challenge of the Ghana shipyards.
- b. Determine the role of government in the strategic focus on the end cycle of ships.
- c. Identify socio-economic challenges to ship breaking and propose mitigative steps.

1.4 Research Questions

The following are the research questions

- a. What are the benefits in targeting the ship breaking market by the Tema PSC Shipyard?

- b. What are the potential challenges of strategically targeting the ship breaking market by the Tema PSC shipyard?
- c. What should be the role of the Ghanaian Government in the steps to targeting the ship breaking market?
- d. What are the key socio-economic challenges in ship breaking and how best to address them?

2. Literature Review

2.1 Trends of Shipyards

Negera (2017) observes a trend whereby South Korea, Japan, and China have been the leading ship building and ship repair nations since the 1960s. These nations currently account for about 80% of the ship building market with China as the leader. Tulykova (2019) research suggests that shipyards are affected severely by global economic and political events hence the global financial crisis which occurred between 2008 to 2009 led to many shipyards struggling, however strategic financial interventions by the government of Japan, South Korea, and China were instrumental in making them survive and recover quickly thus leading them on the path to being powerhouses in the shipyard sector.

A number of global and internal factors impact the fortunes of shipyards; however, the driving force of policy cannot be underestimated. “The Strategic approach of China and its policy framework was instrumental in making it a choice destination particularly with the provision of subsidy making cost of doing business relatively cheaper than other competing regions” (McMahon, 2021).

Technology plays a competitive role in shipyard industry. Asian countries particularly China has caught up with the technological advancement of Western nations and thus is able to compete and attract ship owners seeking to build and repair ships. Negera (2017) highlights how Japan and South Korea were leading China due to their superior Technology however with government subsidies and technological growth China was able to surpass its competitors. It’s important to note that Shipyards are affected by allied industries, hence advancement in technology in such industries help to improve the operations and efficiency of shipyards. Zhao-Hui et al. (2017) article brings to fore the struggle China had due to the lack of technology that prevented them from making an essential component of ship building known as the curved block which is prefabricated sub-assembly component of a ship with curved plates to fit into the hull of a vessel. , however once that technology was developed by China there was no restrictions to the success of their shipbuilding industry. Zhao-Hui et al. (2017) spoke of how the ship building industry is moving into more automated system.

Tantan and CamgOz-AkdaG (2020) brings to fore the growing trends towards the concept of sustainability and focus on Green Shipyards. Thus, regulations and focus from international bodies may drive ship owners towards Green Shipyards for ship breaking.

2.2 Policy Effect on Shipyards

Shipyards are capital intensive industries and thus require governmental support to thrive especially since they contribute extensively to the economy of a country (Hossain & Zakaria, 2017). The importance of governmental support and its role in making shipyards thrive can be seen in countries such as China, Bangladesh, and South Korea. The role of improved technology and innovation drive the shipyard business as stated by Agarwala and Chaudhary (2019) hence policies geared towards technological development and innovation can always be impactful.

The shipyard of Ghana can benefit from a strategic policy development from the government of Ghana in drawing lesson from China. According to Kalouptsidi (2018) China in 2006 focused on the ship building and maintenance and introduced special subsidies which are believed to have been a catalyst in making

China bypass leading ship building nations. The introduced subsidies by the government of China ensured that their production cost was relatively cheaper thus guaranteeing the construction and maintenance of vessels at a cheaper cost to their competitors (Kalouptsidi, 2017), this move ensured “that China controls 40% of the ship building market” (McMahon, 2021). Although the subsidies were useful in making China meet its strategic objectives some challenges came to bare. “The challenge had to do with many new entrants getting into the Chinese shipbuilding market. This led to intensification of industry fragmentation and low-capacity utilization which caused a rapid decrease in ship prices leading to a threat to the survival of many firms hence the government of China placed a moratorium on the entry of new firms and supported only shipyards on a developed whitelist in order to save the industry” (Barwick et al., 2021).

Siddique et al. (2019) highlights how the policy drive of China inspired the Bangladesh government to focus on ship building as means of boosting the nation’s economy. This act caused the shipbuilding industry to grow at a rate of 11.9%. Siddique et al. (2019) further highlighted how the shipbuilding industry was the major contributor to the Gross Domestic Product (GDP) growth of the Bangladesh economy although the policy Bangladesh is embarking on was not clearly highlighted, however credit is given to a few businessmen in taking the necessary initiatives to boost the sector.

Jaison (2021) focused on the shipbuilding, repair and recycling sector of India and concluded that the policy direction of India hasn’t helped to make the industry meet its utmost potential although it has the advantage of a vast coastline, cheap labour, and proximity to international sea routes. This view buttresses the point that, drafting policy without carefully developing the right implementation framework may not produce the desired effects. Jaison (2021) article thus affirms Mourougane (2020) view by stating that the shipyards are under performing although the Indian government has over the years supplied subsidies, loans, and other capital investments. However, the shipyards still struggle due to High Cost of working capital, bank guarantee cost and the huge tax burden shipyards face (Mourougane, 2020). Sharma (2019) argues that a defense, Industrial, Public and Private partnership will be the best way to go for a struggling shipyard sector in India, however the article doesn’t throw light as to how this partnership should be done and the potential bottlenecks.

The conclusion that can be drawn from the policy impact discussed in the three countries that is China, Bangladesh, and India clearly shows that governmental focus and policy is really needed to drive the shipyard sector; however, policy without effective monitoring may lead to some challenges. Furthermore, policies should not be rigid but adaptive. For the Tema PSC Shipyard to thrive especially in focusing on the end cycle of ships, governmental support will be crucial, however the policy development may need a holistic approach and involvement of stakeholders. In conclusion the policy framework will need to be agile and adaptive to changing circumstances.

2.3 Benefits of Ship Breaking

According to Totakura et al. (2021), ship breaking plays an essential role in ship supply and demand especially with regards to freight rates on ship building and has great potential for financial development. Ahmed (2020) outlines Source of skilled labour, favourable geographical location, and available markets as reasons for a ship breaking business to thrive. Ghana as a nation has a good market for scraps ranging from large industries like the Volta Aluminium Company to the local dealers who usually export these scrap metals (Kumi et al., 2019). As of 2016, Ghana officially exported metal scrap to 31 countries (Grant, 2016). According to Nkansah et al. (2015) there is a growth economically of the scrap business in Ghana; research by Gyimah et al. (2021) highlights the importance of the scrap business especially in the informal sector of the Ghanaian economy which suggests a ready market for ship scrap. According to Daum et al. (2017) the scrap industry has one of its largest sites in Agbogbloshie in Ghana with a population of about 6000 people employed directly and 1500 indirectly with majority of them involved in the scrap business. This suggests that there is a market to exploit and through governmental policy and support it could be beneficial and marketed using the Green Shipyard Concept. This will be crucial since an unregulated scrap business may lead to dire environmental consequences.

It is important to note that ship breaking will always have a market for as long as vessels are being built especially since most vessels typically have a life span of 25 to 30 years (Sornn-Friese et al., 2021) or they will become inefficient and less economical for use as suggested by Jayaram (2018). It must be also that the process and technology for ship breaking is less complex and cheaper as compared to building and repairing ships evidenced of the fact that most ship breaking in Asia is done on beaches (Hossain, 2017) although beaching for ship breaking should not be encouraged.

The steel from scrapped ship is so important because it plays a vital role in reducing the exploitation of new steel from the environment while also helping reduce the use of energy required by steel industries thus providing environmental benefits as suggested by Ali et al. (2019). Ship breaking equally provides employment and a great deal of revenue for an economy as declared by Rizvi et al. (2020). Devault et al. (2017) supports the view of Rizvi et al. (2019) and Ali et al. (2020) by stating that ship breaking provides benefits to an economy through the provision of jobs and raw materials. Although Ship breaking introduces environmental concerns adopting the Green Shipyard Concept will aid in surmounting the environmental challenge.

Ship breaking has been seen as a problem riddle industry with social justice issues, as well as substandard facilities particularly in Asia, however these Asian countries that is China, Bangladesh, India and Pakistan over the years have improved the standards of their facilities to meet with international regulations (Sornn-Friese et al., 2021) however they have still remained relevant in the ship breaking market which signifies the fact that ship breaking can be done in a responsible manner and still remain competitive.

2.4 Stakeholder Theory

This study chooses to use stakeholder theory as the appropriate theory for this research. This is important because the shipyard industry activities are influenced by stakeholders. According to Masefield et al. (2021) engaging stakeholders throughout policy development is extremely vital in the success of the policy. Masefield et al. (2021) further explains the importance of engaging stakeholders by stating that engaging stakeholders throughout policy development will provide important information for policy developers to understand the needs of stakeholders. Narbel and Muff (2017) view stakeholder engagement as a value creation process and an enhancement on the limitation of the shareholder theory thus making the firm much more sustainable. Freeman and Dmytriiev (2017) further clarify the role of stakeholder theory as the firm's responsibility towards its stakeholders. Freeman and Dmytriiev (2017) highlight stakeholders as customers, employees, financiers, suppliers, and communities. The government of Ghana as the owner of the shipyard will have to identify its stakeholders and the impact its policy will have on them as suggested by Rose et al. (2018)

Barney and Harison (2018) points to the view of many experts believing that stakeholder theory engages all the critical issues in business all though some believe not all have been addressed. However, this paper believes that the critical issues to be addressed are fully covered by the theory. This is so because the theory provides focus on providing value for the stakeholders and gaining their input. There is however the possibility of a consensus challenge due to individual interest as discussed by Barney and Harrison (2018, p. 204). In other to curtail these challenges, Freeman et al. (2021) advocates for a sustainable stakeholder relationship while calling for the resource-based theory to be aligned with stakeholder theory as a strategic path to undertake.

While stakeholder engagement is critical, it is vital to note that stakeholders are influenced by both internal and external environment; hence there is the need to engagement social, political, and legal experts to help guide process to eliminate stakeholder engagement drawbacks (Gomes et al., 2020). Irrespective of some potential drawbacks related to the stakeholder theory, it remains relevant since a firm's strategic decision has impacts on a wider group of people beyond shareholders as suggested by Valentinov and Chia (2022). Haataja (2020, p.10) suggest that stakeholder theory amplifies the theory that a relational management approach of stakeholders is the best approach. In conclusion the theory is generally focused on the

relationship of a firm and its stakeholders and how that relationship contributes to performance and value addition process (Jones, 2018, p.371). It will be vital for Tema Shipyard to establish stakeholder engagement when embarking on the policy of ship breaking taking into consideration the discussion on the stakeholder theory.

2.5 Conceptual Framework

The Conceptual framework provides a relation between policies, financial investment, sustainability, supply, and demand. The formulation of policy based on the focus of Green Shipyards with the strategic view on ship breaking will have an impact on the supply and demand relationship in the industry, the characteristics of policy effect on supply and demand will provide attraction for financial investment and which will provide the sustainability of the Green Shipyard for ship breaking. It can also be observed that the supply and demand relationship if positive can shape policy which intend will provide incentives for financial investors. The desires for sustainability can also influence by the relationship between supply and demands while impacting policy and the need for investment into the industry. How well these five key areas relate can make the Shipyard business focused on green ship breaking successful and provide benefits across the interrelation of these five areas.

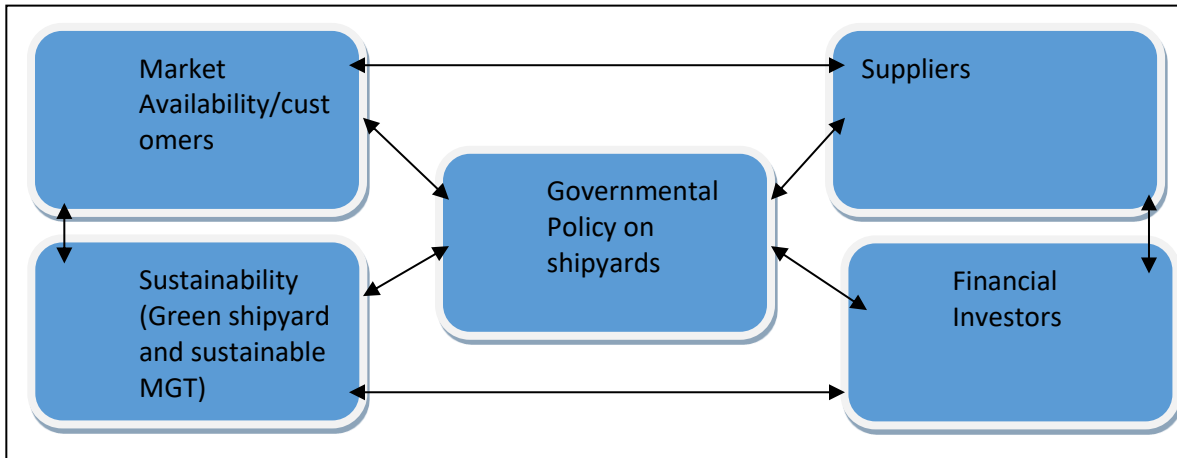


Figure 2. Conceptual Framework

3. Methodology

3.1 Delphi Technique Justification and Process

The paper employs a review of literature and data collection using the Delphi technique which is a repetitive expert centred methodology for research. The Delphi technique is employed due to its ability to be used across wide fields of research, furthermore the Delphi technique thrives on the utilization of untainted opinion of experts; this view is buttressed by Beiderbeck et al. (2021).

Kalaycı Onaç and Birisci (2019) describe Delphi Technique as a data collection tool which focuses on experts with problem solving skills (p. 740). Kalaycı Onaç and Birisci (2019) extol the uniqueness of the Delphi technique in ensuring “participation confidentiality, controlled analysis of group responses, and controlled feedback as the main elements, this makes the technique appealing” (p. 740). The main focus of the Delphi technique is to achieve consensus amongst experts on specific topics (Hernandez-Leal et al., 2022, p. 2). It must be noted that the Delphi Technique is a repetitive process that ends when consensus is achieved however a researcher could choose a percentile range to signify consensus, in view of that Sekayi

and Kennedy (2017) outline 75% as ideal for consensus for every question. This is effective in reducing boredom of participants and vital to work within timelines allocated to the research.

The Delphi process to be used is summarized in Figure 3 below. These involve a repeated process of administering questionnaire, analyzing, re-administering questions which did not meet the required consensus percentage of 75. The process continues until consensus is achieved for all questions. For the purpose of completing the paper, there will be three (3) rounds of administering questionnaire. Summary of views will be shared with experts between rounds of administered questionnaire as a vital aspect of Delphi technique as outlined by Beiderbeck et al. (2021).

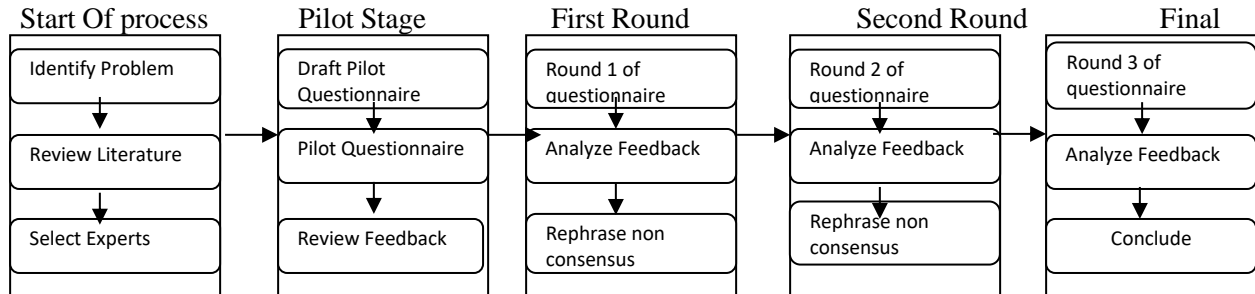


Figure 3. Delphi Process Flow Diagram'

3.2 Sampling Size and Criteria for Selection

The paper seeks to draw experts from both industry and academia to help provide the data required. A total of not more than 30 expert panels will be used which is line with the recommendation of Sekayi and Kennedy (2017). Hence, 30 experts with minimum five (5) years of experience will be drawn from policy and legal professionals, maritime administrators, surveyors, ship managers/agents, and academia.

4. Presentation of Data and Analysis

It is the expectation of this paper that data collected from our experts by use of Delphi technique and analysis through the JASP software will help us answer the objectives of this research and determine if targeting the end life cycles of ships will be the appropriate strategy to use.

The results will be compared against deductions made from literature review. Where deductions agree with findings it will be highlighted while areas of departure will provide a basis for further research.

4.1 Data Analysis

The data obtained from the Delphi technique will be analysed along the following lines with the following expectations:

4.1.1 Policy is Key (The Role of Government)

Based on the literature discussed the importance of policy by government is recognized. Therefore, the data received will be analysed and the research expects opinion of expert participants to align with literature discussed, the paper also expects that expert view will be divergent on the shipyard focusing on the end life of ships as a matter of strategy and policy direction. There are various literatures that discuss private public

partnerships as best options and thus a debate is expected in that direction with regards to policy. The role of policy to attract investors for needed capital injection is one that is expected to achieve consensus however the nature of the policy will be subject to debate and perhaps form a basis for future research.

4.1.2 *Technology and Infrastructure*

A review of the literature dictates that technology is a major driver of the ship building industry hence ship owners are more inclined towards shipyards with upgraded technology, however the lack of capital introduces a challenge for Ghana thus it's expected that participants will draw same conclusion. The paper expects a general consensus on the shipyard lacking the ability to compete with more established shipyard in the building and maintenance of ships. It's expected that expert participants will agree that Ship breaking technology is well within the reach of the Tema shipyard than the technology or infrastructure for ship building and repairs hence their competitive strength will be much more inclined towards ship breaking.

4.1.3 *Ship Breaking Opportunities and Green Shipyard*

Countries like Bangladesh and Pakistan has generally benefited from the Ship breaking industry as observed from the reviewed literature; however, they have also been known to have been riddled with varying degrees of challenges ranging from environmental concerns to work and safety issues. This viewpoint is expected to be expressed and various proposals will be to find a balance between the associated benefits of Ship breaking and the negative issues associated with it.

Green Shipping Concept is seen as a viable approach in finding a balance between reaping benefits of ship breaking while preventing the negatives issues associated with Ship breaking; however, it is one that requires excellent sustainable management practices to be competitive. The paper expects that this view will be upheld and thoroughly discussed. Literature reviewed establishes cost as a major force which determines where ships are built, repaired, or scrapped. Hence data received for this paper is expected to uphold this view and make suggestion on how this can be managed.

5. **Conclusions**

The expectation of this paper is that results of data analysed and comparative analysis with deductions of the literature reviewed will help the paper reach conclusions and provide useful recommendations to guide the implementation of ship breaking as a strategy for the Tema PSC shipyards if the findings endorse it as the appropriate strategy.

5.1 *Expected Outcome*

Key conclusions expected include the following:

5.1.1 *Achieving Competitiveness – Tema Shipyard*

Tema PSC Shipyard stands a chance to be competitive in the ship breaking market and will need to explore that aspect of the market however for that to be possible, the role of government in developing policy is important. Policy will drive investors into the Ship breaking industry and boost it into a major activity. A major question that policy will have to address is if Ship breaking regulation should be limited to the Tema PSC Shipyard or not. This will be subject for future research and focus.

5.1.2 *Ship Breaking as a Revenue Stream*

Ship breaking can certainly generate revenue howbeit the methodology for ship breaking may be a major factor to be considered and presented by expert participants. Green Shipyard Concept is expected to stand tall on the list of the experts as the appropriate methodology.

5.1.3 Green Shipyard

Green Shipyard Concept may be the way to proceed however policy by government will be vital, as well as sound sustainable management practices in order to ensure competitive pricing. Competitive prices are important since cost is a major driving force as discussed in literature.

5.1.4 Stakeholder Engagement

The role of stakeholders will be considered a vital element in the drafting of policy and strategy to focus on ship breaking for the shipyard.

5.1.5 Regulations and Policy

Whiles policy drafting is important, monitoring and making policy adaptive to changing situations is vital since shipyard business is affected by global market events. How adaptive a policy that guides strategy is will make for good discussions in future research. In conclusion the role of government from the research questions is policy formulation and monitoring whiles the advantages of revenue generation and availability of market and supplies may be seen as the pros. Environmental issues and divergent views from stakeholders may be a con which may need to be surmounted.

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Evaluating Digital Transformation of the Pharmaceutical Supply Chain: A Case Study using SWOT Analysis of Hospital in Vietnam

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Abstract: Health care delivery is complex, and the ability to maintain consistent quality and safety standards varies. Pharmaceutical supply chains today face enormous risks and uncertainties. The objective is to study digital transformation strategies in hospitals to improve the safety and convenience of pharmaceutical services when providing healthcare services. In this study, a SWOT analysis is performed to identify strengths, weaknesses, opportunities, and threats with a digital transformation case study for hospitals in the pharmaceutical supply chain in Ho Chi Minh City, Vietnam. Information source for SWOT analysis of published articles and reports in the following aspects: Digital transformation environment of hospitals in the global pharmaceutical supply chain; new technology with reliability, safety, and security; Culture with human resources and customer experience; Laws and policies. The results identify strengths, weaknesses, opportunities, and threats from the SWOT analysis. Using the SWOT matrix with related strategies to maximize strengths and opportunities while managing risks or minimizing weaknesses and challenges in digital transformation is recommended for hospitals in the pharmaceutical supply chain. Finally, as the hospital is part of creating a solid pharmaceutical supply chain, decision-makers and stakeholders are encouraged to use lessons from SWOT analysis and planning to experience hospital digital transformation.

Keywords: digital transformation, development strategy, hospital pharmacy, SWOT analysis, supply chain

1. Introduction

Today, we know digital transformation is applied in many fields. Digital transformation refers to the changes associated with the application of digital technology in all aspects of human society. Digital transformation shows that almost all processes that were previously performed manually can be analyzed and transformed into a more scalable, more consistent, and faster digital process. This includes retail stores, warehouse management, supply chain management, customer relations, marketing and more (Baker, 2015). Digitization will create huge opportunities for supply chain organizations and practices. However, implementing digital technologies in the current supply chain requires a detailed understanding of its impact and benefits. It has also been observed that the digitization of supply chain processes will solve serious supply chain management concerns (Agrawal & Narain, 2018).

In the healthcare sector, digitization is an inevitable but slow process. As a result of the COVID-19 pandemic, healthcare delivery has undergone rapid digitization to meet new provider requirements and changing patient expectations (De-Mooij et al., 2022). The pharmaceutical industry is the fastest-growing high-tech industry in the world. Digital services facilitate sharing of up-to-date patient health data between different stakeholders in the care process (Petrova, 2021). The pharmaceutical industry seeks sustainable

solutions for the future to reduce negative environmental impacts and meet the highest ethical standards. The pharmaceutical supply chain literature shows that the adoption of innovative techniques can reduce pharmaceutical waste, improve the quality of healthcare services, and improve the effectiveness of inventory control, increasing the innovation of the supply chain and improving the reliability of the information in Figure 1 (Meidute-Kavaliauskiene et al., 2021; Zhang et al., 2008).

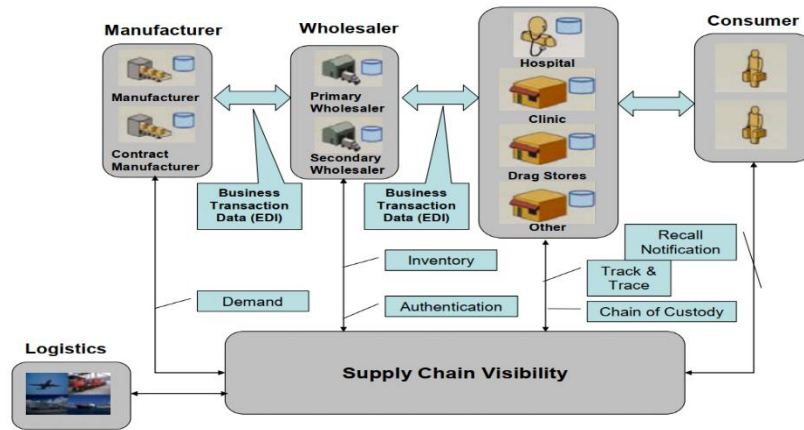


Figure 1. Understanding Local Pharmaceutical Supply Chain

However, the full implementation of lean innovation in the pharmaceutical supply chain has not yet been achieved; they seem to lack experience and knowledge in implementing initiatives (Meidute-Kavaliauskiene et al., 2021). Digital transformation in the pharmaceutical sector means implementing various digital technologies to improve the production and delivery of healthcare products and services. In the pharmaceutical industry, the following areas can be improved with digital transformation: Improve drug development; Helps achieve better patient care and interaction; Better drug research and development; Improve the distribution of pharmaceuticals; Cut the cost; Reduce carbon emissions; Achieve more transparency in the supply chain (Javaid, 2021).

There are also risks in the pharmaceutical supply chain that can not only waste resources but also threaten patients' lives. Internal uncertainties and risks, e.g., financial, quality assurance. Uncertainty and external risks, e.g., supply, demand, and environment (Wang & Jie, 2020). In this study, we are interested in the digital transformation toward smart hospital development strategy in the pharmaceutical supply chain, achieving more transparency in the supply chain, improving the distribution of pharmaceutical products in hospitals, help achieve better patient care and interaction.

The Vietnamese health sector has set specific goals to develop a smart health system, with plans to apply digital technology in three main pillars: smart hospitals for prevention, examination, smart treatment, and intelligent health management. One such initiative, the healthcare digitalized communication network model, is a closed network of communication channels operated and handled over the Internet in a hospital environment. Major hospitals in Vietnam have started to build and deploy the smart clinic model. For example, people can begin registering for medical appointments connected to the hospital's overall management software. The visiting patient receives an automatic ticket number with an ambient display showing the order of the ticket numbers. These steps initially help save management costs and create conditions for visitors to experience more convenient healthcare services at the hospital (Cameron et al., 2019).

Ho Chi Minh City will become a smart city with a strategy for 2030, a digital society. The common goal is that Ho Chi Minh City implements the digital transformation process, develop digital government, digital economy, and digital transformation in industries with the spirit of becoming the country's economic locomotive, taking the lead in the field of digital transformation. They are implementing Vietnam's growth

model. Ho Chi Minh City has many medical facilities operating in various ways; The city's health sector serves the people in not only the area but also the people of the southern provinces and the people of neighboring countries such as Laos and Cambodia. Ho Chi Minh City has 128 hospitals, accounting for 9.38% of the country, of which 82 are public hospitals, including general and specialized hospitals, accounting for 64.1%, and 46 private hospitals, accounting for 35.9%. Many hospitals in the city are large-scale with modern medical equipment, a team of specialized professionals, and modern techniques that bring high medical examination and treatment results (Giao et al., 2020).

Transformative change in the hospital environment is a challenge, and most transformational change fails due to a lack of leadership, vision, engagement, and communication (Burke et al., 2019). SWOT analysis is commonly used for policy-making, decision-making, and strategic planning (or planning) (Ghazinoory et al., 2011). In this study, the interest in digital transformation with related topics is transparency of the pharmaceutical supply chain, improvement of pharmaceutical distribution, and interaction of hospital-patient pharmacy care in the pharmaceutical supply chain research with the following specific objectives:

- a. Collect insights from digital transformation hospital experiences worldwide in the pharmaceutical supply chain.
- b. SWOT analysis of strengths, weaknesses, opportunities, and challenges of digital transformation that can affect hospitals in the product supply chain
- c. Recommend strategies for hospitals to prioritize digital transformation in the pharmaceutical supply chain

2. Literature Review

2.1 Digital Transformation Achieves More Transparency within the Pharmaceutical Supply Chain

In the healthcare sector, the pharmaceutical sector fulfills all the criteria for a complex and highly regulated industry, including multi-stakeholder involvement (e.g., countries, banks, supply companies, manufacturing companies, wholesalers, logistics companies, distribution companies, and prescribers/dispenser). These stakeholders have high decision-making power at many decision points that can be vulnerable to corruption without sufficient transparency and accountability. The overall goal of drug procurement is to ensure that a product is purchased in the correct quantity and quality at the right price for the correct cost and available when needed. Specific forms of corruption in drug procurement include process fraud, collusion, and between and between public and private entities. Corruption can manifest differently depending on the procurement stage (e.g., pre-bid, procurement, post-bid, and implementation) (Mackey & Cuomo, 2020).

Digital technologies that can detect and prevent fraud and corruption are especially important to address barriers to drug access, such as drug availability and affordability, stockpiling and drug availability, shortages, diversions, and penetration of substandard and counterfeit drugs (Mackey & Cuomo, 2020). A technology developed for application in the pharmaceutical supply chain. For example, Blockchain is decentralized, so anyone can access the ledger's data, and manufacturers can scan and analyze the ledger to understand drug requirements better. Similarly, consumers can also check the authenticity of a drug by checking its journey. If there is a faulty agent, it can be identified easily (Panda & Satapathy, 2021).

2.2 Digital Transformation Improved the Distribution of Pharmaceuticals in Hospital

According to WHO, about 30% of all medicines sold in Africa, Asia and Latin America are counterfeit. This is a big problem worldwide, and the situation is even worse in developing countries, where one in 10 medicines is counterfeit or does not comply with drug regulations. Counterfeiting is difficult to detect as these drugs pass through various complex distribution networks, thus providing an opportunity for

counterfeits to enter the authentic supply chain. Public health has become very concerned about the safety of the pharmaceutical supply chain, which is a group effort. Since health is everyone's top priority, many health organizations stress drug traceability during distribution to avoid fake drugs by using the latest information technology (Jamil et al., 2019).

Health care delivery is complex, and the ability of healthcare providers to maintain consistent standards of quality and safety varies. Smart hospitals offer the opportunity to develop data and analytics that track quality and safety standards across every patient, every time, in near-real time (Barnett et al., 2018). The primary function of pharmacists is to provide support to clinical services. Through the implementation of clinical pharmacy operating procedures, pharmacists manage the drug inventory and guide the treatment of patients (Dzierba et al., 2020). Logistics management in a hospital is a complex process that addresses various physical requirements, including pharmaceutical and non-pharmaceutical items. Procurement, distribution, and inventory of these resources through more flexible supply chains contribute to better pharmacy and inventory management within the hospital, which are fundamental to better hospital management. hospital facility management. In particular, for hospital pharmacy support services, an optimal inventory control strategy can proactively reduce the risk of excess inventory (Xie et al., 2022). Information technology was applied to management by establishing new automatic dispensing cabinets to solve the hospital expansion. Modifying the electronic order entry system to include new protocols and drug shortage information is also important in management (Dzierba et al., 2020).

2.3 *Digital Transformation Help Achieve Better Patient Interaction and Care*

A better understanding of the key concepts and defining features for “supportive care,” “best supportive care,” “palliative care,” and “hospice care” could provide a common ground for clinical and research communication and pave the way for standardization (Hui et al., 2013). Consensual Pharmaceutical Care was described as "Any professional activity in which the pharmacist interacts with the patient (and/or caregiver) and other health care professionals to meet the patient's needs, including making plans to meet the short-, medium-, and long-term goals of pharmacotherapy and using new technologies and other ways to keep in touch with the patient." (Morillo-Verdugo, Calleja-Hernandez, Robustillo-Cortes, & Poveda-Andres, 2020). The advent of an electronic medical record that integrates rich clinical data linked throughout the patient's healthcare journey has challenged traditional safety and quality monitoring audit organizations. and leveraged digital platforms to improve patient care (Barnett et al., 2018).

Improvements in health and care support information systems face many barriers. But fundamental to overcoming these barriers is understanding that in 21st-century health care delivery. eHealth is now integral to improving healthcare services (Organization, 2021). Telemedicine, tele pharmacy, artificial intelligence (AI), assistive medical devices, and electronic health records are digital transformation in healthcare that is reshaping the way medical professionals and patients interact. Intelligent systems capable of understanding health problems and complex new diseases will lead to innovations impacting the pharmaceutical industry (Acosta-Gomez, 2022).

With COVID-19 already experiencing unprecedented digital adoption, bringing healthcare delivery becomes critical to build on this momentum and reap the full benefits of digitizing practice. A paradigm shift in care needs to be undertaken. This requires a comprehensive re-examination of how every component of the healthcare experience, from digital tools to exam interactions, synchronizes to address the full spectrum of continuum needs of the patient during the journey (De-Mooij et al., 2022). The digital transformation in healthcare has the potential to make healthcare more human and personalized, but care needs to be taken to increase transparency and data security. Both patients and clinicians should be involved from the early stages of medical technology development to ensure that they are people centered. Healthcare technologists and engineers must have experience in delivering healthcare to the lives of patients and clinicians. These steps are necessary to develop a shared commitment to the design concept that technology and humane care are not mutually exclusive and can be symbiotic (Warrach et al., 2018).

3. Methodology

SWOT analysis involves developing a strategy for the future by analyzing the strengths-weaknesses and opportunities-threats of an organization. The word SWOT consists of the first letters of four English words, Strengths, Weakness, Opportunities, and Threats (Filiz, 2022). The study was performed using a database search at Google Scholar, the National Library of Medicine, and Direct Science (Mengist, Soromessa, & Legese, 2020). The author searched the source of the database during his doctoral thesis at the Malaysia University of Science and Technology and did other research (Nguyen & Premkumar, 2021, 2022; Quan, 2020; Quan & Chau, 2021; Quan & Rajagopal, 2021).

Secondary data will be collected first. Formal database reviews from articles published in multiple journals are preferred resources, hoping to have a solid baseline view of the research objective. In addition, the author conducts observational research in some hospitals and collects it through hospital conference reports and other relevant documents (books, legal documents, etc.) (Electronic Health Administration- Ministry of Health, 2020; Health, 2021; Quan, 2020).

In this study, perform a search with keywords related to hospital digital transformation in the pharmaceutical supply chain. Selection criteria during data collection, studies that were not published in Vietnamese or English were not included in the study. The data obtained in the study are documentary data without permission. As a result, no ethics committee, informed consent, or any legal permission was made to conduct the study. The steps of this research are structured as follows:

- a. We will first explore the issues that arise from hospital digital transformation in the conventional pharmaceutical supply chain by presenting some definitions we found in the literature and keywords from the mentioned document (Paksoy et al., 2020).
- b. Based on digital transformation advancements in smart hospitals in healthcare. We are interested in digital transformation in hospitals, achieving more transparency within the pharmaceutical supply chain, improved distribution of pharmaceuticals, and helping to achieve better patient interaction and care” owing to digital technologies.
- c. The SWOT analysis phase is applied to help identify aspects of strengths, weaknesses, opportunities, and threats based on data collected by hospitals implementing digital transformation in the supply chain pharmaceutical application in Ho Chi Minh City (Rauch et al., 2015).
- d. Then, the SWOT matrix is integrated into four separate strategies: strengths-opportunities (SO), weaknesses-opportunities (WO), strengths-threats (ST), and weaknesses-threat (WT) (Rauch et al., 2015).

Finally, we will discuss exploiting the strategies recommended in the SWOT analysis that can also reduce the risks involved while taking advantage of the opportunities and strengths available to diseases. The hospital realizes the digital transformation into the smart hospital of the future (Vlados, 2019).

4. Main Findings

The deep integration of the digital world with the physical world can bring profound transformation to the global supply chain (Wu et al., 2016). Digital transformation has recently formed one of the popular terms on the World Wide Web. Using SWOT analysis, the author attempts to identify and search for the exact concepts of hospital digital transformation in the pharmaceutical supply chain. The challenge of defining the concept of digital transformation can be solved after the definitions have been reduced to their basic elements. Understand the most important research topics (Baker, 2015; Reis et al., 2019). This search resulted in a larger number of conference papers, and we collected the keywords used in Table 1 (Baker, 2015; Paksoy et al., 2020).

Table 1. List of Words based on Classification of Concepts Study

Rank	Cluster 1	Cluster 2	Cluster 3
1	Digital transformation	Pharmaceutical	Supply Chain
2	Technology	Hospital	Chain
3	Smart	Hospital pharmacy	Supply
4	Digitalization	Pharmaceutical services	Logistic
5	Industry 4.0	Pharmaceutical care	Supply Chain Management
5	Traceability	Clinical pharmacy	Supplier

Table 2. Results on the Database using SWOT Analysis of the Research Form 2018-2022

Document Type	Number of documents	2018	2019	2020	2021	2022
Article	22	2	4	4	7	5
Conference paper	6	2	1	2	1	1
Conference report	10	1	3	2	3	3
Book	4		1	1	2	
Total	42	5	8	9	13	9

Papers and conference proceedings were published in the following databases Google Scholar, National library of medicine, and Science Direct were searched. We consider and assume that academic journals are the best source of information. We look for strengths, weaknesses, opportunities, and threats analysis of SWOT analysis with pharmaceutical supply chain on digital transformation at the hospital in Table 2 (Benzaghta et al., 2021).

Table 3. Summary of Key Characteristics SWOT Analysis of the Situation of the Hospital Pharmacy

Strengths (Internal)	Weaknesses (Internal)
S1: Hospitals with a mission vision to connect national and local policy. Clinical pharmacy in the hospital is developed with attention and guidance from health authorities	W1: Changing habits slowly of medical staff. Most medical facilities do not have a standard data center according to regulations
S2: Pharmacists have the spirit to adapt to changes and contribute to the development	W2: Some medical facilities also use non-specialized home network equipment
S3: The presence of young pharmacists facilitates digital transformation	W3: Lack of synchronization of system integration inside and outside the hospital. The application of information technology in clinical pharmacy has not been maximized
S4: Experience in telehealth, tele pharmacy with anti-COVID-19 process	W4: Information technology investment costs and operating costs face difficulties
S5: Ensure the quality of imported drugs also during storage	W5: Applying information technology in consulting and controlling outpatient prescriptions
S6: Improve sustainability with anti-counterfeiting, timely and complete product delivery. Providing clinical pharmacy services to control dispensing confusion	W6: Major change in management model and working habits of drug management, archival records
S7: The existence of companies that provide advanced technologies that support health services	W7: Universities are not fully prepared to train digital health pharmacy students
S8: The domestic market has great potential to meet the demand	W8: Lack of standardization regulations, data security
Opportunities (External)	Threats (External)

O1: Government regulations, ministry of health, and local authorities. Policies to support hospitals, opportunities for investors outside the medical industry	T1: Paper system at the hospital is a barrier to the digital transformation of the healthcare industry. Procedures and regulations in medical facilities mainly for traditional work
O2: Integrate and apply technologies such as big data, IoT, AI... smart hospitals	T2: Few high-quality IT human resources are working for the hospital. Information technology human resources are difficult to process, and professional or medical expertise
O3: Access to new technology, modern technology brings more advantages	T3: Knowledge and digital behavior skills of people using digital health facilities are still low
O4: Demand from customers for speed, time, and accuracy. Reduce human resources, reduce costs, eliminate waste, streamline infrastructure	T4: Limitations in the field of legal, medical technology appraisal
O5: Clinical pharmacy services develop and reduce risk in treatment services	T5: Potential issues related to ethics, privacy, and information quality
O6: Digital technology positively changes the way of management from the supplier company to the patient	T6: External dependence on technology development and application of products
O7: Bringing great opportunities in pharmacy education and health education	T7: Specialized information technology infrastructure requires highly specialized computerization
O8: The system always accepts prescriptions with 24-hour service	T8: Competition between hospitals and competition between digital technology companies

Case study of the hospital pharmacy in Ho Chi Minh City. The study observes pharmacy services at a few hospitals in Ho Chi Minh City). We also consider ensuring a comprehensive and complete view of the SWOT analysis. Table 2 shows library research data, documents, and hospital-related digital transformation conference reports in Ho Chi Minh City (Health, 2021; Quan, 2020). Data analysis is performed by analyzing the internal and external factors of the current state of digital transformation in hospitals in the pharmaceutical supply chain. Then we combined the SWOT analysis (Strengths, Weaknesses, Opportunities, and Threats) with the results in Table 3 (Ghazinoory et al., 2011):

- a. Strengths: A 'strength' is something positive which should help an activity to succeed. Strengths are the organization's internal attributes that are useful for achieving goals, and it's a win-win situation (Suh & Emtage, 2005).
- b. Weaknesses: 'Weakness' is something negative that can hinder the success of an activity, and weaknesses are internal attributes of the organization that are harmful to achieving goals. An unfavorable condition can lead to reduced profitability or adoption (Suh & Emtage, 2005).
- c. Opportunities: 'Opportunities' are an innovative way to make an activity more successful - to create an environment more conducive to profitability or adoption. Opportunities are external conditions for achieving a goal (Suh & Emtage, 2005).
- d. Threats: A "threat" is something potential such as an event or condition that, if it occurs, will harm the operation and reduce the chances of success. Threats are external conditions that harm the goal's achievement (Suh & Emtage, 2005).

5. Discussion and recommendations

In the many cases in Table 3, the results of key characteristics SWOT Analysis of the hospital pharmacy in Ho Chi Minh City, Vietnam. We propose to create a digital transformation strategy in hospitals in the pharmaceutical supply chain in Ho Chi Minh City between SO, ST, WO, and WT cells and consider the integration with the SWOT matrix in Table 4.

- a. Strengths–Opportunities (SO) Strategies: The combination of strong potential opportunities and the organization's comparative strengths offers real opportunities. It is the central space for formulating an effective strategy(Vlados, 2019).
- b. Weaknesses–Opportunities (WO) Strategies: The combination of potentially strong opportunities and comparable weaknesses is void of lost opportunities. This is the space of the organization's efforts to heal its comparative weaknesses so that opportunities can be seized (Vlados, 2019).
- c. Strengths–Threats (ST) Strategies: The combination of potentially powerful threats and comparative strengths is a defensible space. Here, strategic moves attempt to counter the appearance of a possible threat by mobilizing the strengths and aspects of the organization(Vlados, 2019).
- d. Weaknesses–Threats (WT) Strategies: The combination of potentially strong threats and comparative weaknesses creates real threats (Vlados, 2019).

Table 4. *Strategy Digital Transformation of the Hospital in Pharmaceutical Supply Chains in Ho Chi Minh City, Vietnam*

SWOT matrix	Strength (S)	Weaknesses (W)
Opportunities (O)	(SO) Strategies S1O1; S8O2; S5O6	(WO) Strategies W1O3; W5O4; W4O1; W3O5
Threats (T)	(ST) Strategies S6T5	(WT) Strategies W6T1

Digital transformation as a smart trend hospital in the pharmaceutical supply chain is suitable for building and developing Smart cities. Such solutions require hospital leaders to start with a vision and long-term and short-term target strategies suitable for the hospital's digital transformation process(Božić & County, 2019; Ilin et al., 2018). In table 4, we based the SWOT matrix combined with practical observations to propose strategies to prioritize hospital digital transformation in the pharmaceutical supply chain in Ho Chi Minh City (Benzaghta et al., 2021; Von Kodolitsch et al., 2015).

5.1 *Building a Vision in the Hospital*

- a. S1O1: Hospitals build a vision of strength, connect national and local policies, digitally transform, and complete hospital information systems

5.2 *Develop Long-term Strategies:*

- a. W1O3: Accessing new and modern technologies with specialized equipment as prescribed and meeting medical technology testing standards (servers, PCs, active and passive network devices, software)
- b. S8O2: Cooperation with companies providing advanced digital transformation technology in hospitals step by step horizontal and vertical integration (horizontal - in-hospital and mid-hospital; vertical - with health insurance)
- c. W5O4: Facilitating the application of information technology associated with outpatient prescriptions. Hospital pharmacy supplies consult customer needs about speed, time, and accuracy (Medical center, Nursing center, retail pharmacies affiliated with the hospital)
- d. S6T5: Make sustainable improvements against counterfeiting, potential ethics, and privacy issues

5.3 *Develop Short-term Target Strategies:*

- a. W4O1: Taking advantage of supportive policies, the hospital sets up priority projects for investment and construction of digital transformation infrastructure

- b. S5O6: Taking advantage of digital technologies to positively change the way of lean management to ensure the quality of drugs in stock also during storage and for patients
- c. W7O7: Developing an institute-university model that researches and trains students to adapt to the field of digital health
- d. W3O5: Developing clinical pharmacy service activities, integrating information systems at the data level to manage risks of providing drug-related health services
- e. W6T1: GAP analysis of traditional activities of drug management, record keeping, hospital management methods step by step digital transformation application

In the supply chain 'value' view, companies can enhance their competitive position by looking at the value streams in which they operate, as well as other parallel streams that use the same supply chain and distribution and retail as a “grid” on which they work (Holweg & Helo, 2014). In any transition, it is important to define the focus for the transition. In this study, we propose the management implications for the hospital to implement digital transformation for the hospital's strategy:

First, deliver new values with any transformational change linked to the organizational culture. The Vietnamese government has recognized the role of digital health technology in improving healthcare and optimizing management processes. Awareness of current government regulations, future directions for digital health, and evidence of local research in the field are crucial for introducing these modern technologies in Vietnamese hospitals (Tran et al., 2022). Build pioneering conversion teams first. For healthcare organizations, the organizational culture should focus on all aspects of the patient, with a culture of transparency and honesty. The organization should be committed to continuous improvement, and any change should be made in this context rather than as a matter of financial savings that often fail to form the basis for transformative change (Burke et al., 2019).

Second, the growth footprint is driven by focus areas of the healthcare market combined with cost-effectiveness, time, and other performance metrics (Holweg & Helo, 2014). That has great opportunities, favorable policy, and social, technological, and economic environments to adopt this patient-centered holistic healthcare model. To adopt, adapt and successfully implement digital transformation in hospitals. Hospitals must adopt a system-wide approach to supply chain performance in transformation and operations (Dang et al., 2021). Performance must measure the predictable, budgeted activity that must be carried out, which is key to the success of a transformation project. The leadership team needs to describe the end point of the transformation project clearly and succinctly and how the project got there. Many projects know the endpoint but cannot determine how the change process will be implemented. They are fragmentary, often incoherent, or logical (Burke et al., 2019).

Third, hospitals take the intermediate step of integrating the supply chain with key elements (Human Resource Management, Total Quality Management, Product Delivery, and Information Technology Application) to transform Changing the pharmaceutical supply chain model in hospitals. Hospitals that improve operational efficiency can manage risk and disruptions to the pharmaceutical supply chain, meeting the hospital's goals of reducing risk and ensuring patient safety (Nguyen & Premkumar, 2021). Risk management aspects are related to local/global sourcing in terms of having the capacity and reliable ability to deliver a given digital transformation component to the hospital. Global sourcing increases risk but improves cost-effectiveness in a stable condition, which can be altered by strategic positioning of safe stock and effectively improving delivery performance in nearby factories (Holweg & Helo, 2014).

Fourthly, the 4.0 Revolution will place increasingly new requirements on employees. The education sector needs appropriate adjustments to meet new requirements for employees besides labor and employment policies (Tien & Minh, 2019). Execution strategy and financial customization are necessary to carry out the activities required to generate revenue and operating capital for hospitals, especially private sector hospitals. Financing is also required to deliver the hospital's quality and secure digital transformation program (Burke et al., 2019).

Fifth, hospitals should strongly encourage clinical pharmacists to participate in pharmaceutical professional support to their departments, helping them to apply their acquired knowledge and skills into practice regularly and improving their level of expertise (Nguyen-Thi et al., 2021). Encourage participation and remove obstacles: transformation is a dynamic process and does not happen overnight. There is always resistance to change, and active discussion and collaborative efforts will help you to overcome resistance to change in the long run (Burke et al., 2019). Vision and learning in circulation, connectivity in a circular supply chain, circularity in business models, logistics policies and information technology collaboration to drive innovation. Collaboration of the circular supply chain in the healthcare industry (Tseng, Ha, Wu, & Xue, 2022). Integrated care requires digital support and clinical pharmacists' presence on the care team, allowing them to contribute meaningfully to treatment outcomes (Acosta-Gomez, 2022).

6. Conclusion

This study was evaluated with a SWOT analysis to view scenarios that provide long-term and short-term strategies for hospitals implementing digital transformation in the pharmaceutical supply chain. As a general finding in the study, a SWOT analysis is an important guide to seeing the full range of possible scenarios. The study proposes a common strategy for all hospitals interested in implementing digital transformation with a vision, long-term strategy, and short-term strategy. In addition, it provides the following implications for hospital management that can successfully digitalize in the digital transformation process.

Vietnam's health policy is ready for digital transformation, and this study provides strategic directions for digital transformation connected to the general development strategy of the disease. When reviewing SWOT analysis articles, there are also limitations as the SWOT analysis framework does not have a well-defined structure, which makes it difficult to use SWOT and derive strategies from it (Ghazinoory et al., 2011). In the future, it is necessary to add more studies to apply qualitative and quantitative research methods to practice, for example, artificial intelligence, the Internet of things, big data, etc., showing the possible importance of the subject matter to some extent.

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Self-sufficiency Initiatives in Malaysia for Vegetable and Chicken in the Light of Food Price Increases and Supply Chain Disruptions

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Abstract: Almost every household's basic requirement can be obtained from supermarkets, wet markets and various sundry shops. Housewives go daily to these stores to purchase sufficient supplies of meat and vegetables to prepare home-cooked meals for the family. Fortunately, since the invention of the basic refrigerator, small stocks of meat and vegetables can be stored in freezers or chillers to meet daily cooking requirements. The invention of the microwave oven has also helped to pre-heat cooked meals, cooked a week ahead of consumption. Lately, Malaysia has gone through sharp increases in food prices of common food including vegetables and chicken due to global supply chain disruptions. Thus, this research attempts to demonstrate a conceptual framework from the self-sufficiency perspective of the average man in the street who might consider planting vegetables from home, even raising goats or chickens as an alternative supply to minimize the impact of the supply disruption. A proposed online questionnaire survey will be constructed for potential respondents in Malaysia using a stratified random sampling method to identify patterns based on respondents' social categories and the data will be analyzed using SPSS 26.0. Implications from this paper can be concluded three-fold, firstly consumers' preferences through the change in lifestyle and how it potentially impacts future demand patterns. Secondly, the enhancement of a supply chain policy for the betterment of the consumer and the industry as a whole. Thirdly, the government's initiatives on community farming within housing estates as well as provide land for farmers to expand local farming.

Keywords: agrarian lifestyle, alternative supply, livestock breeding, self-sufficiency, shrinkflation, vegetable planting.

1. Introduction

The switch from hunter-gatherer to an agrarian lifestyle had effects on the earth's biodiversity, land cover and global carbon cycle (Whitehouse & Kirleis, 2014). Early studies in this area show that early humans lacked a written language, hence did not have records of how and precisely when this switch was made. However, evidence from archaeological sites show that the Agricultural Age went through 3 stages (Figure 1) that has seen humans plant rice, grow potatoes, maize, squash, and turnips for human consumption (Study.com, 2022).

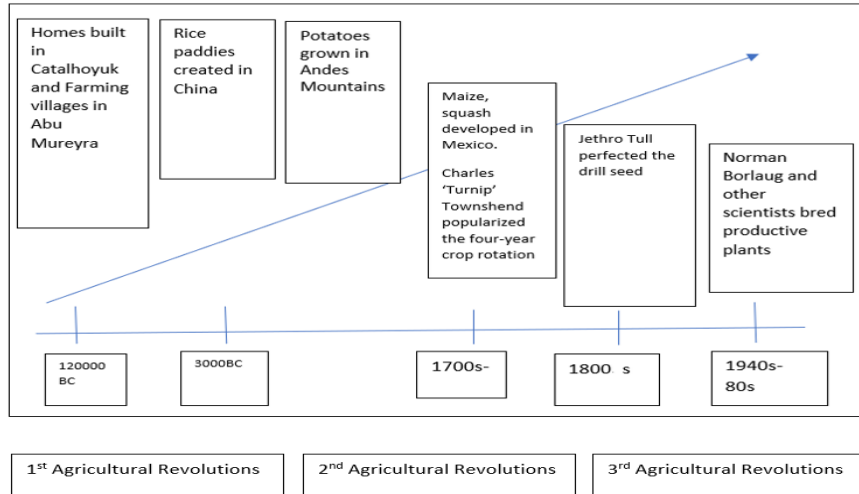


Figure 1. Timeline of the Agricultural Revolutions

Humans have therefore learnt to plant crops and even breed farm animals, thus supplying the needs for a growing global population. In the contemporary world, several advances in the form of regenerative agriculture using less chemicals and high quality and hardier seed banks have seen advances in the field of agriculture (Leichman, 2019). Advances in drip irrigation have become a necessity because traditionally, seventy percent of the world’s water goes towards irrigation and drip irrigation has seen less wasteful irrigation.

In the field of logistics, transportation of agricultural and farming output across the globe has advanced, where vegetables, fruits can be transported using chilled reefer containers across oceans or air-flown for local consumption. Animal meat and poultry have also been physically transported in freezer reefer containers. In addition to global supplies, local farms have also supported the growing population putting food on the table due to efficient global and local distribution. However, even though some studies indicate that urbanization and convenient transportation in cities has generally improved per capita urban agriculture, urban lifestyles have not supported self-sufficiency in terms of putting food on the table due to busy lifestyles of modern humans (Zhong et al., 2020).

2. Increasing Food Prices in Malaysia

The Covid-19 pandemic and the Ukrainian war, leading to increases in global fuel prices has caused supply disruptions for many industries. Global transportation cost increases have seen the highest price increases for food and non-alcoholic beverages for some time. While government subsidized petrol prices of RON95 and diesel in Malaysia have remained steady at RM2.05 and RM2.15/liter respectively, there has been increases of RON97 from RM2.60 to RM4.26 /liter within a year since 2021.

Changes in global transportation costs has resulted in the prices of food and non-alcoholic beverages showing an exceptionally higher than usual price increase in Malaysia (The Star, 2022). Although the government set chicken prices at a ceiling price of RM9.40/per kg (Bernama, 2022), it is now being sold at RM7.50. However, at one stage, chicken meat had increased by 13.4% due to increase in chicken demand as well as the rising cost of chicken feed. This is a concern because chicken meat forms the largest component in the meat group consumption. Overall, the consumer Price Index has shown high increases in food prices (Figure 2).

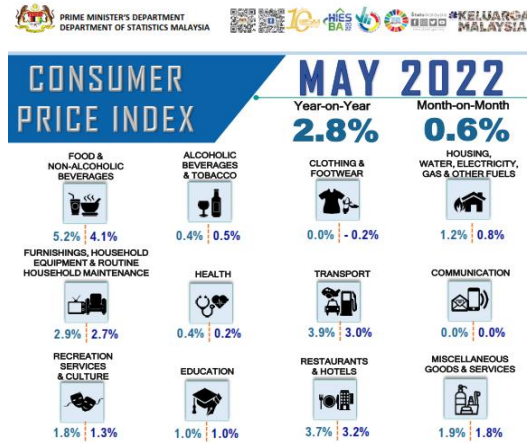


Figure 2. Consumer Price Index Showing Food Prices Highest Increase, Consumer Price Index (2010=100), Department of Statistics Malaysia (DOSM)

As for vegetables, wholesalers have raised prices due to supply chain disruptions causing shortages for a range of common vegetables. As a result, retail of these vegetables has seen sharp increases in several states (MalayMail,2022). States like Kedah and Kelantan have seen vegetable prices increase threefold, but most vegetables have seen single or double-digit increases. Long beans have increased from RM7/kg to RM10/kg, whereas the long eggplant is up to RM12/kg from RM10.50/kg. Salad leaves have shot up to RM18/kg from RM5/kg and okra, red chili, cauliflower, and green beans have seen a RM3/kg increase since. As a result, some retailers have begun to practice the concept of shrinkflation where retailers appear not to increase prices but put fewer vegetables in a packet to reduce packet sizes. In chicken rice servings in Singapore, the portions of chicken have also seen reductions (Romero, 2022) due to shrinkflation.

3. Self-sufficiency

Initially, the self-sufficiency concept highlighted the vulnerability of countries with fewer national food stocks that are insufficient to protect against any food price fluctuations caused by supply crises (Fallows, Wheelock, 1982). Over the years, the self-efficiency initiative has gained importance due to many forces affecting the future of food including rapid population growth, upward food price trends, globalization, and institutional path dependence on global food and agricultural input creating greater challenges (Chaifetz & Jagger, 2014). A model used in this study will consider household knowledge of action possibilities, confidence in one own’s influence and willingness to act towards self-perceived action competence adjusted for self-sufficiency (Figure 3.0)

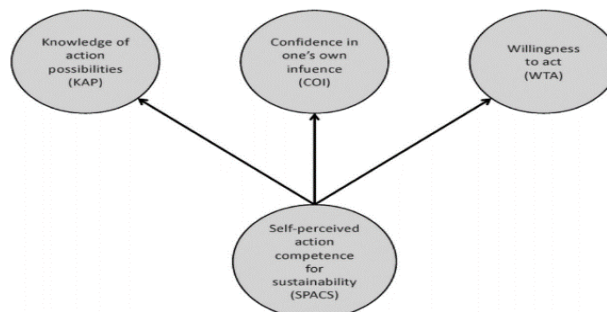


Figure 3.0. Theoretical Model of the Self-perceived Action Competence for Sustainability
Source: Olsson et al. (2020)

To analyze self-sufficiency among Malaysians, we need to consider their dwellings. Malaysians live in urban and rural dwellings. In the rural setting, land is largely available for cultivation of crop trees such as coconut trees, curry leave trees, some vegetables, even tomato and chili plants. There are usually chicken coops behind rural houses that raise chickens for eggs and meat, even goat rearing for meat and milk. Homes in urban settings, especially those living in flats, apartments or condominiums may not be suitable settings for planting vegetables or raising chickens, but there are usually urban dwellers that resort to planting vegetables in potted plants in balconies. Some have also used styrofoam boxes filled with earth and compost to create a mini plot to grow a few plants. Those that live in landed properties such as terrace, semi-detached or bungalow houses may have the land to attempt to do small scale vegetable growing but raising livestock is a challenge due to the foul smell from chicken or goat droppings.

A recent announcement by the Chief Minister of a certain state in Malaysia suggested that the public should consider growing their own vegetables and breed livestock (MalayMail, 2022). This was met by criticism by opposition politicians but is the suggestion truly an ‘out-of-mind’ suggestion, especially since it is a solution to food supply shortage and increasing prices. Additionally, there were reports in the media that the Shah Alam City Council found unhealthy conditions in bathrooms of shops operating in Shah Alam, where live chickens were being housed in toilets (Kulasagaran, 2022) and therefore raising chickens in urban dwelling is not a good idea due to the stench from chicken droppings.

4. Methodology

This research paper attempts to determine the self-sufficiency perspective of Malaysians and how many people in urban dwellings are or may resort to planting vegetables or raising livestock to beat inflation. A questionnaire will be designed to collect data on responses relating to household’s perception or actions that are already in place on the concept of self-sufficiency of a few common vegetables, rearing of chicken and goats. The sampling method used will be a stratified sampling method because urban dwellings could be in the form of flats, apartments, condominiums or landed properties such as terraced, semi-D or bungalow houses. Self-sufficiency must be shifted from foodshed size assessment to a commodity–group-specific spatial configuration of a complex of complementary components, the so-called foodshed archipelago (Moulery et al., 2022).

5. Findings and Discussion

For this study on self-sufficiency, Malaysians from three categories which is the urban city, the suburbs and the rural area are targeted using the stratified random sampling method. The questionnaire will be shared through online channels. Once the data has been collected, the responses will be analysed and a paper written to reflect the findings. The findings will provide some feedback to the government whether urban dwellers are ready for self-sustaining agriculture and whether more community farming initiatives can be initiated, and perhaps more land allocated for agriculture and farming.

6. Conclusions

The recent food price increases must be seen from a different perspective of the people in Malaysia to access whether they are capable of some self-sufficiency in terms of small efforts to plant vegetables or rear chickens and goats. We humans have moved from the agricultural age to the contemporary age where lifestyles have changed but there is still opportunity in terms of unused time, land, and resources to develop something that is natural through the concept of photosynthesis and self-sufficiency. Many countries have

seen their citizens move to farming as a sustainable livelihood and this study will attempt to gain initial assessment whether Malaysians are generally ready or not.

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Questionnaire design

Section A

Dwelling details

Urban/Suburbs/Rural

Owned/Rented

Flat/Apartment/Condo/

Terraced/Semi-D/Bungalow

Number of tenants

Gender of respondent

Household salary range

Section B

Questions related to self-sufficiency

Household knowledge of action possibilities

Confidence in one own's influence

Willingness to act towards self-perceived action competence

Specific questions related to vegetable planting and chicken rearing

Home cooked meals/Buy cooked meals from outside

If home cooked, buy vegetables

If home cooked, buy uncooked chicken meat

Plant vegetables at home

Plant vegetables in pots or Styrofoam boxes

If plant vegetables, what type planted

(Tomatoes/Chilis/Ladies Finger/Cucumber)

Seeds purchased or sourced from store

Soil/fertilizer purchased or sourced from store

Rear chickens at home?

If rear chickens, for eggs or meat (or both).

Support from the local government for seed

Support from the local government for fertilizer

Support from the local government on technology

Resist with Traditional or Promoting Green: How Innovation Stimulates Firms' Supply Chain Management Performance

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Abstract: Environmental issues emerge along with the development of firm performance, and it is a challenge to the business world. The aim of this study is to investigate the impact of green supply chain management (GSCM) practices on firm performance. In addition, this study also examined the role of green innovation in between GSCM and firm performance. The data is collected from 369 participants across 123 multinational corporations (MNCs) operating in Pakistan through purposive sampling technique. SmartPLS is employed to analyse the data. The results reveal that GSCM has positive and significant impact on green innovation and firm performance. Moreover, green innovation mediates the relationship between GSCM and firm performance. Researchers, practitioners, and industry leaders while designing their environmental policies to experience the comparative benefits for both business and society can use this influence of environmentally friendly practices.

Keywords: green supply chain management, green innovation, multinational companies, firm performance, SmartPLS

1. Introduction

Environmental challenges arise following the growth of a company's performance, creating new challenges to the business sector. Green supply chain management is a method for addressing issues such as I) stakeholder adoption of green practices, II) stakeholder desire to implement GSCM, III) hurdles faced by stakeholders to GSCM implementation, and IV) implications for firm performance (Wibowo et al., 2018). Supply chain management refers to a company's interaction with its suppliers, distributors, and customers, in which the organization strives to preserve the environment across the supply chain. By generating green products, the deployment of GSCM can increase company performance in terms of profitability and green innovation (Semana et al., 2019). As a result, the number of businesses using GSCM to improve their performance will expand. Green innovation is a notion that can mitigate the adverse environmental effects while improving business performance to boost public trust, cost efficiency, productivity, and market share (Agustia et al., 2019). Adopting green innovation is a difficult step to take since it involves new aspects such as green process management, ecosystem reconstruction, and green product R&D, as well as a departure from the traditional work system in terms of organizational structure and employee performance (Ge et al., 2018).

Earlier studies have shown green supply chain management improves business performance, even though green supply chain management requires huge costs (Geng et al., 2017). Nevertheless, the green supply chain management has no significant impact on the performance of the firms because few company owners or managers had implemented green supply chain management (Namagembe et al., 2016). Green innovation and company performance have a positive relationship, indicating that technological advancements in innovation that consider environmental implications can improve business performance (Handayani et al., 2017). As a result, green supply chain management, green innovation, and firm performance are becoming increasingly important in Pakistani companies. This study aimed to see how

green innovation and green supply chain management may help Pakistani enterprises enhance their performance.

The direct and indirect consequences of green supply chain management, green innovation, and firm performance were investigated in this study. This research intends to lessen the literature gap regarding green supply chain management, green innovation, and firm performance for MNCs operating in Pakistan. The major driver in increasing firm performance is top management's choice to deliver green supply chain management guidelines (Chu et al., 2017). This study aimed to address the following questions: (1) How green supply chain management and green innovation affect firm performance?; (2) How green supply chain management affect green innovation?; and (3) Can green innovation mediates the relationship between green supply chain management and firm performance?

2. Literature and Hypotheses Development

2.1 Green Supply Chain Management and Green Innovation

The connection between stakeholders in a company's supply chain who can establish green innovation to face pressure from external elements such as the government and regulators is the relationship between green supply chain management and green innovation. Green supply chain management and green innovation have a synergistic relationship in which green supply chain management has a significant and beneficial impact on green innovation (Seman et al., 2019). This demonstrates that the organization prioritizes green supply chain management as a key driver of green innovation. Companies will benefit substantially from the collaboration between green supply chain management and green innovation in improving product design, product manufacturing methods, and boosting compliance to lessen environmental consequences (Chiou et al., 2011). As a result, the researcher came up with the following hypothesis:

H1: *Green supply chain management has a positive impact on green innovation*

2.2 Green Innovation and Firm Performance

Green innovation, which is the technology for generating environmentally friendly products, has been shown to enhance marketing and sales, resulting in dependable company performance. Achieving market share recognition is a sign of a company's success and a mark of green innovation's accomplishment. According to Ma et al. (2018), organizations that use green innovation can enhance their performance by (1) employing recycled resources to cut costs and increase revenue and (2) modifying environmentally friendly product designs to increase sales and profits. Companies that apply green innovation will get a "first-mover advantage," including competitive product prices, improved corporate image, greater market share opportunities, and competitive benefits, which can be quantified both financially and non-financially (Weng et al., 2015). As a result, the researchers came up with the following hypothesis:

H2: *Green innovation has a positive impact on firm performance*

2.3 Green Supply Chain Management and Firm Performance

Green supply chain management, which is being used to save the environment, can assist businesses in lowering raw material prices and increasing the usage of recycled materials, resulting in increased profitability and improved firm performance. Economy, environment, and operations are among the five primary factors of green supply chain management and business success, according to (Geng et al., 2017). Green supply chain management, according to (Choi & Hwang, 2015), can be useful to a firm performance

by assisting enterprises in developing modified environmental management, which leads to improved firm performance. There are disparities in companies' perspectives on implementing green supply chain management to boost firm performance since organizations must understand the variables in green supply chain management to implement them in the company and make them sustainable (Kuei et al., 2015). The authors presented the following hypothesis as a result of this difference of opinion:

H3: *Green supply chain management has a positive impact on firm performance.*

2.4 The Mediating Effect of Green Innovation

There have been a few past studies on how green supply chain management affects corporate performance. However, additional variables like mediation are required to associate green supply chain management and business performance directly. Green innovation is the research's mediating variable. Green innovation can demonstrate a company's ability to compete for market share, grow the economy, develop product networks, and improve the socio-technical environment (Hazarika & Zhang, 2019). Companies can considerably preserve and improve firm performance by using green innovation to lessen the environmental impact talked about by external parties (Seman et al., 2019). As a result, the researchers came up with the following hypothesis:

H4: *Green innovation mediates the impact of green supply chain management on firm performance.*

2.5 Research Framework

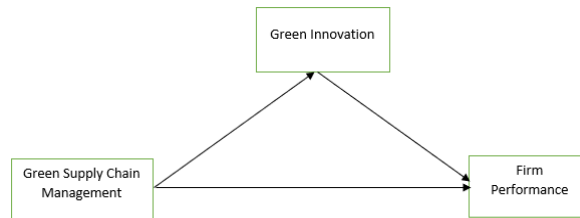


Figure 1. Green Supply Chain Management, Green Innovation, and Firm Performance

3. Research Method

The current study's target audience was MNCs operating in Pakistan registered with the Pakistan Stock Exchange (PSX). Only ISO 9001-certified MNCs were approached, and those who have applied for or intend to employ ISO 14001 and 26000 certificates. The data was acquired using a non-probability convenience sampling technique from MNCs in Pakistan's six major commercial cities, including Karachi, Lahore, Multan, Islamabad, Peshawar, and Faisalabad. The towns mentioned above were chosen based on population density as well as their status as business centres. These cities also represented the three major provinces of Pakistan; for example, Karachi represents Sindh, Lahore, Multan, and Faisalabad represents Punjab, Peshawar represents Khyber Pakhtunkhwa (KP), and Islamabad represents Pakistan's separate territory and capital. Managerial personnel (senior managers, middle managers, and operation management managers) who are familiar with the activities of the supply chain management department, such as purchasing, warehousing, inventory, and so on, were the target responders. Each level manager was from a separate company and represented a firm. A total of 180 companies listed on the PSX were included in the current study's overall population. The target population of 180 was sampled at a confidence level of 95% and a confidence interval of +/- 5%, resulting in a sample size of 123 firms. Total 369 employees in charge of the supply chain departments at the selected companies were approached using Purposive sampling. All three levels; operational, middle, and upper were covered with same percentage 33.33%.

3.1 Questionnaire Design

This study is based on 19-item questionnaire to determine the three components, which have provided in Table 3. Several authors provided the questions utilized in this study to quantify each construct: company performance (Paulraj, 2011), green supply chain management (Rao & Holt, 2005), and green innovation (Kim et al., 2012). The researcher reversed certain questions from negative to positive and vice versa before performing the real survey to avoid skewed findings. This study also took into account a variety of demographic and industry-related factors (dummy variables). Furthermore, we conducted several causality tests to check that the association is in the right direction. The results, however, are not reported in the document for brevity's sake. SmartPLS is a program that is used to simulate structural equation modeling (SEM).

Table 1. *The Composition of Sample firms into Province and Cities*

Province	Cities	Number of Companies	Questionnaire Distributed	Response from Companies
Sindh	Karachi	24	72	72
Punjab	Lahore	23	69	69
-	Multan	16	48	48
-	Faisalabad	22	66	66
Capital City (Separate Territory)	Islamabad	27	81	81
Khyber Pakhtunkhwa (KP)	Peshawar	11	33	33
	Total	123	369	369

Table 2. *Demographic Information*

Specifics	Description	Values	Percentage
Gender	Male	220	59.60%
	Female	149	40.40%
	SUM	369	100.00%
Total Responses	Medium	252	68.29%
	Large	117	31.71%
	SUM	369	100.00%
Job Level	Lower Management	123	33.33%
	Middle Management	123	33.33%
	Upper Management	123	33.33%
	SUM	369	100.00%
Years of Experience	Less than 6 Years	175	47.42%
	6-10 Years	93	25.10%
	11-15 Years	87	23.71%
	More than 15 Years	14	3.77%
	Total	369	100.00%

4. Data Analysis

SmartPLS 3.0 is employed to examine the study's model using partial least squares (PLS) analysis. The researchers used two-staged analytical modules for SEM, as recommended by (Hair et al., 2014). Firstly, the authors looked at the measuring model (reliability and validity of the measurements) before putting the structural model to the test. A bootstrapping method was utilized to investigate the significance of loadings

and path coefficients (Hair et al., 2016). In next phase, utilized PLS to estimate the path model from this subsample. This technique is repeated until a large number of subsamples are obtained, allowing us to estimate the statistical significance of various PLS-SEM discoveries, such as path coefficients, Heterotrait-Monotrait (HTMT), Cronbach's alpha, and R2 values (Davison & Hinkley, 1997). Data normality was checked since SEM requires that the normality assumption of data not be violated. Skewness values ranged from 2.012 to 0.389, whereas kurtosis statistics ranged from 0.039 to 3.031. As per Kline's (2011) criterion, the normalcy assumption was violated because few values exceeded 2 for skewness and above 2 for kurtosis. As a result, we used PLS based SEM in this research. In reporting the findings of this investigation, we used the style described by Henseler et al. (2009).

The results came from the estimate of the measurement model shown in Figure 1, which looked at the correlations between the construct (latent variable) and its indicators in general. Discriminant validity, composite reliability, Cronbach's alpha, average variance extracted (AVE), Spearman-Brown coefficient, and Guttman split-half reliability coefficients were among the validity and reliability tests conducted. Table 1 summarizes the validity and reliability findings. The indicator level discriminant validity is measured using factor loadings. Each variable's items should have a strong relationship with its own variables and be less related to other variables (Campbell & Fiske, 1959). The factor loadings indicate that all indicators have the strongest association to their variables. The AVE values for each variable are greater than 0.5, indicating acceptable convergent validity. Composite reliability and Cronbach's alpha are both more than 0.7, exceeding the minimum acceptable threshold. Furthermore, the consistency between the Spearman-Brown coefficients and the Guttman split-half coefficients is fairly high for all variables. As a result, it can be concluded that the structures are trustworthy.

The Fornell-Larcker test can also be used to determine discriminant validity. Panel A of Table 2 shows the results of the Fornell-Larcker test. Furthermore, by examining the HTMT ratio values, we were able to determine the discriminant validity. According to Henseler et al. (2009), the maximum HTMT value presented in Panel B of Table 4 should be less than 0.85, which is the most conservative critical HTMT value. As a result, the researchers concluded that discriminant validity had been established.

Table 3. *Reliability and Validity*

Construct and Items	FL	CR	CA	SBC	GSC	AVE
Green Supply Chain Management (GSCM)		0.80	0.71	0.75	0.76	0.55
GSCM1	0.730					
GSCM2	0.756					
GSCM3	0.763					
GSCM4	0.784					
GSCM5	0.719					
GSCM6	0.709					
GSCM7	0.763					
Green Innovation (GIN)		0.89	0.79	0.92	0.86	0.54
GIN1	0.720					
GIN2	0.750					
GIN3	0.779					
GIN4	0.769					
GIN5	0.737					
GIN6	0.730					
Firm Performance (FP)		0.87	0.85	0.85	0.80	0.57
FP1	0.746					
FP2	0.679					
FP3	0.778					

FP4	0.692
FP5	0.749
FP6	0.762

Table 4. *Fornell-Larcker Criterion and Heterotrait-Monotrait Ratio (HTMT)*

Panel 1: Fornell-Larcker Criteria			Panel 2: Heterotrait-Monotrait ratio			
Variables	GSCM	GIN	FP	GSCM	GIN	FP
GSCM	0.743	-	-	-	-	-
GIN	0.569	0.765	-	0.555	-	-
FP	0.493	0.510	0.738	0.673	0.573	-

4.1 Structure Model

The structural model assesses the link between a study's given variables. Table 5 shows the structural model results, which include a Beta value representing the value of the explanatory factors' impact on the dependent variable. These numbers are used to determine the importance of a relationship. t-statistics must be larger than 1.96, or the p-value must be less than 0.05 to indicate a meaningful link (Frost, 2014).

Green supply chain management and firm performance have a substantial positive link, with a coefficient of 0.16, t-statistics of 3.00, and a p-value of 0.003. The value of firm performance improves by 0.16 units for every one-unit change in GSCM. It supports the first hypothesis (H1) that GSCM improves firm performance significantly. According to the study, green supply chain management has a considerable impact on green innovation, with a coefficient value of 0.36 and a p-value of 0.000. As a result, the second hypothesis (H2) that GSCM has a considerable beneficial effect on green innovation is valid. Because the p-value is less than 0.05 and the t-values are much greater than 1.96, the direct association between green innovation and company performance is also positively significant. The coefficient of 0.59 indicates that a one-unit increase in green innovation will result in a 0.59-unit increase in firm performance. It demonstrates that green innovation has a large and favourable impact on business performance (H3).

4.2 Mediation Testing

Green innovation plays a big impact in favourably influencing the connection, according to the findings. As a result, the fourth hypothesis (H4) that green innovation mediates the impact of green supply chain management on firm performance is confirmed. Table 5 presents an overview of both direct and indirect effect. Further, Table 5 also demonstrates that the components are significant for the general adjustment of the model and that the model is correct, as evidenced by the Stone-Geisser indicator/predictive validity (Q2) and Cohen's indicator/effect size (f²) values.

Table 5. *Direct and Indirect Effects*

Directions	Direct Effect	Indirect Effect	Total Effect	T Stat.	p value	Q ²	F ²
GSCM > FP	0.16*		0.16*	3.00	0.003	0.079	0.312
GSCM > GIN	0.36*		0.36*	8.15	0.000	0.321	0.451
GIN > FP	0.59*		0.59*	12.53	0.000	0.432	0.442
GSCM > GIN > FP	0.13*	0.21*	0.34*	6.53	0.000	-	-

5. Discussion

We anticipated that green supply chain management has a considerable positive influence on firm performance based on the PBV. This association was shown to be significantly positive, which is consistent with earlier research (Abdul-Rashid et al., 2017). The findings also support the role of green innovation as mediators of the relationship between GSCM practices and firm performance (Adams et al., 2016; Kusi-Sarpong et al., 2019), providing empirical support for the role of innovation as a stepping stone on the path to firm performance of GSCM practices (Adams et al., 2016). Green innovation mediates the link between green supply chain management and company performance. The integration of GSCM practices across organizational boundaries is required since these practices are linked to structures and procedures from both suppliers and the focus business, potentially increasing the need for green innovation. Furthermore, the chain of interaction with structures from external stakeholders enhances the stakes for efficacy evaluation. According to NPT, the communal appraisal can lead to attempts at reconfiguration or the modification or reconstruction of a practice (May & Finch, 2009). GSCM methods can be successfully introduced and integrated into organizational routines without the need for later green innovation to improve business performance. Process innovations, particularly environmental management systems focusing on lean process improvements, quality management, and standards, can help firms successfully regulate and monitor GSCM practice implementation (Dubey et al., 2015; King & Lenox, 2001).

6. Practical and Theoretical Implications

From an industrial standpoint, the findings mentioned above demonstrate the importance of GSCM techniques in achieving firm performance in the MNCs sector. These findings also demonstrate the critical significance of green innovation in achieving firm performance goals, demonstrating that by incorporating GSCM and GI practices, a company can achieve perfection in day-to-day operations, resulting in strategic and competitive advantage. The structural analysis results show that the effective application of GSCM and GI practices is directly linked to business performance targets. Organizations that actively participate in social development initiatives and are effectively involved in quality management activities have the potential to outperform those that follow traditional techniques. Organizations should commit to effective GSCM practices implementation by executing innovative processes to achieve business performance to achieve this goal. The current study also shows that the beneficial effects of GSCM operations are not limited to enterprises operating in developed countries. Parallel effects can be reached if organizations successfully implement GSCM activities in emerging or underdeveloped areas. From a theoretical standpoint, recent research adds to the existing literature on GSCM, GI, and FP in a variety of ways. Firstly, this study fills a knowledge vacuum in the GSCM-FP link, particularly among MNCs operating in Pakistan. Based on Structural Model, this study confirms the PBV theory and investigates the conceptual model's robustness, which has seldom been done before. Finally, this study demonstrates the role of the GI in favourably mediating the link between GSCM and FP, which has never been quantified before.

6.1 Limitation and Future Research

Similar to prior research, the current study has several limitations. The researcher gathered information from respondents to design the questionnaire based on the firm's real production; nevertheless, because the questionnaire was dependent on respondents' perceptions, this could lead to bias. Even though the reliability and validity of the data have been rigorously examined, biases cannot be eliminated. As a result, secondary data from the enterprises can provide more information about the GSCM, GI, and FP relationships. Furthermore, due to the widespread distribution of Covid-19, the researcher was limited in terms of accessibility and response rate during the data collection phase. Second, just six cities' businesses were used as the target market for data collecting. It is suggested that the study's scope be expanded to include other major cities and nations.

7. Conclusions

Given the growing environmental concern sparked mostly by the MNCs sector, the importance of green growth has grown significantly in terms of achieving sustainability. Green growth is particularly important for emerging countries, such as Pakistan, where the phenomenon is still in its early stages and takes a developed-country perspective. The Pakistani government has made major investments in fostering green business practices in recent years. In this study, we looked at the effect of GSCM in company performance and how green innovation mediates the relationship between the two variables. The practice-based view (PBV) and essential arguments built on existing research were used to develop four hypotheses tested using structural modelling. The findings show that GSCM has a large and favourable impact on firm performance and a high potential for improving business operations. Furthermore, green innovation strongly mediates the association between GSCM and company performance. The positive outcomes of GSCM in firm performance in MNCs with the support of green innovation mediation suggest that if companies properly embrace GSCM techniques, firm performance will improve even in developing countries. However, to attain competitive advantage and green business goals, the government's role, and senior management commitment are required.

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Factors Affecting Information Sharing and Work Performance in IT Service Delivery

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Abstract: The paper aims to analyze the aspects of information exchange and its impact on work performance in IT project management. This study was conducted in a Vietnamese company that provides outsourced IT delivery services by integrating differing project management capabilities. It delivers tailored service packages by working with various suppliers to offer cost-effective IT solutions to its clients. Service delivery is a collaborative process of information exchange to achieve effective and efficient work performance. This study researched and developed a structured equation model (SEM) of trust, common objectives, responsibility, coordination, and information sharing that affected work performance. A total of 208 project managers of IT companies in Vietnam were surveyed. Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA) and Structured Equation Modelling (SEM) were used for data analysis. The findings of linear structural model met the conditions of good fit, whilst bootstrap analysis found that common objectives, coordination, responsibility, and trust affected information sharing, in the order of influence. This research demonstrates the importance of information sharing in the implementation of IT projects and offers practical solutions to improving work efficiency, use of resources, and achieving quality project management and administration.

Keywords: IT delivery, information sharing, work performance, project management, SEM

1. Introduction

The phrase "supply chain management" gained prominence in the mid-1990s as many articles and books on the subject were published. Supply Chain Management (SCM) has begun to appear in the names of operational managers. Since researchers (Davis, 1993; Lee & Billington, 1992; Towill, 1991) and managers began to evolve into SCM studies and practices, there has been a large body of literature on the subject. SCM is primarily used in the industrial industry and less rarely in the service industry. Service activities have distinguishing features not present in manufacturing (Akkermans & Vos, 2003). A typical Service Supply Chain consists of three essential structural elements: the customer, the service integrator, and the service provider. Since services are intangible, there is no material flow between these elements; they are only connected to information (Sakhuja & Jain, 2012).

We focus on understanding the factors influencing information sharing based on previous research papers. The review is organized within a framework based on the critical structure of the service supply chain and the nature of the demand. This framework emphasizes the information requirements of supply chain coordination. Furthermore, the identification of these issues points to some directions for future research in this area. The rest of the review is organized as follows. Section 2 discusses the theoretical basis and research model. Section 3 presents the research results. Finally, Section 4 includes discussions and findings, and finally, Section 5 concludes and suggests future research directions.

2. Concepts Related

2.1 Information Sharing

In all activities, especially in the Supply Chain, information is constantly required. Information sharing is the communication of critical, often exclusive, information between supply chain participants via face-to-face, telephone, fax, mail, and the Internet (Cai et al., 2010). According to Theo Cao and Zhang

(2011), information sharing occurs when a firm communicates a range of relevant, accurate, comprehensive, and private information with its supply chain partners on a timely basis. Service integrators frequently demand their supply chain partners, such as other service providers, to follow standard processes and requirements sharing of information to improve supply chain coordination and service quality (Cheng, 2013). Sharing information has a tremendous influence on lowering supply chain costs and obtaining a competitive edge (Cheng, 2013, Jain, Wadhwa, & Deshmukh, 2009). According to Crook et al. (2008), when independent businesses collaborate and share information and expertise with others, they can reap advantages that go beyond what can be obtained in long-term trades. In an era where technological developments are accelerating, a lack of information will progressively erode competitive advantages. Information is seen as the "glue" that binds together corporate structures that enable supply chains to adapt to competitive threats on time (Sanders & Premus, 2002).

2.2 Work Performance

The final aim that researchers are concerned with is work performance. According to Parker (1998), job performance is the ability to perform a specific task, and it is also defined as the behavior associated with the fulfillment of expected role requirements, specific or formal, for members of organizations and individuals (Campbell, 1990). Indeed, work efficiency is evaluated to ensure objectivity, self-assessment of each employee's job outcomes, understanding strengths and weaknesses to continue to promote and signal limits, incomplete points to actively overcome, and solution to change. Work efficiency manifests itself in various ways, based on criteria such as working position, allocated duties, and individual and organizational authority. Many views believe that work efficiency is an essential criterion for evaluating the quality of resources, assessing each employee's capability, and assessing the ability to adapt and overcome implementation challenges with strict discipline, openness in relationships and collaboration, and coordination with personnel from different other organizations and units. Work efficiency is also measured in terms of the quality of completed work, the quantity of unfinished work, cost-effectiveness, and timeliness of each completed task.

2.3 Factors related to Information Sharing and Work Performance

There have been a number of studies on the factors affecting information sharing, presented in Table 1. Contributing to the factors are (1) Trust, (2) Common Goals, (3) Responsibility and (4) Coordination. These factors have also been studied to assess the impact on job performance, also shown in Table 2.

Table 1. *Factors Influencing Information Sharing*

No	Factor	Contribution/Approach	Author (Year)
1	Trust	Trust is viewed as a motivator with a favorable influence on information sharing.	N Balau, S Utz (2016); SZailani, R. Premkumar (2014); Li & Lin (2006)
2	Common Objectives	Shared goals influence information exchange	I. Kocoglu et al (2011); Stasser (1992); Yu et al (2010)
3	Responsibility	Increased responsibility and trust influence the attitude of more information sharing.	Abdolmohammadi, Shanteau (1992); Raban & Rafaeli (2007); Du et al (2010)
4	Coordination	Coordination is required for the actors involved to share information	Vail, Veloso (2003); Goldratt (1994); Schonfeld (1998)

Table 2. *Factors Influencing Work Performance*

Author (Year)	Title	Focus	Contribution/Approach
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William Ouchi (1981)	Theory Z	Demonstrate an interest in working together in a collaborative atmosphere to increase productivity and organizational stability.	- Increase work morale and job satisfaction, boost productivity and lower the quit rate. - Pay attention to the following factors: Trust, general goal; Responsibility; conflict resolution.
Lencioni (2005)	Overcoming The Five Dysfunctions of a Team	Team building to increase work efficiency	Common goals, responsibility, and communication management are factors that disrupt collaboration, impacting job efficiency.
Ulloa & Adam (2004)	Attitude toward teamwork and effective teaming	Focus on teamwork to improve productivity.	-Provides characteristics for an effective team such as Communication; General objective; Clear responsibilities, safety mentality. - Examines the influence of the variables as mentioned earlier on each individual's working attitude and productivity.
Morgan & Hunt (1994)	The Commitment-Trust Theory of Relationship Marketing	Effective cooperation and achieve goals of businesses.	Trust, commitment, and responsibility are essential to ensure maximum cooperation and work efficiency.
Yeh (2005)	Identification of factors affecting continuity of cooperative electronic supply chain relationships: empirical case of the Taiwanese motor industry.	Effective cooperation model of suppliers in the supply chain	Variables such as trust, Responsibility, and commitment; Perceived risks impacting work quality and efficiency
Zacharia. (2009)	- An analysis of supply chain collaborations and their effect on performance outcomes	Level of collaboration	To enhance performance and operations, measure and identify the degree of coordination throughout the supply chain.
Vereecke và Muylle (2006)	- Performance improvement through supply chain collaboration in Europe		

2.4 The Relationship between Information Sharing and Work Performance

According to Du et al. (2012), information must be shared for the supply chain to function correctly. There are two ways to share information in the supply chain. Internally, for effective buying planning and corporate growth, resulting in flexibility, coordination, a sense of ownership, and externally, for information exchange with supply chain partners to enhance demand planning, physical flows, and financial processes (Rai et al., 2006).

According to Yu et al. (2010), supply chain management combines processes within and across organizations as a system. Companies may efficiently manage product flow and information linked to production capacity, consumer demand, and inventory using IT intermediaries at a reduced cost and with more efficiency. Sharing information may enhance supply chain performance and operating efficiency substantially. Alzoubi and Yanamandra (2020) discovered empirically that information exchange plays a critical intermediate function in Agile Supply Chains (ACS) to attain improved performance.

Thus, there are opinions that the interchange and sharing information impact work performance via the intermediate function. According to the findings of this study, information sharing is also connected to job performance; the more the openness and readiness to share of expertise providers, the better the job performance. Based on the above theoretical bases, the author proposes the research model shown in Figure 1.

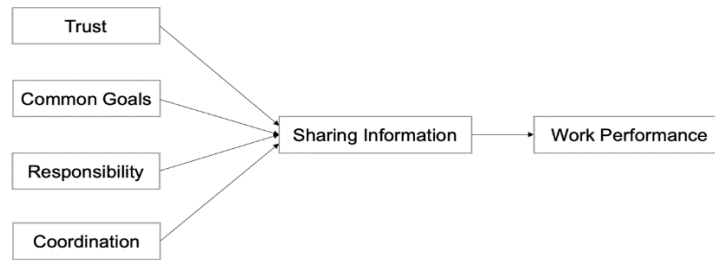


Figure 1. Research Model Proposition

2.5 Analytical Method

The analysis is performed in four (4) steps:

Step 1: Cronbach's Alpha reliability coefficient is used to measure the reliability of each factor affecting work performance. The variables with a total correlation coefficient less than 0.3 will be excluded; that is, the observed variables do not contribute much to the description of the concept to be measured. After removing unsuitable variables, Cronbach's Alpha coefficient will be recalculated to determine whether the measured variables are related or not; the scale is selected when Cronbach's Alpha coefficient fluctuates in the range of 0.7 to 0.8. In addition, if Cronbach's Alpha coefficient is from 0.6 or higher, that scale can also be accepted for reliability (Nunnally & Bernstein, 1994).

Step 2: Use the exploratory factor analysis (EFA) method to test the influencing factors and identify the factors affecting work performance. It is necessary to ensure the conditions for the results of factor analysis.

The number of factors extracted (Eigenvalue criterion): is a commonly used criterion to determine the number of factors. Elements with an Eigenvalue index greater than 1 (≥ 1) will be kept in the analytical model.

Factor loading: According to Hair et al. (2006), factor loading is an indicator to ensure the actual significance of EFA. Factor Loading greater than 0.3 (> 0.3) is considered minimal, Factor Loading greater than 0.4 (> 0.4) is considered necessary, and Factor Loading greater than 0.5 (> 0.5) is considered to be of practical significance.

Total variance extracted: indicates how many percent of the measured variables are extracted. This sum must be over 50% (> 0.5) to be acceptable.

KMO coefficient (Kaiser Meyer Olkin): is the criterion to consider the appropriateness of factor analysis, KMO must be in the range from 0.5 to 1, meaningful for related factor analysis, and if the KMO is less than 0.5 (< 0.5), then the factor analysis is more likely not to fit the data.

Step 3: Confirmatory factor analysis (CFA) is a statistical technique of linear structural modeling (SEM). Confirmatory factor analysis allows us to test how well the observed variables represent (structural) factors. CFA is the next step of EFA because CFA is used when the researcher already knows the underlying structure. The relationship or hypothesis (obtained from theory or experiment) between the Observable variables and baseline factors is assumed by the researcher before statistical experiments are performed. Confirming factor analysis (CFA) was used to determine that the scales guarantee reliability, discriminant validity test, and convergent validity. In CFA, we are interested in Chi-square values adjusted for degrees of freedom; Tucker & Lewis Index (TLI); Comparative Fit Index (CFI); RMSEA (Root Square Error Approximation) $< 0,08$ then the model is suitable.

Chi-squared/ratio of degrees of freedom (X^2/df): used to measure the fit of the entire model in more detail. According to the study of Hair et al. (1998), the smaller X^2/df , $1 < X^2/df < 3$, the better the

research model is. In addition, in some actual studies, two cases are distinguished: when the sample size is more significant than 200 ($N > 200$), then $X^2/df < 5$; When the sample size is less than 200 ($N < 200$), then $X^2/df < 3$, the model is considered suitable (Kettinger and Lee, 1995). The related indexes TLI, CFI value > 0.9 is considered as a good fit model, GFI is a measure of the absolute goodness of fit (unadjusted for degrees of freedom) of the structural model and the measurement model with using the survey dataset, while AGFI is adjusting GFI value by degrees of freedom in the model.

RMSEA is an important criterion; it determines the model's fit compared to the whole. The researchers think that the RMSEA index < 0.05 , the model is suitable. When this value is < 0.08 , the model is accepted (Taylor, Sharland, Cronin, and Bullard, 1993). P-value < 0.05 is considered a good fit model, which means that the hypothesis of the proposed research model cannot be rejected, that is, no better model can be found than the current model.

Step 4: Testing the model hypothesis by SEM (Structural Equation Modeling). SEM linear structural model helps to analyze all the variables in the model simultaneously, can explain the relationship between the dependent variable and the latent variable, and shows the relationship between the latent variables together. In addition, this method allows to combine latent concepts with their measurements and at the same time can consider the measurements independently or in combination with the research model. When analyzing the model results, the following criteria are considered: Are the Chi-Square coefficients/df, TLI, CFI, RMSEA, and P-values of the concepts statistically significant? CFA is a form of SEM (Hair et al., 2006), so metrics that fit the SEM model are considered in the CFA test. The higher the absolute value of the normalized weights, the stronger the independent factors influence the dependent factor.

2.6 Data Collection Methods

The data of the study was selected by convenience sampling method by questionnaire through the subjects who are project leaders or more of IT companies. The survey was conducted between March 2019 and December 2020, an important development period for the field of digital transformation during the Covid-19 pandemic, with strategies to stimulate meet the needs of IT application in remote work management and control.

This study has 28 observed variables to measure 4 components of information sharing and 1 intermediate variable to measure job performance.

The author uses a Likert interval scale with 5 ratings from 1 to 5. Therefore, the minimum sample size required for the study is: $5 \times 28 = 140$ samples. During the research, the author conducted an investigation, distributed 238 questionnaires, collected 223 votes, of which 15 failed. The results received 208 satisfactory votes, ensuring the number of sample sizes to carry out this study.

3. The Results of Testing the Reliability of the Scale

3.1 Exploratory Factor Analysis

The results of exploratory factor analysis (EFA) of all variables show that the KMO coefficient > 0.5 shows that the factor analysis results are reliable. And the significance level $\text{sig} = 0.000 < 0.05$, shows that the results of factor analysis ensure the statistical significance and the observed variables are correlated with each other in the overall. All variables have factor loads greater than 0.5. (Table 3)

Table 3: Test Results of Reliability of Information Sharing Scale and Work-performance

No	Scale	Code	Variables	Cronbach's Alpha	Corrected Item – Total Correlation	Result
1	Trust	T	4	0,807	0,561	Accept

2	Common Objectives	CO	4	0,846	0,665	Accept
3	Responsibility	R	4	0,839	0,631	Accept
4	Coordination	C	5	0,859	0,597	Accept
5	Information Sharing	IS	5	0,898	0,712	Accept
6	Work Performance	WP	5	0,891	0,706	Accept

Source: Author's compilation from survey data processing results

Based on the results of EFA analysis, the extracted factors of the main research hypotheses are satisfied. Therefore, the research model consisting of 5 independent factors: Reliability, Common Objectives, Responsibility, Coordination, Information Sharing used to measure the dependent factor of job performance is accepted.

While EFA (Exploratory Factor Analysis) is used to find latent factors, CFA (Confirming Factor Analysis) is determinant factor analysis assert, and the primary role is used to check that the elements constructed from the theory are appropriate. The analysis's findings are depicted in Figure 2.

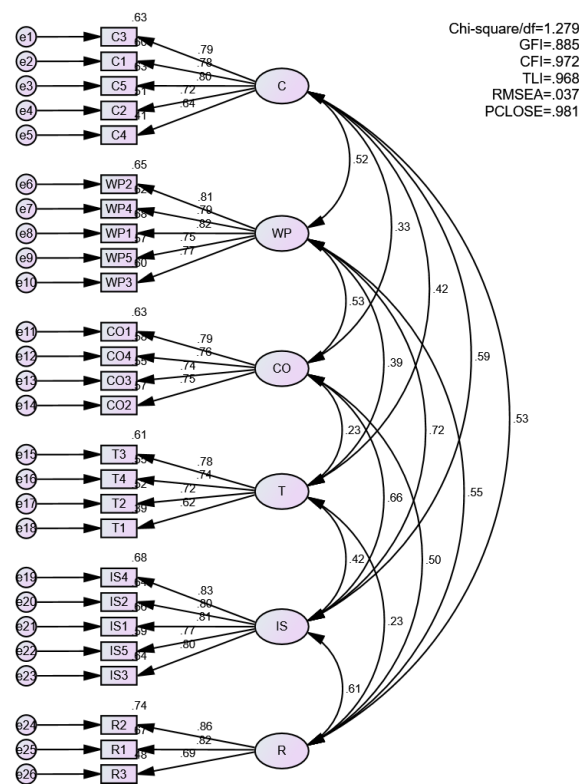


Figure 2. Normalized CFA Confirmatory Factor Analysis Results

The results of data analysis show that the index $CMIN / df = 1,279 (<3)$; $GFI = 0.885$; $CFI = 0.972 (\approx 1)$; $TLI = 0.968 (\approx 1)$; $RMSEA = 0.37 (<0.06)$ and $PCLOSE = 0.981 (> 0.05)$. These indexes all satisfy the condition of good fit, only GFI index = 0.085 (<0.9), however, due to the limitation of sample size, the GFI value is difficult to reach 0.9, so the minimum value of 0.8 is still accepted according to Baumgartner and Homburg (1995), and Doll et al. (1994). Therefore, it can be concluded that the model fits the market data.

Research results of SEM linear structure model show that $Chi-square / df = 1,291$; $GFI = 0.882$; $CFI = 0.971 (1)$; $TLI = 0.967 (1)$; $RMSEA = 0.37 (0.06)$ and $PCLOSE = 0.981 (> 0.05)$. These criteria all satisfy the condition of good fit, so it can be concluded that the measurement model fits the data shown in Figure 3.

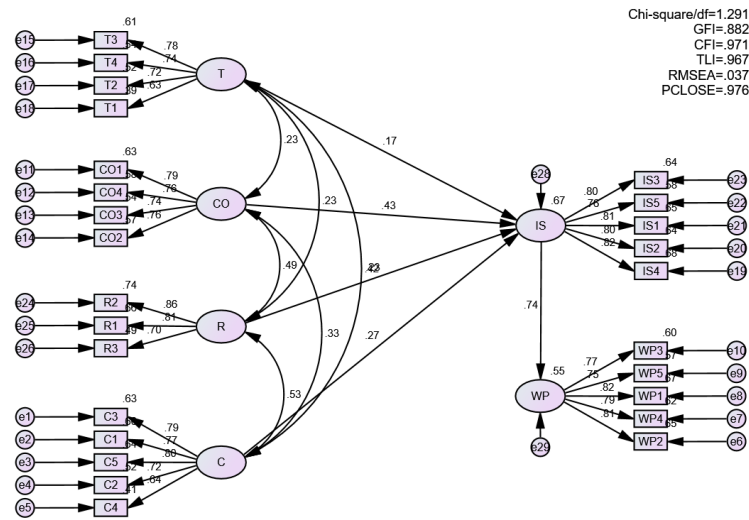


Figure 3. Results of Analysis of Linear Structural Model

From the analysis and measurement of the coefficients Cronbach Alpha, EFA, CFA and SEM, we get the results as shown in Figure 4.

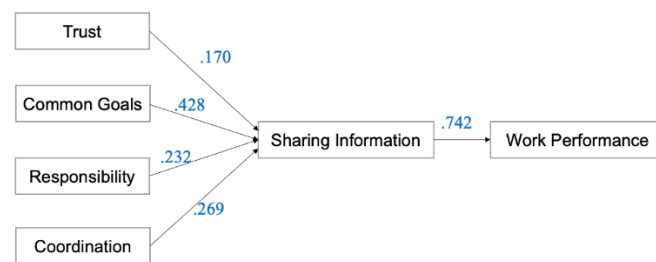


Figure 4. Final Research Model

Thus, four elements influence information sharing: Trust, shared goals, Responsibility, and Coordination. The factor with the most significant influence on information sharing is Common Objectives, which has the most considerable normalized weight of 0.428; the second most decisive influence is Coordination, which has a normalized weight of 0.269; the third influence is Responsibility, which has a normalized weight of 0.232; and the weakest influence is Trust, which has a normalized weight of 0.170. Also, from Information Sharing, it has an additional impact on Work performance with a normalization factor of 0.742. It is an essential foundation for the author to provide practical management implications to further increase information sharing among partners, consequently improving work efficiency.

4. Recommendation[s]

Based on analysis results and identified research objectives, the study makes recommendations to synchronously implement solutions to improve work efficiency in the project, specifically as follows:

4.1 Common Objectives Factor Solutions

The project leader must concentrate on defining the project's shared goals; these goals must be united and harmonized in order for the stakeholders to accomplish them. As a result, the parties can better recognize and comprehend the need to share information to achieve the project's common purpose. Objectives must be developed following the principles of SMART. Goals must be precise about the

responsibilities and duties of each stakeholder, quantifiable by criteria, and based on the skills and resources of each party To guarantee the feasibility of the project.

To bring the most efficiency to the project, the participating representatives must exchange information, do research, communicate, and set goals and strategies based on the capabilities of each party. Once a common objective has been agreed upon, which serves as the foundation for suggesting solutions to assist the parties in operating efficiently, it is constantly reiterated and shared information throughout the implementation process, under the overall project's common aim. These aspects rely on each other to preserve relevance and requirement in initiatives to be conducted jointly. This also offers an incentive for them to act, making people appreciate the value of providing information.

4.2 *Coordination Factor Solutions*

The project manager must support team member participation by providing a vision of client demands and performance benchmarks. Shared information enables visibility, allowing the whole project to be assessed so that stakeholders may plan properly and make better decisions that improve overall project performance. As a result, information visibility assists members in integrating the procedures required to adapt to changing situations. As information visibility among members improves, there is a greater need to exchange accurate and timely information about workload difficulties, cost-related issues, and implementation time.

To increase information visibility, the Project Leader must use information technology in the management and operation processes. The use of project management software and the administration of work items will provide members with a comprehensive picture of all information shown in the project. As a result, the members will view each other's coordination process, including the points accomplished and not attained, from which they may learn and improve their coordination actions.

4.3 *Responsibility Factor Solutions*

Throughout the project, the project manager must set general regulations on information exchange that clearly describe the stakeholders' roles, powers, principles, and operating procedures. It is also the foundation for organizing, managing, and operating the project, preventing extrusion and a lack of Responsibility in coordination and implementation.

The management board must create a clear and public assignment of tasks for members to understand and practice; assign one member to monitor the progress and quality of the project's work, regularly exchanging information, urging and reminding members to complete the task, and ensuring the project's efficiency and quality. Common principles contribute to increased stakeholder participation. Furthermore, more outstanding standards of behavior, shared labor, cohesiveness, cooperation, and Responsibility should be implemented. As a result, there is a shift in awareness, individual Responsibility, and overall project responsibility.

4.4 *Trust Factor Solutions*

The project manager must instill trust in the environment where the project is carried out. In particular, it is necessary to pay attention to the fundamental factors that build trust, including Honesty, Openness, Consistency, and Respect. Furthermore, it is advised to create principles to ensure member confidence, such as:

Ensure equality, foster trust, and advocate for equality among members. Each has unique knowledge, experience, and talents. As a result, each member has the right to provide feedback and solutions to the project's difficulties or give valuable ideas in the workplace. Equality is also expressed because all participants may contribute to the shared task and accept responsibility for the project's outcomes.

Ensuring information transparency, Providing accurate and up-to-date information will assist members in understanding the current situation and adjusting their job accordingly. On the other hand, a

transparent working atmosphere helps members comprehend each other's work and concerns, allowing them to be more open in exchanging and sharing information and assisting each other in overcoming challenges while working and developing together. Transparency and openness will aid in the elimination of misconceptions, doubts, insecurities, and sources of distrust.

Ensure that members reciprocate and work together. When members share a spirit of reciprocity and collaboration, trust is developed. Members must constantly be ready to cooperate, promote advantages, and compensate for each other's flaws to get the best outcomes. To foster a cooperative attitude among participants, the project leader must clearly and adequately divide the job among them. When they understand their duties and responsibilities and the roles and obligations of other members, everyone will know whom they need to coordinate with to finish the task, and they will be able to help each other handle difficulties that emerge during the implementation process.

4.5 Other Solutions

Pay attention to information communication in the project, ensuring that stakeholders properly grasp the information, scope, and volume to prevent losing control when implementing the project and avoid information blind spots for all stakeholders. Frequent review sessions must be held, with recommendations and improvements, particularly customer input, documented regardless of whether they exceed initial goals and scope to address this. It is necessary to analyze and review the exchange made to ensure all parties satisfaction.

Ensure balance and harmonious combination of interests. Each member has personal goals that they want to achieve at work. It is vital to balance and harmoniously mix individual and shared interests in order for members to think and act together toward a common objective. If members of an organization prioritize personal interests over collective interests, it will result in self-interested behavior, regardless of the harm to the collective or other members. On the other, if the collective interests do not coincide with the person's interests, or if the individual's interests are not safeguarded, that individual is not motivated to engage for the common good.

5. Conclusion

Based on the study results, it is established that four aspects influence Information Sharing: Common Objectives, Coordination, Responsibility, and Trust. Furthermore, Information exchange is a component that significantly impacts the project's work performance. In terms of academic contributions, the study systematizes the scientific rationale of the supply chain. Therefore, the study will add more material to the theoretical framework of service delivery. From there, it is possible to call and serve academics and researchers who want to continue to explore and learn more about service management.

In practice, the research topic demonstrates the meaning and importance of information sharing in the implementation of common IT projects while also orienting and supplementing solutions to improve information sharing ability, contributing to increased work efficiency, ensuring the efficient use of resources, and improving the quality of project management and administration.

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Cross-border Operational Capabilities for Import Halal Trade Facilitation in Malaysia

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Abstract: International movement of goods demands a certain set of measures that modernize and simplify the technical and legal procedures for products entering or leaving a country to be traded across the border. Thus, since the beginning of the 21st century, every country has been involved with various forms of trade facilitation initiatives to improve its border trading process. World Trade Organization (WTO) initially introduced the wide-ranging concept of facilitation promoting simplification, harmonization, standardization, and transparency operation which then translated into specific border operational objectives namely speed, dependability, quality, cost, and flexibility to measure the operational goals. Substantially in Malaysia, the complex procedures of importing Halal trade comprise the physical handling and documentation formalities always require a robust facilitation measurement. Thus, enabling relevant agencies for cross-border logistics operations involved concerned with the overall events within the whole import halal trade logistics process. The purpose of this paper is to identify the operational capabilities of the halal trade import facilitation process. This exploratory study used a series of semi-structured interviews with 45 participants among border agencies from the sea, air and land border communities. Hence, this study discovered that there are nine (9) other pertinent operational components for cross-border halal trade import facilitation including regulation, policy, knowledge, experience, visibility, commitment, attitude, mentality, and consistency on top of the five (5) original operational objectives related to facilitation at the border. This study also demonstrates every facet of the border clearance activities in the context of Halal trade across the Malaysian border as a highlight to the policymakers to make relatively further improvements to the border environment.

Keywords: trade facilitation, cross-border logistics, strategic operational objectives, import Halal trade, border operational capabilities

1. Introduction

Globally, the trade facilitation initiative is known as a successful international measure to eliminate unnecessary time and cost burden associated with border administrative operation for moving across border trade (WTO, 2017). This involve multi layers of regulatory category and therefore, requires a wide set up and generally include an entire trading system with further attention to border environment (Grainger, 2010). It is highlighted that adoption of correct trade facilitation measures will help economies especially the higher middle-incomed countries to enjoy 15.5% trade cost reduction (Moïsé & Sorescu, 2013). Trade facilitation requires a wide set up in international trade including border control procedures that encompasses.

In assuring Halal integrity of goods entering the country; based on the current import requirement in Malaysia, Halal certificate is only required for meat and poultry import but not for other imported food. This shows that majority of food import is not filtered accordingly with Halal control procedures during its arrival (Sarbani & Jaafar, 2018). In fact, that the Halal certificates requirement in Malaysia is particularly for meat and poultry products only. The rest of imported food products are not imposed

with halal import requirements at the border is very concerning. Besides, the current practices in maintaining halal integrity are merely concentrating on major logistics activities only, thus creates broken links in the Halal pipeline especially in the context of international trading that are not clearly specified in the Malaysia Halal Supply Chain Management System Requirements: MS2400-1-2019 Transportation, MS2400-2-2019 Warehousing and MS2400-3-2019 Retailing. It is very important to draw halal critical control points during border clearance activities when dealing with halal consignment (Sarhani & Jaafar, 2016). Thus, this study attempts to identify the systems on how the imported foods being moved, monitored, and inspected across border to ensure the Halal integrity of the halal product. Consequently, the framework for Halal cross-border clearance is proposed in this study, after identifying the influencing determinants of halal land cross-border clearance operation in assuring halal integrity at the cross-border entry point.

1.2 Trade Facilitation

Trade facilitation has emerged as a popular remedial tool for an effective and efficient cross border process especially towards import border coordination. As such, several theories and models were highly discussed in significance to the importance of trade facilitation towards the logistics operation. Theory reviewed are around related cross border trade logistics process. Among others from the economic perspective previous researcher has suggest that trade facilitation in Australia suggest that national trade facilitation should be adapted from multilevel structures for better coordination featuring a national trade and transport facilitation body, trade and transport facilitation sub-bodies, and specialist working groups (Widdowson et al., 2018). There are three principal for cost in trade facilitation including physical connectivity, institutional connectivity, and people-to-people connectivity (Shepherd, 2016) as well as building effective enforcement commitment with a strengthen cooperation between countries (Thanh, 2015). It is agreed that trade facilitation are giving extensive margin of trade from the impact of implementing the export agreement on developing countries' (Beverelli et al., 2015). improvement in infrastructure quality would bring the greatest benefits in terms of export growth. (Helble et al., 2012).

Improvement in port operating efficiency also tends to increase export variety (Feenstra & Ma, 2013), For agricultural trade, factors of trade times, logistics performance and infrastructure quality are having significant relationship between trade facilitation representations and trade costs across product sectors and regions (Brunner et al., 2014; Liapis, 2015). This can be done with effort improving the relevancy and efficiency of the interventions which were carried out through structural and cohesion funds (Gutu, 2016). It is also highlighted that trade facilitation focus on trading time and cost across border (Francois & Manchin, 2013) and in addition smaller countries are more open to trade than the large countries in term of trade facilitation (Amin & Haidar, 2013). Costs to export is useful in analyzing commodity-level trends in trade costs that signify the efficiency of trade (Hamanaka & Domingo, 2012).

In the other hand, for cross border facilitation in developing countries it is important to focus on risk-based verification procedures to conduct material inspection of every single shipment customs agencies must ready with proper personnel and technological means which begin from investment in education and create a business environment that fosters innovation (Martincus et al., 2015). Furthermore, new customs procedures and logistics security standard be able to helps companies in increasing their competitiveness on the market (Erceg, 2014). This can be done by focusing on speed, reliability, and security are more important for just-in-time delivery to reduce level of stock which can be resolve through coordination (Pomfret, 2014). Contingency management influences to development of more international cross-border trade (Amage et al., 2013). It is highlighted that official import and export cost and days involved in completing trade procedures is the ability to deliver goods on schedule (Moisé, 2013;Orliac, 2012). Time to export and import in the other hand are giving significant impact to cross-border cost measure adversely and radically towards regional bilateral trade in agri-food (Boughanmi, et al., 2021). Subsequently, on a different view Portugal-Perez and Wilson (2012) claims that customs-driven delays have a major negative effect on firms' foreign sales. Hillberry and Zhang (2015) suggest that good governance and impartiality and formalities regarding automation are contributing to better import facilitation while better understanding of knowledge about trading across multiple spatial scale (Bathelt & Li, 2020).

Trade and customs procedures are more than a technical compliance problem because impacts it will impact every movement across the border (Grainger & Morini, 2019). Table 2.7 shows the summary of relevant facts from trade facilitation based on respective research stream.

1.3 Halal Trade

Besides a huge effort on trade facilitation agenda, there is an increasing area of concern in the international trading involving halal trade logistics, which involves halal trade movement (Alqudsi, 2014; Choudhury & Biraima, 2002; Fischer, 2015; Jaafar et al., 2011; Kamaruddin et al., 2012; Spiegel et al., 2012). It is reported that the global Muslim population in 2010 was estimated at 1.7 billion (24% of the world's population), and it is expected to increase to 3.3 billion (29% of the world's population) by 2050 (HDC, 2014; IHI, 2010). The present growing demand for Halal trade especially food consumption also shows the increasing trend for the demand of related services (Lodhi, 2010). In the olden days, Halal food is consumed by only Muslim but now the consumption is beyond other religions and backgrounds because Halal is concerned about safety, hygiene and ethical quality (PRNewswire, 2016). It represents lifestyle that came into being after adjustments to the environment, people, and things through generations.

1.4 Clearance Operation at the Border

Border import clearance is closely related to the concept of an international logistics environment, a generic term that is normally used in connection with logistics referring to the international movement of goods (Anderson, 1985). Cross border activities are described as part of supply chain's broad and complex process (Hesketh, 2009). The process in cross border import involves the international trade transaction, which includes commercial contracts for the arrangement of import and export formalities to meet regulatory requirements as part of the cost of purchased cargo (Keretho & Naklada, 2011). The logistics strategy involving import border clearance is also influenced by service quality presented through logistics characteristics, infrastructure and human capital involved at every import checkpoint (Melan & Sabar, 2014).

Import clearance normally involve four main clearance stages namely documentations preparation, customs clearance and technical control, port and terminal handling and lastly, inland transportation and handling (Ministry of International Trade and Industry, 2009). The most common international cross border transaction is heavily involved with tariffs, quotas and formal impediments to trade that relays the level of country's performance in import trade (Anderson & Marcouiller, 2002). Within the process of cross border import, border control aspects are mostly viewed as impediment to trade for international inbound traffic (SASEC, 2014). In the East Asia, there are huge regional cross border initiatives, which focus on the creation of single market for the free movement of goods and services and are often referred to as the largest border alliance among the member countries named in the ASEAN Economic Community (AEC) (Petri et al., 2012). Cross border import initiatives also involve paperless trading initiatives to minimise barrier when trading in the ASIA-Pacific region (Bassa et al., 2021; Australian Department of Foreign Affairs and Trade, Cooperation, & Advertising., 2001). From the supply chain perspective, import activities are embedded in the overall logistics performance on trade, which refers to the cost, time and complexity contribute to the entire trading process (Hausman et al., 2013). Regulatory control for freight import clearance varies from one country to another due to every country's unique setting on product category and depending on the country's policy declaration using tariff code selection (Jensen & Vatrapu, 2015; OECD, 2005). Import activities behind the border often discussed as part of non-tariff barriers to trade involving various requisition for import (Hassan, 2014).

2. Methods

Based on qualitative research approach, this study conducted 45 semi-structured interviews with the stakeholders at the four (4) case studies from international border communities including two (2) land

cross-borders, sea freight and airfreight environment. Malaysia namely the Royal Malaysian Customs Department, the Food Safety and Quality Division, the Malaysian Quarantine and Inspection Service agency, and terminal operators, warehouses, and freight forwarders. The unit of analysis in this study is individual, thus results a total of 45 respondents from the respective stakeholders. The purposive sampling technique used in this study allows the best informants to be chosen, who can better answer the questions (Cresswell, 2014). The criteria in selecting the informants are those who involve in the import food clearance. On the other hand, the criteria of the private agencies are those related to food-related formalities that experience or involve in the import clearance operation at cross-border. Both public and private agencies views were considered in the data collection to avoid any bias in the output of this study. Table 1 below exhibited a brief demographic of respondents that includes their roles and the length of experience.

Table 1. *Table of Respondents*

Participant(s)	Designation and Division	Length of experience	Participant(s)	Roles	Length of experience
P1	Head of station	24 years	P24	Senior Officer	23 years
P2	Senior officer	20.5 years	P25	Officer	23 years
P3	Officer	5 years	P26	Officer	23 years
P4	Senior officer	22 years	P27	Officer	6 years
P5	Senior Officer	19 years	P28	Officer	6.5 years
P6	Senior Officer	22 years	P29	Officer	6.5 years
P7	Senior officer	15 years	P30	Manager	18 years
P8	Regional Manager	25 years	P31	Senior Manager	20 years
P9	Senior Manager	11 years	P32	Senior Manager	21 years
P10	Operation Executive	10 years	P33	Senior Executive	16 years
P11	Head Freight Division	23 Years	P34	Operation Manager	15 years
P12	Head Land Cross Border	24 Years	P35	Supervisor	18 years
P13	Senior officer	20 Years	P36	Senior Manager	23 years
P14	Senior officer	14 Years	P37	Officer	20 years
P15	Officer	10 Years	P38	Officer	8 years
P16	Operation Manager	18 Years	P39	Officer	6 years
P17	Finance Manager	12 Years	P40	Head of Import (North)	25 years
P18	Senior Manager	22 years	P41	Assessment Officer	4 years
P19	Head of Import (West)	22 years	P42	Assistant Operation Manager	11 years
P20	Head of Import (South)	18 years	P43	Assistant Manager	5 years
P21	Head of Import (North)	19 years	P44	Operation Executives	6 years
P22	Assessment Officer	4 years	P45	Operation executives	10 years
P23	Senior Officer	25 years			

3. Data Collection

The sources of data analysis in this study are solely from face-to-face in-depth interview. The initial process of this study is conducted by reviewing various source of literature. The major sources of information on halal trade import facilitation were best extracted from the border authorities and companies to identify the operational factors of halal trade import. Therefore, the focus was interviewing the qualified person involves in halal trade import facilitation directly as the deal with the cross-border ambience. A total of 45 respondents from private and public agencies participated in the data collection. The location of the interview took place at the interviewee premises and was conducted in the form of meeting. Prior to the interview, every participant was informed and briefed about the study. To facilitate and ensure that the interview will run smoothly, a set of interview questions were prepared beforehand. All of the questions were open-ended with the aim to stimulate the interest of the

informants and obtain comprehensive feedback from the informants. Table 2 contains the guided questions to answer the objective of this study.

Table 2. *List of Guided Interview Questions*

Set 1: Set of Question to Authorised Agency

No	Questions
1.	Kindly explain, what are the general practice for food import clearance process involving your agency?
2.	How does import information data and information are managed during clearance process?
3.	What are the formalities involving physical cargo during clearance process?
4.	What are the import requirements for import for food products and Halal food products?
5.	Can you please explain, does your agency involve directly with the Halal trade import monitoring?
6.	Is there any specific tariff classification to be referred as a guideline to Halal food import?
7.	Is there any specific or dedicated facility for Halal trade import provided during the physical cargo inspection?
8.	How does the import coordination between your agencies and other authorised agency being carried out?
9.	Is there any specification given to differentiate between Halal and Non-Halal criterion as a guideline of your import assessment?
10.	What is the main challenges for border agency to operate Halal Trade?

Set 2: Set of Question to Terminal Operator/Warehouse Operator

No	Questions
1.	Kindly explain, what are the general practice for food import clearance process involving terminal/warehouse operation?
2.	Do you refer to any specific regulation or guideline procedure for Halal import?
3.	Any specific mechanism or advance notification about the Halal food import status?
4.	Are there any differences on the treatment of regular food import and Halal food import?
5.	Do you separate your workers according for Halal operation and general food category during physical handling?
6.	Is there any segregation or separation between Halal and Non-Halal food at your terminal/warehouse?
7.	Do you require any specific documentation for Halal food products?
8.	How do you keep yourself informed about Halal food/non-Halal food import that you are handling?
9.	Is there any requirements or request to separate Halal food with non-Halal food at your terminal/warehouse?
10.	What are the main challenges for terminal/warehouse operator to operate Halal food trade?

Set 3: Set of Question to Freight Forwarders/Forwarding Agency

No	Questions
1.	Can you share what is the general procedures for food import?
2.	What is the procedure for normal Halal import and regular food import?
3.	How do you normally arrange the clearance for food import from the arrival until the delivery of the products?
4.	Do you engage with certified Halal terminal or transporter for your food import?
5.	Are there any differences on the treatment of regular food import and Halal food import?
6.	Do you separate your workers according for Halal operation and general food category during physical handling?
7.	Are you able to identify category of food import that you are handling whether it is Halal food/non-Halal food?
8.	Are you aware of Halal logistics standard, and do you carry out your work for Halal food?
9.	Is there any requirements or request to separate Halal food with non-Halal food at from your customer?
10.	What are the main challenges for freight forwarders to operate Halal food import?

This study ended up with a total of 45 respondents from public and private agencies after the data reached its saturation point, which means the last few data collected showed similar inputs, ideas, and information. The average time taken of the interviews was 2 hours.

5. Data Analysis

All the interview data were recorded and transcribed using Microsoft Excel. The transcribing processes were due immediately after all the interviews were completed to ensure the accuracy of the data. To systematically extract labels and summarize the information, Yin (1994) provides guidance for data analysis including grouping the information, categorizing them with its evidence in each category, and build flowcharts examination. On top of other 10 analysis method for qualitative data, thematic analysis

was used for the data analysis in this study. The thematic analysis is a textual interpretation that allow researcher to deepen their thoughts on the case study issues. Thus, this research opted for a thematic analysis as a medium to identify the identify the factors influencing operational capabilities of the halal trade import facilitation process. This decision lies within the fact that this method allows the researcher to get deeper understanding on the subject that is being studied. During the data analysis phase, the factors that occur in the transcriptions were identified, tabulated, and categorized based on the same group and based on the occurrences in the transcription. These processes were done manually by tracking down all the potential quotations by putting meaning into it.

5. Results and Discussion

From the analysis, six (6) determinants of operational capabilities for of the halal trade import facilitation process.

1. Knowledge

Knowledge elements in this study first highlighted on operational capabilities to carry out task as border controller and facilitators at one that is depending on individual level of expertise. This is highlighted in Case study one and Case Study three where level of knowledge differentiates decision-making, and evaluations result during import assessment. Officers at the border are facing a challenging situation when they deal with various attitude of agents or importers at the border that they always find tricky and difficult to handle. Therefore, officers need to exercise their authority to ensure that they will not jeopardize the facilitation but at the same time they can control the border effectively this include the judgement of products that may affected based on the officers' experience. Extensive knowledge on products category based on the tariff classification also importance as an authority to protect the border from false declaration attempt (Bathelt & Li, 2020)

As stated by P7:

“For halal food, do they need for halal cert or something for clearance. what like we handle now, when the supplier in Thailand, when they issue the cargo, they will come out with one cert. it is the health certificate to follow”.

P10 added:

“...so, our officers must be on alert always, gain more experience and deepen their knowledge, especially the one that has to deal with products checking...”

Supported by P34:

"It depends on the senior officer because the senior officer in this process has 5-6 people. so under his jurisdiction. Maybe if he can't, he'll refer you. You will take action”.

2. Expertise

Another factor that found as important elements that categorized as operational capacity to develop effective and efficient halalan-toyyiban trade facilitation is a reliable expertise to control facilitation that also understand halal principles too. By definitions expertise refers to the optimal level at, which a person is able and or expected to perform within a specialised realm of human activity the knowledge or skills acquired by a period of practical experience of something, especially that gained in a particular profession. (Swanson, 1994 p.94). This study is agree with argument made by , which mentioned that material technology and specialised social expertise shape the way company, as a social organisation, understand and practise halal this expertise to implement a comprehensive certification system. From this study it is revealed that expertise in halal facilitation at the import border is required to have an advantage interm of knowledge to face various type of halal and non-halal product, as well as the set of border situations that entwined with the import formalities.

P11 stated:

"The one who controls it should be the expertise. People who know about the ins and outs of halal and haram. For example, the state religious department, the federal federation. For example. They are the ones who should do that thing. Only he can give authority to other departments if the members of the department are not present at that time. But they should do it themselves. we are not the expert. So when he reaches the legal level he will be".

And supported by P15:

"... "But usually we trace when we go to examine it. But not necessarily we will get. Based on the instinct. He is actually instinct is important ".

3. Visibility

Process visibility refers to sharing and accessing process of information by management and process workers in an operational context. The level of process visibility is defined by the extent to, which process information is contextualised, relevant, trusted, timely and integrated. This study agrees with the arguments made by Aigbogun et al., (2014) that visibility is categorised dimensions of supply chain capabilities visibility as a mitigating effect on the supply chain vulnerabilities, as well as an enhancing effect on the supply chain capabilities. It is highlighted in this study that visibility is an important requirement for import cross border clearance to mitigate the risks of halal import during the import formalities. This study reveal that visibility need to be spell out in the form of reference database, halal certificate, visible information, visible halal cargo identity, quick reference trademark, halal traceability and data transparency.

And stated by Resp 30:

"... "If it involves import and export, I think it is halal. We can share his views in the tariff code whether it is non-halal and halal is segregated. ..."

And supported by Resp 12:

"..Because he has a Halal sign on the packet as well. Near the outer package there is usually a halal sign. if the product is not halal, there is no halal sign ".

1. Commitment

Commitment refers to any action taken in the present that binds an organization to future course of action. An action becomes a commitment, in other words, if it restricts a company's future options in a way that would be costly to reverse. They are how company secures the resources necessary for its survival but more than just necessities, they can be powerful tools to help company beat the competition. This study agrees with study conducted by (Pellan & Wong, 2013a) when they argue trade facilitation need to be specified in terms of commitment. It is further highted in this study that commitment need to be translated into commitment for halal control, firm halal effort, stakeholders' contribution, continuous cooperation between stakeholders, obligations towards halal initiatives and consistent enforcement by border communities to support halal trade facilitation at the border.

P2 highlighted

"Every agency should aware the important of Halal for this nation. And know their role function. With full responsibility.

And supported by P16 and P20:

"...as for Halal part, there are a lot that needs to be improved. If it's only based on the documentations, it is not enough. And assuming that, if the given certificate is fake we would not know. We only carry out our duty, that's all."

2. Mindset

According to (Talib et al., 2015; Wilson et al., 2013) halal is fully adopted as merely a tool and thus low certification involves the mindset of people. This is also in line with this study that people or stakeholders at the border have a limited knowledge and awareness towards halal implementation. Majority of the stakeholders does not care about halal because it is not a compulsory operational exercise to differentiate halal and non-halal item at the border. Furthermore, halal is set to become further hindrance to trade facilitation according to some group of people due to the import requirements. Among others researcher that highlighted about halal and the mindset of the people involved in the business is include the work from (Hashimi et al., 2010; Hunter, 2014; Kathuria & Gill, 2013; Othman et al., 2016; Shokri et al., 2014; Tlemsani, 2010; Wilson & Liu, 2010) where special highlight has been given towards mindset position. This study in addition highlighted the further importance mindset elements involving import cross border facilitation for halal freight including perceiveness among stakeholders, intentional escapism involving import formalities, profit oriented mindset and lack of preparation within the halal import activities.

As stated by P1:

“...for example chicken. After several checking actual is beef. It is fraud because they attempt for wrong declaration ...”

Added by P19:

“...There are some staff intentionally break customs rules. this will lead to fraud ...”

3. Consistency

Process consistency is a system that put in place that will support overall business strategy. It makes to business more competitive because its able to evaluate the strengths and weaknesses and find areas where they can improve. Products and services are delivered consistently, which increases customer satisfaction and loyalty. Arguments on supply chain and trade facilitation consistency has been made by (Gutu, 2016; Moïsé, 2013), but within this study further arguments involving consistency is being made. This study found that element of consistency exists in the event of procedure for food import checking, which currently not consistent across all type of food consignment. The current procedures, halal checking involve only for certain shipment category under the meat and poultry declaration. Other food that claimed as halal import food is not specifically monitored and control during border formalities. Consistency also demonstrates through border agency requirements for food import because it will involve various requirements according to the agency involved. For instance, food import formalities at least involve three different department decision during import formalities including Customs department, MAQIS and health department as control and monitoring agency. Furthermore, the control purpose is mainly the requirement for halal import. As compared to halal domestic requirements, halal cross border is a lenient in term of halal control, it is argued that the halal certified food is also imported food but the halal status has never been checked during border clearance process yet when it arrive local market it is claimed as halal product.

P6 revealed,

“...Most of the time inspection done separately among agency., if someone needs us to do, we will cooperate with other agency such as MAQIS. This is because every agency had different requirement to be check...”

The statement supported by P31,

“...Through the Klang port and KLIA, the import conditions are the same, but the methods are different...”

5.1 Research Framework

The results from this study demonstrated that the contribution of six (6) determinants including knowledge, expertise, visibility, commitment, mindset, consistency to the operational capabilities of the halal trade import facilitation process. From the overall framework it shows that the operational capabilities mediated the strategic context with the operational objectives of halal trade import facilitation process. Based on the thematic analysis, major themes were derived from detailed quotations from informants. Figure 1 demonstrated the research framework showing the identified determinants contributing to an efficient halal trade import facilitation. These determinants were found significant for a successful halal trade import clearance at the border crossing point.

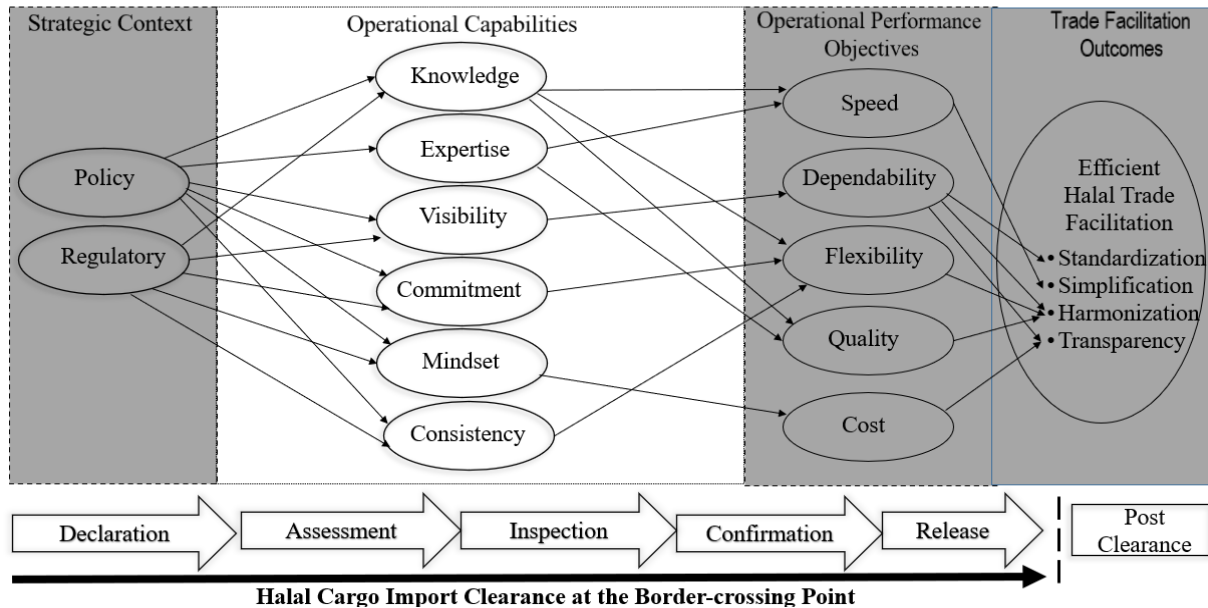


Figure 1. Research Framework Operational Capabilities of the Halal Trade Import Facilitation Process

5.2 Validation

In adopting qualitative research, the results can pose a different impact from quantitative methods. Therefore, validating qualitative research is essential to inform the findings have important implications, true and reliable. One of the ways in validating qualitative research is through cross-case analysis. If the responses from the participants become more consistent across the larger number of samples, the data becomes more reliable. Accordingly, to validate and ensure the reliability of this study researcher used cross-case analysis. This step is taken to assure that all data collected and inputs in this study are valid and relevant. From the transcription, it shows that all the 45 respondents the four case studies share the same thoughts and are consistent in discussing the topic. No new prospects are being discovered down to the last participants; therefore, it has reached the saturation point. The table below shows the validation for this study. It discloses the frequency of the respondents on discussing through the identified construct. The table below illustrates no significant gap between each informant. Thus, has proven that the identified construct is accurate and reliable.

Table 2. Comparative Analysis of Determinants from Operational Capabilities among the Four Case Studies

Broad Themes	Case Study One	Case Study Two	Case Study Three	Case Study Four
Knowledge	✓	✓	✓	✓
Expertise	✓	✓	✓	✓
Visibility	✓	✓	✓	✓
Commitment		✓	✓	✓
Mindset	✓	✓	✓	
Consistency		✓	✓	✓

6. Conclusion

The result from this study shows that halal operational capabilities is vital and can be considered as critical control point for halal assurance. The results provide insights to the, policy makers, enforcement agencies, businesses on how to improve the halal trade import facilitation at the entry point that could assure the integrity of halal processes. This study strongly recommended that by strengthening operational capabilities in the clearance systems across border be able to improve accommodation towards halal trade. This study also suggested that the stakeholders at the border need to be fully equipped with operational capabilities to preserve the integrity of halal in a global supply chain. It is strongly recommended that future studies should conduct an in-depth interview with the importers community to obtain direct inputs during clearance process. To further establish the identified determinants, future work on quantitative method may need to be done to explore the degree of influence of these determinants towards halal import trade facilitation in assuring halal integrity.

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**BUSINESS,
MANAGEMENT,
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The Relationship of Trust-Based Ties, Entrepreneurial Activity, and Economic Growth in Developing Countries

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Abstract: While the importance of trust-based relationship for firms and economic growth has been highlighted in a significant number of scholarly studies, particularly those focusing on low institutional pressures, its impact on firm economic performance has largely gone unstudied. Is it better for businesses that rely on trust in their dealings with partners than those that do not? Are organisations that rely on their trust network able to capitalise on possibilities for growth or exit? Despite its importance, there is no obvious empirical response to this topic as of yet. As such, this research attempts to seek evidence that the beneficial functions of trust ties contribute to an increase in entrepreneurial activity, which leads to economic growth. In other words, the purpose of this study is to demonstrate the link between trust and economic growth through entrepreneurial activity. The fixed effect estimation methodology was used in this study, which included two regression models. The World Values Survey (WVS) data on generalised trust, Global Entrepreneurship Monitor (GEM) data on entrepreneurial activity and GDP figures from the International Monetary Fund's World Economic Outlook (IMF) were used in this study. However, due to the variable's low availability of data across years, it is difficult to generate solid panel estimation.

Keywords: trust-based relationship, growth, entrepreneurial activity, panel data analysis

1. Introduction

Since Putnam's key study in 1993, the relationship between trust and economic progress has gotten increasing attention in the literature. According to Knack (1999), economic development is better in high-trust cultures due to lower transaction costs. Because trust protects both property and contractual rights, resources do not need to be transferred from production to protection. Knack and Keefer (1997) and Zak and Knack (2001) show a positive relationship between trust and economic development using data from a wide range of countries (poor, middle, and high-income). Helliwell (1996), on the other hand, analyses data from a group of high-income OECD countries to indicate a negative relationship. Beugelsdijk and van Schaik (2005), on the other hand, investigated local data from high-income European countries and discovered no association. Dincer and Uslaner (2007) identified a positive correlation between trust and growth using data from US states. Because past research has yielded contradictory results on the relationship between trust and economic growth, we are compelled to explore for the missing link that could explain this situation. What if the missing variable is entrepreneurship?

What exactly is entrepreneurial activity? In business contexts, entrepreneurship occurs naturally. The entrepreneurial mindset that successful business organizations embrace promotes change and growth. However, the entrepreneurial process enables people to persevere and grow even in the face of commercial insecurity. Entrepreneurship can emerge from a variety of sources, including opportunity- and market-driven businesses, innovation, digital technology, and entrepreneurship education. Entrepreneurship was originally divided into two categories: opportunity-based and necessity-based. Other studies classified entrepreneurship as small business entrepreneurship or entrepreneurship driven by innovation.

Data show that entrepreneurs have a generally favorable impact on economic growth, however the results vary greatly among economic sectors (Acs, 2006). Politicians are particularly interested with entrepreneurs because they certainly contribute to economic growth (Nuemann, 2021). However, other academics believe that the potential for entrepreneurship to benefit the economy is overstated (Summers, 2015). Entrepreneurship contributes to unequal growth throughout the economy's many sectors. Despite the prevalence of innovation, entrepreneurs, and innovation philosophy, economic growth studies show that productivity growth has been "at best moderate in recent years." According to National Bureau of Economic Research, this is because innovation affects industries differently, which means that it has a significant impact on the growth of some economic sectors but not all of them (Andrews et al., 2022). Academic literature reviews reveal a typically good association between entrepreneurship and increased well-being. This link, however, is complicated and depends on a variety of circumstances, including the size of the local population, the number of entrepreneurs in the area, and the industry in which they work (Nuemann, 2021).

“Entrepreneurship as trust”. What is the reason for this? Our interactions with others are built on trust. Since these entrepreneurs deal with people, trust is central to all entrepreneurial activity. As a result, trust is a vital aspect of becoming an entrepreneur because it aids when things are unclear (Mickiewicz & Anna, 2020). To the best of the author's knowledge, there are independent studies on trust and economic growth, entrepreneurship and economic growth, and trust and entrepreneurship. However, there is no studies that associated entrepreneurship with trust and economic growth. To address the contradictory findings of trust and economic growth, this study employs data from emerging markets, as Helliwell (1996) advises, in accumulating trust statistics for a broader range of nations and regions. To further the line of research, this study adds entrepreneurship as the missing link to explain the causal linkages between trust and economic growth, as research shows that trust have been holding most business together in developing economies. Against this background, the present study examines the following research questions:

RQ1: Is there any causal relationship between trust and economic growth in developing economies?

RQ2: If there is causal relationship, is entrepreneurial activity mediates it?

In order to achieve its research aims, the study adds two separate pieces of knowledge to the body of literature. It begins by attempting to contribute to what is already known about trust and economic growth by examining a sample of developing countries. Second, by integrating entrepreneurial activity in the interconnection, this study hopes to help to explaining the inconsistent findings of trust and economic growth in earlier studies. The rest of the paper is structured as follows: Section 2 examines the theoretical and empirical research on the relationship between trust, entrepreneurial activity, and economic growth. The study methodology and data sources are described in Section 3. Section 4 goes through the estimation findings, and Section 5 wraps things up.

2. Literature Review

Trust-based ties are intangible resources that include skills and competencies (what the business ‘does’) that assist organizations in selecting, designing, implementing and achieving value-creating market strategies (Hall, 1992; Amit and Schoemaker, 1993; Day, 1994; Galbreath, 2005). Using the resource view based (RBV) approach, organizations can gain a sustainable competitive edge by utilizing productive trust-based relationship (Barney, 1991; Peteraf, 1993; Wernerfelt, 1984). In informal or relational government, trust is essential (Bradach & Eccles, 1989). The concept of trust that underpins contractual relationships is grounded on societal standards and human interactions (Lewis and Weigert, 1985). Indeed, as Heide and John (1992) explain, norms are crucial for establishing economic and efficient connections between autonomous companies. They argue that supportive rules have a significant economic benefit when particular assets must be secured. Trust reduces need for vertical integration by decreasing the likelihood of opportunistic behavior and uncertainty (Granovetter, 1985). Macaulay (1963) demonstrated that demonstrated that commitment rules impose requirements on parties to transactions at the expense of human relationships in non-contractual economic cooperation. Arrow (1979) defines trust as "an key lubricant of a social system," emphasizing its significance as a

control mechanism (p. 23). Without confidence, obtaining alternative penalties and assurance would be extremely costly, and many opportunities for mutually beneficial collaboration would be missed (Arrow, 1969).

2.1 *Theoretical Literature Linking Trust Ties and Entrepreneurial Activity*

Welter (2012; p. 194) summarizes the connections between trust and entrepreneurship: “When pursuing entrepreneurial activities and trusting, individuals deal with the unknown; when acting entrepreneurially, we do not know whether we will achieve the intended results; and when trusting, we do not know whether the persona in whom we trust will be worthy of it”.

Previous study has found that trust, network, social norms and associational activity are all important components of a successful economy. Generalized trust and social norms (along with associational/network activity) are significant components of social capital, as discussed by Bjørnskov (2006). In this research, we will employ generalized trust to quantify trust-based ties in this study, which means we have a favorable outlook on how our fellow citizens, many of whom we do not know personally, will behave.

Entrepreneurship is a process that involves the discovery, creation and exploitation of possibilities to introduce new products and services, new organizational structure, or new processes (Venkataraman, 1997; Shane & Venkataraman, 2000). By focusing on the initial stage of entrepreneurial process, this research adopts the Kirzner (1973) perspective on opportunity recognition, which states that entrepreneurial possibilities come from individuals’ uneven access to information. In summary, people uncover opportunities as a result of their realization of the worth of fresh knowledge (Shane, 2000). Trust ties has been researched as the mechanism that facilitate information sharing.

According to the network literature, people obtain information through interactions with other people, who are in turn connected to others, and that network features affect the availability, timeliness, and quality of information access. To date, the literature on individuals’ network embedding has presented two perspectives. Specifically, Burt’s (1992) structural hole arguments and Coleman’s (1990) network closure argument. Both perspectives begin with the premise that the nature of networks influences information flow and hence the amount to which people may benefit from it. Trust is essential for conducting business. Simply having an employment contract or engaging in business activities necessitates some amount of trust. Trust is an emotional as well as a cognitive act. Emotionally, it is when you disclose your vulnerabilities to others but feel they will not exploit your vulnerability. Logically, it is the point at which you have analysed the probability of gain and loss, computed expected utility based on hard performance data, and decided that the individual in issue would behave predictably (McEvily et al., 2003).

2.1.1 *Measurement of Trust Ties*

The generalized trust variable has been a widely used trust and social variable, including data from the World Values Survey (WVS). The data are obtained in waves of survey, with each wave lasting around 4-5 years. There are six waves between 1981 and 2015. In all, there will be six waves of survey: 1981-1984, 1989-1993, 1994-1999, 1999-2004, 2005-2008 and 2010-2014. The first wave has just 21 countries, the fourth wave has 69, the fifth has 57, and the last has 60. In other words, if the country is covered by all waves, the maximum number of observations per country is six. As a result, the dataset’s weakness when panel data is approximated (supported by Ahmad and Hall, 2016).

2.1.2 *Empirical Evidence Linking Trust with Entrepreneurial Activity and Economic Growth*

Knack and Keefer (1997) and Zak and Knack (2001) are essential works to the empirical cross-country macro research on social trust. For instance, Zak and Knack (2001) examine economic development in 41 countries, most of which are industrialized, by regressing both interpersonal trust (as measured by the WVS) and an index of formal institutional strength. When formal institutions are kept constant, the authors discover that interpersonal trust has a positive and substantial relationship with growth. They

do not, however, examine the potential of non-linear trust effects of trust that vary according to the number of formal institutions. Beugelsdijk, De Groot and Van Schaik (2004) discover that the findings of Zak and Knack's (2001) robustness analysis are generally robust, even when institutions-related indicators (such as religion and political stability) are included, but that the marginal effect of trust is stronger in low-trust countries. Likewise, Tabellini (2010) demonstrates a beneficial effect of interpersonal trust on growth in European areas using an instrumental variable method, but does not examine on the differential influence by formal institutions. Beugelsdijk and Van Schaik (2005) found that associational activity best predicts growth as the results from analyzing 54 European regions.

2.2 *Theoretical Literature Linking Entrepreneurship and Economic Growth*

Davidsson (2003) explores many contemporary viewpoints on entrepreneurship and argues in favor of Kirzner's (1973) view that "entrepreneurship consists of the competitive behaviors that drive the market process". Entrepreneurship, in this context, is defined as the introduction of new economic activity into the marketplace. As such, entrepreneurship is demonstrated not just by new enterprises entering the market, but also by established firms entering the market in inventive and imitative ways.

From historical perspectives on entrepreneurship, theoretical and descriptive reasons connecting entrepreneurship and economic growth have arisen in a variety of domains of economics and management research, including economic history, industrial economics, and management theory. Wennekers and Thurik (1999) and Carree and Thurik (2003) conduct comprehensive reviews of the broad literature on entrepreneurship and economic growth. According to the literature, entrepreneurship improves economic performance through introducing innovations, fostering change, fostering competition, and fostering rivalry. The knowledge and technology revolutions of the last two decades have revitalized theoretical thinking on the relationship between entrepreneurship and growth, with new ideas coming from the fields of industrial evolution and evolutionary economics (Audretsch, 1995; Jovanovic, 1982). Entrepreneurs, according to evolutionary economics, act as change agents, introducing novel ideas to markets and stimulating growth through a process of competitive company selection.

Wennekers and Thurik (1999) synthesized diverse strands of literature to build an operational framework linking entrepreneurship and economic growth. They underline the entrepreneur's function beyond that of innovation. Entrepreneurs' role in innovation involves newness (implementing inventions), as well as new entrance (starts-up and entry into new markets). In their final framework, they clearly explain the myriad consequences and conditions occurring at various levels for entrepreneurial activities to ultimately impact on economic growth. In this paradigm, the impact direction of impact is not predetermined. However, if other factors remain constant, an increase in the number of entrepreneurs should lead to improved national economic growth.

To address a dearth of formal growth models that place a strong emphasis on the entrepreneur, Schmitz Jr (1989) conceived a model inspired by Romer's endogenous growth models (1986). According to these theories, new business formation is an endogenous predictor of economic growth that results from rational choice by individuals between employee and entrepreneur positions. This theoretical model concludes that increasing the degree of entrepreneurial activity in an economy result in increased economic output.

2.2.1 *Evidence Relating New Business Creation to Economic Growth*

There are few empirical research studies examining the econometric relationship between national economic development and entrepreneurship in the form of new business formation. This is partially because it has been difficult to create a measure of national entrepreneurialism that is suitably connected with national economic growth as measured by production, productivity, or wealth. As demonstrated in Wennekers and Thurik (1999) paradigm, macro level assessment of entrepreneurship requires operationalizing entrepreneurship as a multidimension notion based on micro-level typologies.

The job creation literature abounds with evidence that small businesses and recently established enterprises generate a significant number of new employments, with some research indicating that tiny and newly formed organizations generate most new jobs. This result has been found in various studies on employment creation in a variety of nations, including the United States (Birch, 1979; 1987), Sweden (Davidsson et al., 1998) and Canada (Picot et al., 1995). Numerous writers have done within-country regional-level analyses correlating economic development and well-being with company entrance and departure dynamism. Like this paper's attempt to correlate new business creation with national economic development. Using data from business births and deaths in 382 United States labour market sectors, Reynolds and Curtin (2008) established a direct link between creative destruction as expressed by firm formation dynamics and economic growth as measured by job creation.

Apart from the literature on job creation, several studies analyze the ambiguous causal relationship between the development of new enterprises and the level of unemployment. Audretsch, Carree and Thurik (2001) present an outline of the relationship's opposing bidirectional pressures. Increased unemployment may have a good or negative influence on entrepreneurial activity (according to the push effect hypothesis of income choice) (according to the pull effect theories on entrepreneurial capability and risk attitude). Similarly, the reversed causality connection is uncertain. New start-up businesses create jobs for themselves and for established businesses (Fritsch & Mueller, 2004). However, given the poor survival and growth rates of new enterprises, their contribution to unemployment reduction would be modest.

Empirical studies indicate the existence of divergent causal linkages in both directions. Storey (1991) conducted an early study to describe the mixed empirical data about the unidirectional effect of unemployment on company start-up. According to certain research, such as Picot et al. (1998), new firms boost employment levels through encouraging economic activity and producing new jobs. On the other hand, Evan and Leighton (1989) and Reynolds et al. (1994), among others, established a "refugee" or "shopkeeper" effect, in which unemployment causes individuals to seek self-employment, hence increasing entrepreneurial activity. Van Stel and Storey (2004) added that this "refugee" push effect, when combined with low entry barriers, may result in start-ups that provide employment for business owners but do not create revenue.

Numerous empirical studies have included this bidirectional causation and modelled entrepreneurship as an endogenous predictor of employment. These studies argue for the existence of both a "Schumpeter" and a "refugee" impact. The "Schumpeter" effect is said to likely to be noticed in advanced countries, whereas the "refugee" impact is more likely to be detected in lower-income countries with less established social security systems. In time series models, the refugee impact occurs during a business cycle slump. Audretsch and Thurik (2000) used these assumptions to develop an estimating equation that included changes in firm ownership as a component in the change in unemployment rate. They concluded, using data from 23 OECD nations from 1974 to 1994, that an increase in the number of entrepreneurs results in a decrease in the rate of unemployment.

The analysis was then broadened to include economic growth as measured by per capita production (GDP). Carree et al. (2002) developed an error correction model to estimate the equilibrium rate of entrepreneurial activity as a function of an economy's stage of development. The equilibrium rate concept is rooted in the labour market's option between self-employment and paid employment. Additionally, this study used data from 23 OECD nations to calculate the equilibrium rates of entrepreneurship and shown that departures from these rates have a large and negative effect on GDP growth. Audretsch et al. (2002) in a different field, used this framework to examine the influence of small business predominance and obtained a similar conclusion. Any country that deviates from the equilibrium rate of entrepreneurship pays a growth cost in terms of economic growth that is sacrificed. Thus, depending on whether a country's actual rate of entrepreneurship is greater than or less than its equilibrium rate, the link between economic growth and entrepreneurship can be negative or positive.

Entrepreneurship is defined in the research that use data from 23 OECD countries as firm ownership or self-employment, in accordance with Storey (1991). Carree et al. (2002) admit that business ownership is not identical with entrepreneurship. They argue that in contemporary countries, the rise in firm

ownership is a reasonable representation of the trend in entrepreneurship. The advantage of using firm ownership as a proxy for entrepreneurial activity is that comparable cross-country data on this metric are available via the Compendia 2000 – a dataset, which incorporates OECD labour force statistics and other country-specific data.

However, because data from non-OECD countries is scarce, the study's scope is limited to developing nations. Additionally, company ownership statistics measures existing self-employed firms, not the new ones. While the two may correspond strongly in developed nations, this is unlikely in emerging countries, where entrepreneurial activity is projected to be more variable. The GEM's fresh empirical data may help overcome these problems (Reynolds et al., 1999). However, prior research on the relationship between entrepreneurial activity rates as assessed by GEM and economic growth has been confined to bivariate correlations with short-term GDP rates, with no attempt to adjust for other variables (Reynolds et al., 2000; 2001; 2002).

Thus, two hypotheses are proposed to evaluate the link between trust ties, entrepreneurial activity and economic growth:

Hypothesis 1: Trust ties matter to economic growth in developing countries under study

Hypothesis 2: Trust ties affects economic growth via total entrepreneurial activity in developing countries under study.

3. Methodology and Data Sources

3.1 Data Sources

Rate of Economic Growth, the dependent variables, is calculated using the growth in GDP per employed person over a five-year period. The growth rate is calculated by averaging the yearly compound growth rates from 2008/2009 to 2013/2014. The average growth rate over a five-year period is used to level out yearly growth rate volatility. GDP figures are derived from the International Monetary Fund's World Economic Outlook (IMF). Euromonitor Global Market Information Database (GMID) data on employed individuals are derived from national sources.

Total Entrepreneurial Activity. The GEM Adult Population Survey provides data on TEA. This collection provides a variety of entrepreneurial metrics derived from surveys of around 3000 respondents per nation (70 countries in 2013). The TEA is defined as the proportion of adults (18-64 years old) who are actively interested in establishing a new endeavor or who are the owner/manager of a firm that is less than 42 months old (Reynolds et al., 2002).

Generalized Trust. The World Value Survey (WVS) data on generalized trust are available for 72 countries. The WVS is undertaken in a number of countries: generally, more than 1000 respondents in each nation reply to several questions about their values on generalized trust. The poll contains a question concerning the respondent's level of trust: "Generally speaking would you say that most people can be trusted or that you cannot be too careful in dealing with people?". A total of 49 countries are taken as sample as they are categorized as developing economies and there are data collected on the generalized trust survey.

3.2 Methods of Analysis

The fixed effect estimation methodology was utilized in this study because it has the potential to lessen omitted variable bias and time-invariant heterogeneity when compared to the more often used cross-sectional estimation. This study carries two regression models.

To begin, this study uses a 49-country dataset to examine the relationship between trust and economic development. By altering the control variables, various models were evaluated, resulting in a standard

model that would serve as the foundation for subsequent regression research. Second, we incorporate TEA indications. Thus, this research examines whether trust links have an effect on the TEA rate, while accounting for a variety of other factors. Second model, using economic growth as the dependent variable, the models are validated using controls and supplemented with TEA and the WVS trust indicator. The following generic types of regression models are used:

Equation 0-1

$$\begin{aligned} & \text{Rate of economic growth} \\ & = \alpha_0 + \alpha_1 \text{GNI per capita} + \alpha_2 \text{Gini} + \alpha_3 \text{growth population} \\ & + \beta_1 \text{generalized trust} \end{aligned}$$

Equation 0-2

$$\begin{aligned} & \text{Rate of economic growth} \\ & = \alpha_0 + \alpha_1 \text{GNI per capita} + \alpha_2 \text{Gini} + \alpha_3 \text{growth population} \\ & + \beta_1 \text{generalized trust} + \beta_2 \text{TEA} \end{aligned}$$

3.2 Control Variables

When studying the link between entrepreneurial activity and general trust, it is necessary to include additional elements that affect a country's entrepreneurial activity rate. Economic, institutional, and demographic factors are used as controls in this study to evaluate the hypotheses. The per capita income is used to determine the economic development level. Gross national income (GNI) per capita is represented in purchasing power parities per \$US and is derived from the World Bank's 2018 World Development Indicators database.

To account for institutional context, this research contains a variable on income inequality by nation. According to Zak and Knack (2001), trust erodes when a country has pay discrimination that is not motivated by economic motives. On the other side, trust is increased when a country's inhabitants experience a fair and equal distribution of money. Easterly et al. (2006) argue that socially cohesive countries will ensure that the rich and poor share the costs and benefits of reforms equally, and thus will enjoy greater prosperity than more divided countries, where benefits accrue primarily to the rich and costs accrue to the poor. As a result, a country that is equitable in terms of economic distribution frequently has socially cohesive inhabitants who have a high level of trust among themselves.

In a demographic environment, growing population is critical. Growing population is predicted to boost entrepreneurship (Armington & Acs, 2002). An increasing population offers new economic opportunities as new and larger consumer markets arise because of population growth (demand side of entrepreneurship). Population expansion may also operate as a catalyst for new economic activity to earn a livelihood, particularly when immigration is the primary driver of population growth (supply side of entrepreneurship). The population growth rate from 1998 to 2014 is based on data from Gapminder, HYDE, and the United Nations Population Division (2018). The correlation coefficients for the variables utilized in the study are listed in Table 1. Correlations between GDP per capita growth and predictors (generalized trust and TEA) appear to be in the opposite direction of the basic, with a negative significant connection between TEA and growth and no significant association between trust and growth.

Table 3. Correlation Coefficients between Variable in Estimation Equation

	Real GDP per Capita Growth	Generalized Trust	TEA	Income Inequality	Population Growth
Generalized trust	-0.0029				
TEA	-0.4509*	-0.2617			
Income inequality	0.5093*	-0.5373*	0.1055		
Population growth	-0.2175*	-0.1452	0.0646	-0.3991*	
GNI per capita	0.9631*	-0.1034	-0.3749*	0.5971*	-0.1631

Note: * Significant at 5%

4. Estimation Results and Discussion

As panel data are employed in this investigation, fixed effect estimate is performed. The fixed effect technique is capable of decreasing estimate bias due to omitted variables and time-variant heterogeneity. The Hausman test was used to determine whether strategy is superior, and the test statistics show that fixed effects are favored.

The rate of GDP growth in Equation 4.1 is calculated using generalized trust and its conditional convergence parameter. The results are summarized in Table 2 – refer to Model 1. Because there are no TEA data before to 2002, these regressions employ generalized trust from Waves 4, 5, and 6. Hence, it explained the drastic lesser number of observations in Model 5, 6, 7 and 8. Appendix B.1 is a list of the developing nations that participated in this study in detail.

All model specification in Table 2 use income inequality, population growth and gross national income per capita as control variable. Result for Model 1 include generalized trust and all three control variables. Separately, the control variables were added to examine their independent contingency in the link between trust and economic development, respectively to Model 2 – income inequality, Model 3 – population growth and Model 4 – GNI per capita. Our initial hypothesis is refuted by the results. Except for Model 4, where the coefficient is small. Model 1, 2, and 3 are insignificant. However, as the adjusted R^2 value is high, there is some chance that the model is overfitting as lots of “insignificant” predictors. The second level involves the use of variable trust and TEA as a predictor of economic development as show in Equation 4.2. The study indicates that the link between TEA and economic growth is inverse.

Table 4. Regression of Growth Model

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Constant	4.2035***	6.809***	9.0988***	2.6144***	8.4670***	11.517***	10.2018***	3.1306***
<i>Control variables</i>								
Income inequality	-0.0053	0.0547*			-0.0241***	-0.0282***		
Population growth	-0.3006*		-0.3970**		0.4553**		-0.0547	
GNI per capita	0.6352***			0.7629***	0.2717**			0.7297***
<i>Predictors</i>								
Generalized trust	-0.0013	-0.0039	-0.0021	0.0061***	-0.0027	-0.0080**	0.0035	0.0019
Entrepreneurial activity					-0.0231***	-0.0307***	-0.0424**	-0.0072
Observations	32	33	92	87	18	18	37	36
Adjusted R ²	0.9104	0.2152	0.0271	0.9369	0.8530	0.7208	0.1354	0.9374*

Notes: Dependent variable: Log real GDP per capita growth. ***p<0.01, **p<0.05, *p<0.1

All three models 5, 6, and 7 have a statistically significant weak and negative association with economic growth. The TEA rate's opposing effect on economic growth is consistent with the findings of van Stel, Carree and Thurik (2004), who discovered that the TEA rate had a negative effect on relatively poor nations and a positive one on relatively wealthy countries. The most plausible explanation for this situation is that these developing nations do not have enough large firms. Large firms play an important role in leveraging economies of scale and breadth, allowing them to produce low-tech things. Many local residents may be hired by large firms, and via on-the-job training, these local residents may become more productive than when they managed a small business and struggled to make ends meet as an entrepreneur. Furthermore, smaller businesses may thrive near larger organizations since they may act as suppliers to giant corporations (by outsourcing) and learn a lot from them. Nonetheless, as a viable alternative to unemployment, entrepreneurship should be supported in developing countries.

5. Conclusion

The article's main aim is to examine the link between trust, entrepreneurial activity, and economic growth in developing nations in the Asia, African, and Latin American areas over a ten-year period, 2004–2014. This study uses panel estimation to examine the most generally used measure of trust, generalized trust as measured by the WVS. However, due to the variable's low availability of data across years, any significant panel estimations are hardly to be achieved. It is supported by Ahmad and Hall's work (2016).

In general, a higher level of entrepreneurialism does not imply improved economic success. This condition may be compared to the definition of the total TEA rate, which defines entrepreneurship broadly as the proclivity to engage in entrepreneurial endeavors and manage newly founded enterprises. This implies that only specific entrepreneurial activities and services may generate growth at the microeconomic level. Because the current research is at the aggregate macroeconomic level, the study is unable to discriminate between these various entrepreneurial responsibilities. However, emphasize this as an area in need of empirical research.

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The Impact of Remote Learning on Students in the Private Education Sector in Malaysia

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Abstract: As we were eagerly waiting for over three decades to step into vision 2020, we were struck by the sudden and swiftly accelerating crisis that paralyzed the whole nation. Covid-19 has put the whole world to a standstill and forced everyone to stay at home. Due to the crisis, students were forced to change their learning habits due to the abrupt closure of schools and universities. This article aims to analyze the impact of remote learning and the adaptability of students in the private education sector in Malaysia. Remote learning encourages students to be more independent as it focuses more on being student-centered rather than teacher centered. A correlation was calculated based on the dataset on how the pedagogy of remote learning affects the students' understanding as well as how versed the students are on the use of digital technologies in their self-learning.

Keywords: remote learning, online, digital technologies, self-learning, independent learning

1. Introduction

As the world was shaken with the covid crisis, the whole nation came to a standstill. The crisis has not only shaken the social and economic sector but also the education sector. The higher education was forced to make a drastic modification in terms of the learning process and shift from being teacher centered to student centered. To avoid the pandemic spread, all gatherings of more than ten people had to be limited or even cancelled to ensure social distancing as recommended by the World Health Organization (WHO, 2020). Due to this, all the universities in Malaysia had to close their operations and implement remote learning to ensure there was no disruption in the students' learning process. This has pushed the students to change their learning habits and be more independent in their learning process (Naima, 2020).

This transition brought many challenges in educational institutions mainly on the challenges and the opportunities that will arise from this crisis (Adedoyin & Soykan, 2020). Students were compelled to attend their lectures and classes remotely and leverage the usage of digital libraries to support their learning process all at once. However, due the lack of internet availability and accessibility in remote areas in Malaysia, there were still a strong preference for conventional learning among students especially for the students who have just graduated their high school and transitioning to tertiary education.

This was confirmed by UNESCO (2020) that the closure of universities has several adverse consequences on students such as interrupted learning which results in student being deprived of the opportunities for growth and development. This article aims to understand the impact that the students in the private universities in Malaysia on remote learning. This is also to identify what are the challenges that the students are facing and how are they adapting to this new educational process. By understanding this, private universities can leverage on the information to prepare all the necessary facilities to equip the students better for their pedagogy process (Oliviera et al., 2021).

2. Literature Review

2.1 Remote Learning

Remote learning consists of web-based learning and streaming classes over TV and radio. Remote learning is a process that requires students to be more independent and have own initiatives in seeking knowledge. However, access to remote education varies dramatically in conjunction with family's income level. This indirectly causes accessibility to the internet especially in remote areas as well as the availability of computer especially for students that comes from a lower income family. Due to this, students' studies will be affected due to loss of connection or due to sharing of computers with other siblings in the family. Therefore, to have a successful remote learning, the accessibility of internet as well as providing students with a computer will be the major factor.

The success of any educational process is measured on its commitment of the teachers and students (Naima, 2020). Thus, in the context of remote learning, the commitment and acceptance of students is the main criteria for a successful online learning (David, 2020). Teachers have given full commitment in guiding students through the process of online education throughout the period to ensure that students are not lost in between the teaching and learning process. This might increase the workload of the teachers as they will have to put more effort and introduce other modes of learning to keep students motivated in the program. Remote learning tools such as e-learning platforms plays a crucial role in today's generation. These digital technologies will enable teachers to plan, deliver and track the teaching and learning process. (Naima, 2020). Besides that, the methods of assessing the student can also vary as there are many digital platforms that has been introduced to support the teaching and learning process to better equip private institutions (Chick et al., 2020). The Ministry of Education in Malaysia have even modified their teaching and learning assessment in their MQA from face to face to become fully online and apply other remote learning methods such as learning through assignment and self-learning. Students should also be exposed to practical components that can be implemented through video or virtual simulation to meet the stipulated course learning outcomes and to better equipped private universities and students to accomplish the learning objective in the programs offered by the universities (MQA, 2020).

2.2 *Information Technology (IT) Usage and Literacy*

During this transition period, information technology and the internet are vital to higher education institutions and students to support remote learning. Although the internet has been visible in the world since the 1970s, it only came to the public in the early 1990s. By 2020, approximately 4.5 billion people or more than half of the world's population were estimated to have access to the internet (Kahn, 2022). The millennials, which are known as generation Z (Gen Z) today, are unique as they were born during the introduction of the graphical web. This generation resembles the internet today, as they experienced the rise of mobile devices and prefer to communicate using social media over direct contact with people. (Harwati, 2018). Due to this, it is assumed that the students will be more advanced and will be able to adapt better when it comes to remote learning as they are already well versed in the usage of information technology. However, this presumption was wrong as students have difficulties in adopting to the remote learning process (Almaiah et al., 2020).

In this transition period, the use of digital technologies had to be extended and new methods were rolled while IT services had to react quickly to face up the crisis and come up with innovations solutions to ensure academic year continuity in better conditions (Naima, 2020). The introduction of remote learning tools was provided for free by providers such as Google Meet, Zoom, Google Classroom, Moodle and so on to allow private education sector to lead their digital transformation immediately to avoid delay in the students teaching and learning process. However, the introduction of such tools did not seem to help students as some of them were encountering with technical issues that indirectly affected their learning process. The literacy of technology, in addition to independence for learning activities, the level of student understanding of the use of technology is the main component in remote learning (Epryanti et al., 2021). Some students have difficulties in access and use of digital technologies while some of them had issue due to the lack of understanding in the use of technology, lack of accessibility of internet at home due to their remote location due to their geographical area as well as their family income background. As a result of the struggles, students lose the motivation to carry out independent self-learning.

2.3 Remote Teaching

Online learning is learning that is done remotely with the help of the internet. In online learning, facilities and infrastructure are needed, in the form of laptops, computers, smartphones, and internet network assistance. In addition to facilities and infrastructure, a teacher must also be able to adapt to the situation of students (Epriyanti et al., 2021). Teachers must be able to develop the teaching profession and carry out their duties by adjusting the needs of students and learning materials that keep up with the times.

One of the challenges with online learning is the expertise in the use of technology on the part of both educators and students (Epriyanti et al., 2021). Just as institutions take steps to inform, reassure and maintain contact with students and parents, they must also ramp up their ability to teach remotely. In remote learning, facilities and infrastructure are needed, in the form of laptops, computers, smartphones, and internet network assistance to facilitate online learning. Educators resorted to online platform to reach out to students, while webinar became a temporary classroom, parents were called for monitoring at home and students got deprived of social interactions among peers (Aris Alea et al., 2020).

The WHO advised educators and students to conduct alternative learning to mitigate school cancellation of classes through providing a resource list of the World Bank's Edtech teams to provide some online materials that can be used during the period. However, keep abreast of remote or distance learning education trends, the teachers should be equipped with the knowledge and skills in remote learning education (Rhini, 2018). Teachers must be able to develop the teaching profession and carry out their duties by adjusting the needs of students and learning materials that keep up with the times. Teachers need to prepare themselves with the platforms that can improve the teaching and learning process to keep student motivated and focused throughout the classes. The teachers should also be well literate in terms of digital technologies and platforms that are needed to be used to enhance the pedagogy process as digital technologies also serve as a communication channel between teachers and students (World Bank, 2020).

In addition, teachers could also adopt asynchronous learning to give the students the flexibility to access to the modules and lesson at their convenience. For most aspects of learning and teaching, the participants do not have to communicate simultaneously. Asynchronous working gives teachers flexibility in preparing learning materials and enables students to juggle the demands of home and study (David, 2020). As asynchronous learning works best in digital formats, teachers do not need to deliver material at a fixed time: it can be posted online for on-demand access and students can engage with it using wikis, blogs, and e-mail as well as their private institutions website to better suit their schedules. This way, teachers can check on student participation periodically and make online appointments for students with needs or questions. Creating an asynchronous digital classroom gives teachers and students more room to breathe (David, 2020).

Teachers should also take initiatives to reach out to students that they feel might need more attention as this will give the students the little attention and motivation that they need to in their learning process. Although, asynchronous learning will be a good approach, however, teachers should still take interest in student's assessments and guide them whenever needed. This way, students are not forced to sit for a class that has been scheduled and will have the flexibility to tune in the class video or presentation when it is convenient for them. This is to take into consideration on the availability of computers as well as internet accessibility in remote areas that might disrupt the teaching or learning process if they were to attend during a certain time in a day. Therefore, this method of learning will give student a free hand to access to the lectures during a better internet connection. This is because, internet connection is one of the main issues within students during remote learning.

2.4 Maintaining Reasonable Expectation

Many may think that remote learning means more free time for students or teachers. However, there are other challenges that teachers and students might face during the period of remote learning. Stressors

such as sickness, uncertainty, lack of childcare, the blurring of work life balance can compound the difficulty of adjusting to remote education (Vollbrecht et al., 2020). Despite all these challenges, the teachers and students are expected to maintain the highest quality of education. This expectation should be reasonably measured during the period of remote learning. Institutions, faculty, and students should work together to ensure the success of remote learning by providing flexibility in terms of schedules, weekly time off from work, non-mandatory attendance at live events asynchronous events, and clear communication to help promote wellbeing. Besides that, completely overhauling content delivery is never an easy task, and adding new technology to the mix further complicates the situation (Vollbrecht et al., 2020). As more faculty undergo the process of creating remote learning plan for their courses it is important to remember that although the content should remain the same, the delivery of that content will likely change. Technical and administrative support provided by institutions is especially important for faculty and students during remote learning. Although none of the faculty involved would argue that the remote learning experience is equal to an in-person experience, in the time frame provided both students and faculty felt that the course was adequate given the circumstances. It is encouraged that faculty to carefully consider the needs of their students and what will work best to facilitate learning. A mix of both asynchronous and nonmandatory live, synchronous events provide some level of normalcy and an ability to assess student progress, while providing students the ability to determine what works best for them given the new circumstances of their learning environment.

3. Discussion and Conclusion

The challenge of remote learning is for the learning process to be done online and independently. Remote learning can only be achieved successfully with the help on a stable internet connectivity. During remote learning, facilities and infrastructure are needed in the form of laptops, computers, smart phones, and internet network assistance. Therefore, the need for teachers and students to equip them with the facilities is important to ensure the success of remote learning. Besides the facilities, students need to also be well versed in the use of digital technology to support the self-learning process. Students need to also increase their interpersonal communication skills to ensure that the teaching and learning process will be effective. Most of time, due to the lack of communication students tend to be quieter during remote learning as they are afraid to voice out their opinion online if they are unsure of certain things during the lecture. Also, because lack of observations from parents, students tend to join the class but fail to give concentration and full commitment in class. This interaction is necessary, especially when students have difficulty understanding the material. Apart from this, interactions also need to be maintained in order to train their social spirit. Some students are generally more isolated from other students in the virtual-learning environment. Students do not have the chance to socialize physically with other classmates, except when they are assigned as a group/team as part of the requirements for projects or assignments in a synchronous (or real-time) environment. With the lack of face-to-face communication, students can feel that they are “left in the dark,” unless they communicate with the educator and receive prompt responses.

Remote learning needs high student enthusiasm during the learning process to support independent learning. When learning online, the criteria for the completeness of understanding the material being learnt are determined by the student themselves. Knowledge will be found by the students themselves, and students must be independent. So that the independent learning of each student makes a difference in different learning success. Additionally, technological literacy should be considered because it will help students succeed with remote learning. Students are encouraged to master the technology that they will use as a means of online learning, such as computers, laptops, and smartphones, as well as the platforms of online learning itself, such as Moodle, Google Classroom, Zoom, or Microsoft Teams. This will ease their teaching and learning processes.

Remote learning is one of the solutions for the current crisis which causes learning that is usually carried out in schools to become learning at home. Implementation of remote learning requires adequate facilities and infrastructure in order to ensure its success. Distance learning makes students more independent because it puts more emphasis on being student centered. They are more courageous in expressing their opinions and ideas. Thus, the government has a role to provide several platforms that

students can use to learn as well as to accommodate students who are studying remotely with a strong internet connection to ensure there is no disruption in their teaching and learning process.

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Flipped Classroom: Approach in Improving Speaking Skills

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Abstract: The flipped classroom approach is a contemporary technique that has evolved alongside with the Industrial Revolution 4.0. The rapid growth of the technology has created a paradigm shift in the teaching learning process especially among Technical and Vocational Engineering and Training institutes in Malaysia. The aim of the research is investigating the effectiveness of flipped classroom approach for improving TVET learners speaking skills where they are able to communicate in the working environment fluently. A quantitative research methodology was used in the current study. The study was participated by second year TVET learners from Klang valley. Further, the TVET learners will gain confidence to engage with peers via speaking in English language. Additionally, the finding will also postulate whether the flipped classroom approach is efficient for the learners to improve their speaking skill.

Keywords: flipped learning, TVET learners, speaking skills

1. Introduction

Learning English as a second language (L2) is a challenging task especially for the second language learners (Brown, 2012). According to Brown in order to master the English language, learners have to be adequately exposed to all of the four basic skills, namely listening, speaking, reading and writing. Hence, among these four language skills, speaking is considered as the most demanding skill as long as the ability to speak a language is judged the same as mastering that language (Supyan Hussin & Kemboja Ismail, 2019) among the second language learners. Brown coined that speaking is an interactive process of constructing meaning that involves the actions of receiving, processing, and producing information due to the context of a speech. Conversely, Nunan stressed speaking skill as “the productive oral skill, and It consists of producing systematic verbal utterance to convey meaning”. Therefore, English Language is crucial as a global language that makes it as a demanding skill which needs to be developed and performed effectively (Supyan Hussin & Kemboja Ismail, 2019).

On the contrary, communicating in English can be a challenging measure for many English language learners especially for the Technical and Vocational Education and Training (TVET) learners who are the second language learners. Teaching English to Vocational Trainees is considered thought provoking experience, hence, to satisfy these challenges efficiently, educators need to handheld some innovative methodologies to improve the communication skills (Charanjit Kaur Swaran Singh, 2020). Thus, the flipped classroom approach has been embedded to seek the effectiveness of TVET learners in improving their speaking skills. Accordingly, Mohamad Yahya Abdullah stated that emerging technology in the pedagogical process paves the way to creating more flexible models of teaching and learning, such as Flipped Classroom which embodies the concept of promoting learners the opportunity to construct their learning process, enhance their understanding, apply language skills, and communicate collaboratively with their peers.

2. Literature Review

According to (Piaget, 1968; Vygotsky, 1978) the student plays the role of the constructor of information and takes an active role. The active learning is defined as any teaching method that engages the student into learning process. For example, cooperative learning, problem-based learning, and project-based learning are accepted as active learning methods and have been implemented for a long time. According

to Bishop and Verleger (2013), claimed that flipped classroom improves learners with new understanding and achieve to be an expert on their own where the current approach will increase and improve college students' possibilities to prompt ways cognitively by allocating time to practice and explore in the target language. Unlike traditional teacher-centred instruction, in which students are treated as empty vessels that passively absorb information (Betihavas et al., 2016), flipped classrooms are centred around the students – not the teacher (Bergmann & Sams, 2012).

On the contrary, Mohamad (2017) stated that TVET delivers more expertise training prospects for school leavers hence to become skilled technical assistants, technicians, technologists, semi-professionals, and business personnel. Thus, to face this scenario and encounters, hands on skills are alone not enough in dealing with the problem that occurs in workplace (Bakar & Hanafi, 2012). Therefore, the institutions must expose the learners with educational excellence by becoming proficient in communicating in English which is important in the hospitality industries (Bishop & Verleger, 2013).

Adding on, TVET learners still suffer from learning challenges that provide negative impact on their English proficiency. Trainees need to be taught new approaches to improving communication skills for industry careers (Dove, 2013). Conversely, speaking skill proficiency has become a concern employer have raised in recent years (Mestrea Research Infozone, 2012). Khairi Izwan and Nurul Lina, 2010 coined that, university students are identified in having problems speaking the English language which contributes to graduate unemployment (New Straits Times, 2013). On the other hand, Vijayaletchumy, 2011, claimed that students in tertiary level especially those from rural areas are found weak in the speaking skills and anxious when presenting. Similarly, this scenario is the same in vocational colleges especially (IKBN), where teacher centred and would be the main obstacle for students in improving speaking skills (Charanjit Kaur Swaran Singh, 2020). Relatively, limited communication and interaction between students and teachers in the classroom are insufficient to enhance students' English and communication skills, and seldom satisfied Malaysia's workforce needs (Charanjit Kaur Swaran Singh). Thus, the study's focus is to provide ways in improving as well as motivating them to use English efficiently.

2.1 *Flipped Classroom*

Bishop and Vergler 2013, Gannod, 2008, Enfield 2013, Moroney 2013, Gaughan 2014 have stipulated, that flipped classroom as an interactive group learning both inside as well as outside with the videos. The main elements of flipped classrooms are pre-class learning through video recordings, vodcasts, annotated notes, and interactive online modules, in-class learning via discussions, group activities, individual feedback, scaffolding, and assessment through diverse approaches such as embedded self-assessments, audio response systems, wikis, discussion forums, essays, and projects (McLaughlin et al., 2016).

2.2 *TVET Learners*

The TVET learners focus on skill-based subjects (such as technical, commercial, services and information and c communication technology courses) that have been improvised and improved to be in line with the national plan in achieving Vision 2020. (Suhaily Abdullah, 2013). TVET learners are defined as learners who study technologies and related sciences as well as the acquisition of practical skills, attitudes, understanding, and knowledge relating to occupations in various sectors of economics and social life" (UNESCO). The learners in this these institutions are from the age of 16 years. These learners are defined as poor in English language especially in speaking skill. (Khairuddin, 2011).

2.3 Theories of Flipped Classroom

2.3.1 Mastery Learning

The Mastery theory is promoted by Benjamin Bloom in the 1960s. This particular theory supports the flipped classroom leaning where it recommends the use of flipped learning in a structured as well as meaningful way (Figure 1) The current theory promotes students to learn at their own pace. Bergman and Sams (2012) argue that Mastery Learning supports flipped learning because it provides instruction that is differentiated, asynchronous and student-centered; and it provides a context for remediation and efficient feedback. This aligns with flipped learning where students have the potential to learn in their own time with a certain amount of autonomy regarding time management.

2.3.2 Constructivism Theory

On the contrary, Vygotsky's Constructivism theory is also being embedded for this study. Vygotsky postulated that learning is an active process in improving learners speaking skills (figure 1). Vygotsky (1978) defines the zone of proximal development (ZDP) as "the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance, or in collaboration with more capable peers". Conversely, learning occurs when a student works with skilled adult or peer to solve any problem. Thus, while using the flipped classroom strategy, learners are required to use the information they have acquired through watching the video outside of the classroom as part of the learning process. According to Bergmann and Sams (2012) the use of flipped classroom approach connected these two theories to improve learners' speaking skills. Hence, the two theories are practiced in flipped classroom. Based on these theories, the current study will apply new teaching and learning approach to improve the TVET learner's communication skills.

2.4 Speaking Skills

According to Chaney (1998), speaking is the process of making and sharing meaning by using verbal and non-verbal symbols in different contexts. Similarly, Brown (1994) and Burns and Joyce (1997) defined speaking as an interactive process of making meaning that includes producing, receiving, and processing information.

3. Conclusion

The current study will evaluate the effectiveness of flipped classroom approach in teaching learning of speaking skills. Teachers, policy makers and students will attain success in overcoming communication barriers. Conversely, communication skills are the part of teaching learning among second language learners especially TVET students.

The findings of this study may provide significant implications on curriculum reformation particularly related to flipped classroom approach. The usage of various methodology in flipped classroom activities such as videos, discussions, presentations, and audio listening will enhance the students learning experience. Further, the teachers will be able to identify the appropriate approach to in the classroom. An interactive learning environment should take place to encourage students, policy makers, and teachers to have a successful learning experience of TVET learners. The limitation of the study will be the respondents where it is targeted for the TVET learners located at Klang Valley. Further, only a small number of respondents will be used in the study due to limitation of time.

Further, this will be a concrete platform for the students to explore, exhibit and experience methodologies that scaffold their full potential when speaking in public. Hence, flipped classroom approach will aid in improving speaking skills of these learners where they become an efficient and improved communicator as it meets industry needs (Gamble, 2016).

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Cross-Linguistic Swearing in English Conversations of ESL Malaysian Young Adults

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Abstract: The use of swear words is frowned upon in most societies due to the negative connotations of the words, which are perceived as vulgar and offensive. However, the use of swear words in social conversation, particularly among young people is common and has become a norm. A unique phenomenon of swearing in a multi-lingual context is observed when speakers from different linguistic backgrounds switch languages when swearing. This study seeks to investigate the occurrence of cross-linguistic swearing among Malaysian young adults from different linguistic backgrounds during group discussions in English. A qualitative methodology is used to record group discussions among students in a Malaysian university. This study identifies swear words, their meanings, and general functions in different languages used by the participants, examines the instances of cross-linguistic swearing and its communicative functions that occur in the interaction among participants, and investigates the perceptions of the participants about the use of cross-linguistic swearing in their conversations.

Keywords: swearing, swear words, bilingualism, multilingualism, cross-linguistic.

1. Introduction

Swear words have been existing as an uninvited component of language for a long time in our society and as described by dictionaries, are words that are taboo as they are socially offensive to be used, furthermore, the use of swear words contains meaning that is deemed impolite, rude, or harshly offensive for many of the people who share the same language as well as ideas. Swear words in some cases referred to as taboo words, are restricted from societal use under the assumption that they will cause harm in some way. Words come to be recognized as “taboo” through aversive classical conditioning during childhood when parents and other authoritative figures scold or punish children for using them (Jay, 2009b). This inevitably provides reasons why swear words as we all understand are deemed as causing harm when used in social communication.

Jay (2009) expanded on the crucial importance of the context in which swear words are used, and the degree of formality of the speech. A particular swear word may thus not be judged offensive in a casual conversation between friends but would be considered offensive by the same people at a formal dinner. Swear words plays the role of group identity tag even though their functions are not constructive. While taboo words can be used for positive purposes, such as humor and in-group slang, two-thirds of swearing data has been linked to expressions of anger and frustration, such as in contexts of sexual harassment, blasphemy, and hate speech (Jay, 2009a). Research has found that taboo words used in certain contexts can and do cause harm to people (Jay, 2009a).

Swearing has been defined as language use that: (i) refers to something taboo or stigmatizing in the swearer’s culture, (ii) is not intended to be interpreted literally, and (iii) can be used to express strong emotions or attitudes (Andersson & Trudgill, 2007). In the real world, taboo words are uttered (or written) by people in specific situations. Depending on the identity of the person and the (in)appropriateness of the situation, a given taboo word might well have variable perlocutionary effects (Austin, 1962), stronger or weaker psychological and/or physiological effects, on the one who is perceiving it. Telling and understanding jokes in a foreign language or being appropriately polite is also more challenging for speakers using a foreign language than their L1. However, the social consequences of not getting the joke, or not being as polite as expected are less severe than the inappropriate use of offensive words. Their use is part of “a complex social practice fulfilling intricate pragmatic functions”

(Beers-Fagersten, 2012), and getting it wrong could cause serious embarrassment to the foreign language speakers and their interlocutors (Dewaele, 2012).

Swearing fulfills several interpersonal functions, such as expressing emotions of humor and verbal emphases such as social bonding and solidarity; and constructing and displaying identity within groups (Stapleton, 2010). It can also, inhibit aggression and cause emotional pain to others (Vingerhoets et al., 2013). The question is whether these functions are equally fulfilled in the L1 or in the second or foreign language of multilingual speakers. The incomplete or inaccurate conceptual representation of offensive words and the different set of standards that apply to foreign language users compared to those applying to the L1 users means that foreign language users swearing in a new language might have a very different illocutionary effect compared to the same words used by L1 speakers in an identical situation (Dewaele, 2010; 2013).

As Steven Pinker (2013) puts forth in his study; there are 5 types of swearing that exist namely abusive, cathartic, dysphemistic, emphatic & idiomatic. Abusive swearing is used mainly to offend, with the intent to abuse, insult, or intimidate someone by causing emotional or psychological damage. Cathartic swearing is usually used in situations where there is a need to respond to pain or casualties. Dysphemistic swearing is used by speakers to influence their listeners to have the same thoughts on the subject matter that is being discussed. Emphatic swearing is intended to draw additional attention to something that is being discussed in the context of the speaker. Finally, idiomatic swearing is used purely in informal situations where the speaker and listener share a conversation, where it is used to show that a meeting is informal and that a person feels comfortable enough around the other people to swear. In conclusion, we can understand that swearing is indeed an integral element of language and society, providing purposeful meanings in different areas by altering their connotations wherever necessary with the notions set by the speaker.

Lastly, linguists have taken a neutral and descriptive stance on taboo words. The role of linguistic studies has been to document which words are avoided in what situations. Adding to this, words themselves are not taboo, dirty, or profane as they are claimed to be. Many of the words currently considered inappropriate in public settings were the neutral, normal term for an object or action in earlier forms of English. One foremost example is the word 'shit', which was not always deemed inappropriate or impolite for a long period of time in the olden days. In a similar way, many languages of the world still treat bodily functions in a less euphemistic manner. Nevertheless, over the change in time, some words are dragged into full-on euphemism rather than dysphemism (Peter & Silzer, 2005).

The phatic function of language is that which keeps the channels of communication open. Despite it appearing that content is minimal. It is a function as primarily serves to establish, prolong, or discontinue communication (Jakobson, 2002). It is a kind of sociological function as well as a linguistic one, where we as language users tend to make them worthy in both social contexts and linguistics. One of the most apparent places is the use of words like “good morning” or “have a great day ahead” which are greetings that carry minimal content that directly describes the day or depicts the picture. The phatic expression is further described as speech to promote human warmth, which in this case is as good a definition as any of the phatic aspects of language. For good or ill, humans are seen as social creatures and cannot bear to be cut off too long from their fellows, even if they have nothing really to say to them, this is notified as a phatic expression (Anthony Burgess, 1964).

2. Literature Review

Code-switching has been a sophisticated element of multilingual society for a long time, in a study conducted in 2012, the relationship between swearing and slang to code-switching in Spanish and Basque languages is examined. The results showed that the switching strengthens one another: when different stylistic and stance-taking devices co-occur, they become even more salient, thus underlining the effect for which they were introduced to the conversation (Lantto, 2012). The study emphasized swearing, which can be connected to changes in footing, such as in expletive side remarks, and slang to emotions if the change in footing takes place to convey emotional content. In conclusion, the study

states that the occurrence of code-switching and swearing in speeches of bilinguals are due to emotive functions of their message and context, agreeing with the idea that bilingual speakers do swearing & code-switch when there are large amounts of emotions laden into their conversations. Even though the use of code-switching is examined with nuances that are in the sense of emotion-laden instances, the study gives insights into how bilinguals tend to switch languages during interactions and especially when the interaction needs an emphasis on emotions.

Other studies carried out in the judicial domain suggest that the persuasive effect of vulgar language occurs without recipients' awareness: Although respondents perceived swear words as a sign of deceit, their presence increased the believability of fictitious statements (Rassin & van der Heijden, 2005). The study further investigated how there is evidence of profanity's positive effect in terms of persuasiveness, mediated by language intensity, and speculated that, beyond the expressive function, people curse because they have learned from experience that swear words may reinforce message effectiveness, due to the automatization of the association between swearing and positive outcomes (Cavazza & Guidetti, 2014). The results obtained showed how the vulgar messages used in political contexts were perceived as more informal than the control message of the same context, further, the vulgar message globally induced a more positive impression about its author as compared to the ones without. The study further elaborates how vulgarity embedded in a public political speech, even though socially sanctioned, can positively affect receivers' behavioral intention, increase language perceived informality, and improve the impression about the source. Moreover, the study suggests that the appropriate use of swear words by politicians works, and highlights that it works through perceived language informality that gets the politicians closer to people. The positive effect of cursing seems to apply to the whole electorate, as this effect did not vary as a function of participants' gender, education, involvement in politics, and self-reported position on the left-right political spectrum. The findings of the study outline the importance of studying the influence effect of vulgar language to acknowledge that cursing should not be seen only as an expressive behavior, since it also fulfills a strategic communicative function, in this, it signals that swearing works not only in a cathartic manner where it is used to respond to pain, but it works as means of emphatic & phatic means of communication.

Adding to this, a total of 80 native English speakers of the ages of 18 to 59 from the University of Illinois were given 32 test sentences and 64 filler sentences which carried fillers in each different factor. The first factor was Speaker, with the levels of either more or less likely to swear, the second factor was the Situation, with the levels of inappropriate or appropriate for swearing and the third factor was Exclamation, with the levels of either a taboo word or a non-taboo word. Filler sentences all included an exclamation inside of quotation marks, in line with the same formatting as the experimental items, but with various sentence structures and varying degrees of the appropriateness of the exclamation. The probe word in the filler sentences varied across sentence positions as well as part of speech. The study concluded that the situation and speaker, along with individual differences between perceivers in their likelihood of being offended by a taboo word are present in their reading materials. Further, the study enabled them to understand the processing of taboo words and the significance of their effects around. The study finalized its view that the presence of taboo words heightens the attention given to the sentences it appears on, increasing the contemplation of the participants, in ways which we understand as emphatic swearing as well as idiomatic to many.

In a conclusion, we can understand that the act of swearing, and the use of profanity is seen is sometimes deemed as offensive, or negatively portrayed in many social domains, however, the social influence of swearing in interactions can never be forgotten, it proves to be pervasive throughout all social domains in forms of creating appeal & exerting influence. It is prevalent in casual settings, used more when there are fewer formalities to heed to, it improves the perception one has of the speaker who uses it in conversations, furthermore, the users of the swear word tend to use words from L2 and L3 more frequently as compared to words from their native L1. Swearing as a whole in the given studies tends to emphasize that it is used commonly in the recent society as means to express emotions that are laden into their speech acts, agreeing to cathartic use of swearing where swearing has been used as a means of responding to pain, expanding into the progressive use of swearing that is influential in speech acts, draws attention within conversations, increases captivation of communicators, and swearing is also used in a phatic manner where it is entirely present to prolong or establish conversations amongst speakers.

Furthermore, swearing is also seen as an act to recognize identity, improve peer exchanges within casual speech acts, and exhilarating interactions, and is commonly accepted as part of the speech act in the current age. Lastly, we also can agree that though swearing began and is still prevalent in expletive manners throughout all language settings, where it is used to express sexual or vulgar utterances, which are offensive entirely, the current adaptation of swearing as we will investigate in our study tend to have swayed towards uses to invoke attention, humor as well as identity association, leaving behind the offensive overlay it carries in many settings.

3. Result and Discussion

Words used:

Participants	Cross-Lingual Words Used by Speakers	Ethnicity	Language(s) spoken
PA2	buta (blind - Malay)	Chinese	English, Chinese
PB2	kiasu (selfish -Chinese)	Indian	English, Malay, Tamil
PC2	pandi (pig - Tamil)	Chinese	English, Malay
PD3	babi (pig - Malay)	Chinese	English, Chinese
PD2	setan (satan - Malay)	Chinese	English, Chinese
PF1	sei ya (die - Chinese)	Indian	English, Tamil, Malay
PG2	sampah (rubbish - Malay)	Chinese	English, Malay
PH3	sei ya (die - Chinese)	Indian	English, Tamil, Malay
PK2	mangkuk (bowl; a dumb person - Malay)	Indian	English, Tamil, Malay
PK3	tiu (fuck - Chinese)	Indian	English, Tamil, Malay
PJ3	pundeh (female genitals - Tamil)	Chinese	English, Chinese, Malay

Question: Do you know the meaning of these (Cross-lingual) words you used?

PA2: I said buta, means blind, I don't like to use stupid & sound bad, so I usually use buta to cuss. I also like using babi sometimes but It sounds too much, so I keep it for special situations, especially when I drive (laugh).

PB2: I use a lot of Chinese words I'll be honest; I do use Malay words here & there. My favorite word is sei, tiu & mafan! (laughs).

PC2: I know it means pig in Tamil.

PD3: Yes it means pig in Malay.

PD2: Yes they mean satan, pig & something like damn it.

PF1: Yes, sei means dead, tiu and chibai are really harsh words, I think.

PG2: Yes, sampah is rubbish, bodoh is stupid.

PH3: Yes "sei" means die in Chinese.

PK2: Yes, it means something like a stupid person, maybe. (mangkuk)

PK3: Yes, it's the chinese word for fuck, I know it sounds bad. (tiu)

PJ3: O yes (laughs) it's a very bad word for Indians, I think it refers to your mother in a very bad way, I don't wanna describe it. (pundeh)

When asked if they knew the meanings of the cross-lingual swear words they used in their conversations, all 10 participants agreed that they know the meaning of the words they use in their exchanges, they also described the words in English for the interview, especially 10 participants describe the word in English proving that they do understand the meaning of the words; or the known meaning of the swear words they used in their exchanges. However, participant PJ3 agrees he knew the meaning of the word he used in his exchange but refuses to describe it for the interviewer as he assumes the word to be terrible and provides a description that is vaguely accurate to the actual meaning of the word he used in his exchange and further refuses to describe on it even more. From the answers provided, we can see how participants use words that are familiar to them in their exchanges, especially words that are not from the languages they speak or know fluently, in addition, the speakers are very confident with the words they have used in their conversation, implying that they do know the meaning of the word as they have used in their exchanges. Moreover, we can also identify how the speakers are clear about their understanding of the cross-lingual words they have used or regularly use even though

they may or may have not looked for the meanings of these words to understand them for what they actually mean, rather, we can imply that they have picked up these words when they hear them being used in other conversations or by other people around them, which has inevitably made them use it for their own exchanges. Furthermore, we can also understand how speakers of this study are clear of the swear words they use in their exchanges, which are borrowed from a language that they do not speak but are using appropriately in the given context of the swear instances.

Question: Where did you learn these words? How? Do you speak know Chinese/Tamil/Malay?

PA2: I learnt it from my friends in school, but most of us don't really speak in Malay

PB2: I don't speak Chinese but literally all my friends are Chinese, I learnt most of these words from them, and yes, thanks to them I use it a lot.

PC2: I have a lot of Indian friends, I learned it from them

PD3: Yes I do speak Malay & I learn this word from my friends at school.

PD2: Yes I speak Malay but not so fluently, I learn all these from my Malay friends.

PF1: I don't speak Chinese, I learned these words from my Chinese friends, they always use it even when they speak in English.

PG2: My Malay friends use them a lot, Yes I speak Malay of course

PH3: I don't speak Chinese, I learn these words from my friends, they always say the word.

PK2: Yes I know Malay and my friends always use those words, i copied it also.

PK3: I don't speak Chinese but I learn them from my friends, and they use the word all the time

PJ3: My Indian friends use it every time, I don't speak Tamil but I know it's a very bad word to use sometimes.

For the following question, we can notice how all participants readily agree that the words that they are using are indeed learned from their friends, all participants surely state that the words they used in their exchanges are learned from their friends who have seemingly used these words in their presence, further influencing the participants to apprehend them for the use of their own. Moreover, we can understand how most of the speakers also agree that they do not know the language the cross-lingual word comes from, six out of 11 speakers agree that they do not speak the language the word comes from, however, still understands the meaning of the words to an almost accurate notion. From these answers we can understand that even though the speakers tend to assimilate the words they used in the exchanges as similar to the swear words they already know, they do understand that some words carry a different meaning when it comes to the severity of the word's meaning, it could be because of this that all speakers readily admit that they learned the words from their friends as compared to claiming that they use the words out of their own wills.

Moreover, we can understand how each of the speakers explains how they learned the cross-lingual words they casually use from their friends, implying that they are using them since another member of their group is using them as well, and that the use of such words in conversations are readily accepted within group interactions without being frowned upon. Furthermore, we can understand how the use of swear words here as being described by the speakers, is seen as an accepted norm that occurs within a group discussion, adding to this, we can also see how the speakers agree that they use swear words; especially cross-lingual swear words that are learned from their peers or friends, and some understand the meanings of these words; some casually describes the meanings of them while others are not ready to expose the meanings of these words due for they understand that they are indeed vulgar though used regularly.

Question: Why do you use the cross-lingual word instead of one in English?

PA2: I think they sound better, maybe because they are less vulgar than other words maybe.

PB2: I think they carry better feeling as compared to words from English. I personally feel English words too decent to use in many places.

PC2: I think it sounds nicer when you say it.

PD3: I find the word fits in easier than English words.

PD2: Some of the words are very nice to use when describing things, better than using English words.

PF1: Because I think it makes the entire message sound more, more, eh, more extreme la.

PG2: I think Malay words sometimes sounds nice when you are speaking to your friends, of course, we can't do that in our presentations.

PH3: I feel the (cross-lingual) word sometimes can express the feelings better (than English).

PK2: English words sound more like just a saying, cross-lingual words sound more vulgar, for me I think.

PK3: English words can be too formal, cross-lingual words make the whole expression more impactful & the sound of the word is nicer.

PJ3: Cross-lingual words sound way better than using English words, at least we feel it can be used to scold or insult someone better than English words.

In the following question, all speakers agree that using cross-lingual swear words is better in conversations than compared to English swear words. All speakers undeniably mention that using an English swear word when speaking in English especially makes the conversation less impactful as compared to a cross-lingual word, further, we can understand how all speakers collectively agree that using a cross-lingual word can give more meaning in sense of expression, feeling & intensity as compared to an English word being used in the very same situation. English swear words here as deemed as too decent, not vulgar enough, and too formal by most speakers, this may be due to the fact that all speakers learn to speak and use English in its formal style in schools as well as in their conversations, being a Malaysian bilingual, most speakers would have learned English in its formal style throughout, and this could have been the reason why most speakers deem the language and its sworn words in such manner. Furthermore, swear words in English may sound less vulgar or insulting since all of them are learned as a word rather than as swearing for these people. Lastly, we can also imply that swearing in cross-lingual words, taken from Chinese, Tamil, and Malay may be seen as a more expressive way of swearing due to the fact that maybe speakers are exposed to the speakers of these languages using those words in their swearing exchanges rather than in any other settings, moreover, the swearing done in Chinese, Tamil, and Malay that these speakers have seen take place around them could have been an influencing factor for why they prefer using cross-lingual swear words more than English swear words when they want to express a certain feeling in their interactions with friends. Also, the due to the factors that Malaysians do swear in their native languages when there are in a dire need of swearing might have been a contributing factor to why these speakers also reckon cross-lingual words as better swear words than English words.

Question: Do you think there is any difference when you use the Chinese/Tamil/Malay word as compared to the English word?

PA2: These words make it easier to express, they are too harsh or strong, maybe that's why.

PB2: I think they carry better feeling as compared to words from English. I personally feel English words too decent to use in many places,

PC2: Yes, they sound very strong when you say it

PD3: Yes sir, the word can be more rude than English words.

PD2: Yes, the Malay words sound more extreme than English words. English words sometimes don't feed the feeling properly.

PF1: Yes, the Chinese sounds more harsh when you say it compared to using English or Malay words

PG2: English words can sometimes be boring, I find Malay words can be interesting to use when speaking with friends.

PH3: Yes, of course, Chinese words for me sounds nice to pronounce, maybe that is why.

PK2: Those Malay words actually sound nicer than English word, maybe that's why.

PK3: Definitely there is, the cross-lingual words from Tamil make it sound very harsh & accurate as compared to English words, which sometimes makes it very bland, maybe.

PJ3: Cross-lingual words are nice & vulgar, I feel better using them than English words.

For the following question, all speakers indeed agree that it is undoubtedly better to use cross-lingual words when they swear as compared to English words, even when they speak in English. This is further substantiated by the answer that using English words is too decent to be used in many places; swear-prone settings most probably as deemed by the speaker. Adding to this, speakers also state that English

is not rude enough nor feeds the feeling properly for their swearing purposes or any situations that need swear words that are basically abusive or offensive in manner. Going on, even more, speakers stated that the words in English are bland for swearing, as compared to the words in Chinese, Tamil, or Malay words. This may be since English words are learned in a formal style as compared to Chinese, Tamil, or Malay which is the non-acquired language for the speakers, and it may be due to the fact these cross-lingual words from Chinese, Tamil, and Malay were exhibited to the speakers in swear forms, that might have influenced speakers to use them in their exchanges. Whereas for words in English, the speakers may have learned the meanings of words even before they could make up to use them in their swearing, this could be one reason why these bilingual speakers prefer using cross-lingual swearing more than English words in their social exchanges.

Question: Does it feel better when you use swear words from another language that you do not speak? Why?

PA2: I think they are less strong as words in English, maybe when I say it they don't sound that bad or nasty lah.

PB2: Yes, of course, I find it really intense when using Chinese words, better than English words, seriously.

PC2: Yes I feel like the word make it better when you use it.

PD3: Yes, when I say babi it sounds better than saying pig, the word babi has more damage than using the pig word.

PD2: Yes, the Malay words make it very satisfying for me, I don't understand why.

PF1: O yes, people think you are scolding them really hard when you use words from another language, it works.

PG2: Yes it gives a different feeling to the way you say things, I like it.

PH3: Yes, of course, some of them carry special sound & make the whole conversation impactful.

PK2: I guess it's because the words sound different & it clearly sound like a vulgar word maybe.

PK3: Yes, they have sound different, so I find it nice to use.

PJ3: Yes actually, maybe because we think the people won't understand the words, that's why sometimes I use it.

For the following question, we can notice how all speakers collectively agree that they use swear words from another language in their casual English conversations, to which each has a similar reason for doing so. All speakers agree that using a swear word from another language that they do not speak is better, due to reasons that the words are intense for the exchanges, the words sound better (phonetically), sound harsher in the exchange (phonetically), making it satisfying (for reason not mentioned), people think they are getting scolded hard, gives a different feeling when said, more impactful, sounds like a more vulgar word and because the abused person should not understand the word. We can understand how all speakers of this study collectively agree that they use swear words from a different language when they interact with their friends, this could be a reason why even though the conversations these speakers have with their friends are in English, they used cross-lingual swear words in their exchanges, maybe to make the interaction less formal or maybe because the conversations are already casual for them to the words for.

Question: Why don't you use words from your own language when you need to swear? Is there a reason for it?

PA2: Words from my own language sometimes can be very vulgar, I worry it will offend people when I use it, maybe that is why I use Malay words to reduce the rudeness, maybe.

PB2: I don't know really but I find Chinese words more intense!

PC2: I feel when I use these words, they make it sound more intense la, that's why

PD3: I find words from my own language too maybe too much to use in many places, sometimes people will get offended la

PD2: The words I know in English are too formal la & Chinese words I worry will be too offensive sometimes.

PF1: I find Tamil words are too much to use when speaking, they are too extreme la sir, they might cause me trouble.

PG2: Words from my own language can sometimes be too extreme, and may cause trouble, that's why I don't use them.

PH3: I find words from the language I know can sometimes be boring as we are familiar to those, and some words can be terribly vulgar, that's why I don't use them.

PK2: Words from my own language can be very harsh, I might get into trouble if I used them, that's why.

PK3: Words from my own language can be very harsh sometimes, I don't want to offend my friends using words as such, I prefer cross-lingual to use with friends.

PJ3: Words from my own language are very offensive, that's why I use these words.

Following this question, we can clearly see how all speakers do not prefer using words from their own spoken languages, which include English, Chinese, Tamil, and Malay when they speak in English, whereas they comfortably prefer using cross-lingual swear words in their social exchanges. In addition to this, we can understand how all participants clearly agree that cross-lingual words; being described as words from the language they do not speak sound better, nicer, or carries better meaning than words found in languages they speak and understand. This could be the reason that speakers in this study could have categorized the languages they speak into different formal-informal settings on their own. We can clearly see that these speakers despite being able to speak English fluently and some may also be more proficient in the language tend to compartmentalize English as a decent language as compared to the other languages they speak. It is clear in the answers given, that speakers somewhat classify English as either too formal or too decent in many places, hindering the language to be accurately used for swearing.

On another note, speakers classify the language they speak other than English as too vulgar, too offensive, or too harsh in many places, this can be since maybe the speakers associate the language they speak as their native or dominant language, and this may contribute to the reason why they assume the words from these languages being too offensive or harsh to be used for swearing within group interactions. This perception can be because speakers who are bilinguals may have been exposed to English of a more formal style when they acquired it, as compared to the other languages they speak which could have been introduced to them in a more informal or casual manner. Furthermore, all speakers may have learned to speak their native languages at home; where users of the language could have been exposed to the less formal style of the language, whereas the English they have acquired could have been formal and rigid in many places, which has contributed to the notions that English words are decent, formal or bland for use in swearing, although words from their native languages are perceived as too harsh or too offensive in the same manner.

Question: If given a choice, what words will you use for swearing with friends, in a casual interaction? Cross-lingual, English, or your own language's words?

PA2: I would use cross-lingual words, it's better than English or others.

PB2: I will use cross-lingual words, not English words for sure.

PC2: I think cross-lingual is the best for use with friends.

PD3: I will choose cross-lingual words for sure, they make discussions fun.

PD2: Cross-lingual word will be best for use with friends, but you must make sure they understand also la.

PF1: I will choose cross-lingual words for sure.

PG2: I will use cross-lingual as I can relate better with my friends with it.

PH3: Cross-lingual words will make things very interesting when used with friends for sure, I'm sure of it.

PK2: Cross-lingual words will be best.

PK3: I will choose cross-lingual words, it's like talking with friends what.

PJ3: I will choose cross-lingual words, better than English words.

For the following question, we can understand how all speakers of this study have undeniably chosen a cross-lingual word to swear when it comes to social interactions with friends in a casual setting. It is apparent that cross-lingual words are the choice when it comes to swearing in a casual setting for these speakers, even though the reasons for such choice can already be gauged by the answers they have provided for the previous questions, we can understand how speakers of this ESL classroom readily admit that they will use cross-lingual words when they swear with their friends in their casual discussions. The choice is made maybe since cross-lingual swear words carry an underlying connotation that is not as vulgar as it is perceived to be. Though some cross-lingual words these speakers use carry a vulgar & offensive meaning to the intended saying, the speaker has adequately attached a less offensive meaning to it, making it an idiomatic-emphatic word that can be easily included in social exchanges with friends when the scene is casual in nature. It is also apparent how the use of cross-lingual words has already become a practice for these speakers where they deem the word are best, more fun, and better when describing for use with their friends in their exchanges when compared to English or their native words; this can estimate how the use of cross-lingual words have impacted the bilingual's speech as a whole, especially in casual settings to begin with.

Question: If given a choice, what words will you use when you are angry & need to swear really harsh, words in English or in your native language?

PA2: I will use my native language when I'm really angry.

PB2: I will choose my native language words.

PC2: I will definitely use native language words for this, I can't use English.

PD3: I would choose native language lah sir, I can't control what I say when I am angry.

PD2: I will definitely swear in Chinese, that's when I am angry.

PF1: I will surely swear in my native words, Tamil words can be extremely offensive when you use for shouting.

PG2: I will use native language, it's the best word to use when you're angry.

PH3: I will use Tamil words for sure, especially when I am angry.

PK2: I will use my native words when I need to shout at someone for sure.

PK3: I will surely scream in Tamil when I'm angry, not English of course.

PJ3: I will lash out in Chinese for sure, English won't work for me unless I am calm.

Following this question, we can understand how all speakers of this study collectively agree that they will use swear words from their native language when they need to swear in an angry situation, or when they need to vent out their frustration at an angry moment. From these answers, we can see how speakers will use swear words from their native languages when they are angry, this could be due to the reason that it is easier to describe, vent out and abuse someone when you need an offensive when using words from the language that is native to yours. Furthermore, we can understand that the speaker would use swear words from their native languages much quicker than an English word when in need, from all the reasons the speakers have given for distinguishing the difference between words from English as well as words from their native words. English as we can understand in this study, is coined as a language with words that are formal, decent & used for formal situations whereas, words from the native language are seen as being too harsh, too offensive, extreme, and vulgar for the speakers of this study. With these answers we can indeed conclude that the bilingual speakers of this study correlate the words from English as formal and decent for social exchanges, words from their native language as very harsh, intensely vulgar, and offensive for swearing usage, and that cross-lingual words from the languages they do not speak as swear words best for use for casual conversations with friends and peers.

Question: Has the use of cross-lingual swear words given you an interest to learn the language? How?

PA2: O yes, I sometimes feel like using it a full sentence but I need to learn.

PB2: O yes, I can use the words I know in a full sentence, to insult especially,

PC2: Yes, I have learned to use them properly in a sentence. I got learn some more also but rarely say it though.

PD3: Yes sir, sometimes I will use it in a Malay sentence properly but I still need to learn more.

PD2: Yes, sometimes I swear fully in Malay, and I do use those words in proper sentences too.

PF1: Yes, I can say the word in a full sentence sometimes, I have also learned some other words also, but swear words also la.

PG2: Yes I do sometimes swear and continue a few words in Malay without realizing.

PH3: Yes, sometimes I do want to learn to use the words I know in a full sentence, I have learnt some but they are swearing mostly.

PK2: Not sure, but I would love to learn other words from Tamil as well, I know a few right now, I wish I can learn more.

PK3: Of course, nowadays I tend to use more words from Malay because of my friends, they teach me also, and I would like to continue if there is chances for me to learn.

PJ3: Yes I think, because sometimes I do watch how my friends say the words in their sentences & I wish i can say it also if I tried.

For the following question, we can notice the speakers of the study mentions how the use of cross-lingual words has somewhat influenced them to learn more words from the language they do not speak to enhance their use of words progressively into sentences. It is quite startling to understand that the use of cross-lingual swear words in this study has become something of more positively impactful in sense of language learning, in which speakers of the study who used cross-lingual words from languages they do not speak to swear in their casual conversations, tend to indirectly grow interests to learn the words that they have been using to swear as properly learned words for move improved usages. We can also understand how the swear influence of the cross-lingual words has constructively improved the perception of the speakers towards the language they borrowed the word from, contributing to the interest to learn more words & consecutively igniting the interest to use words from the mentioned language in a more proper sense; in this case beyond swear instances. With this, we can summarize that the speakers of this ESL classroom who are bilinguals have borrowed words from languages they do not know for use as swear words and have built interest to learn the language for better usage beyond swear instances, showing how swearing can be constructive in this case.

Question: As a bilingual Malaysian, do you think this cross-lingual swearing in our conversation is unique?

PA2: Yes, I will agree to this statement. It is unique to us.

PB2: As I bilingual I feel that this practice is special.

PC2: Yes, it is unique, and maybe that is why we are talking about it also.

PD3: Yes it is unique to us as Malaysians, we should be appreciate it.

PD2: Yes it makes things unique to Malaysians as a whole, I would agree.

PF1: I will agree to this, it is unique to us as Malaysians.

PG2: Yes, I think they are unique to our culture.

PH3: Yes I think it is unique because we Malaysians are famous for doing it.

PK2: Yes, I will say it is unique because it makes us Malaysians.

PK3: I think is it what that makes us Malaysian unique as bilinguals.

PJ3: I think as a bilingual we are all unique & yes cross-lingual word add into it also.

Following the last question of the interview, speakers collectively agree that the use of cross-lingual swear words in their casual conversations is a unique phenomenon, special to Malaysians as Bilinguals. The speakers agree that the practice of cross-lingual swearing, which in many cases is like code-switching, a common language practice for Malaysian bilinguals is a unique element in our social communication. We can also relate to the speakers' way of describing the practice as something unique after being exposed to the notions of cross-lingual words, swearing in casual conversation & the understanding that they are bilinguals who are involved with these concepts has made an understanding of these speakers. Lastly, we can encapsulate that the speakers of this ESL class, who are bilinguals agree that the mentioned practice indeed makes them unique, moreover, since they rampantly practice them in their exchanges, have come to agree that cross-lingual swearing is indeed special & makes the bilingual community unique as it is.

4. Conclusion

In a conclusion, we can summarize that in the setting of this study, the bilingual ESL students use swear words it means to relate to their group identity, especially in informal English conversations that are made within the discussion of friends and peers. In addition, the bilinguals believe that using swear words in their native language can be too intense for situations that would turn out harsh, or immensely offensive in their perception.

Additionally, the bilinguals conclude that cross-lingual swear words are best for use in casual conversations as it carries a balance between being offensive and being harsh, making them most appropriate for use with friends, whereas English words are deemed as too formal for use in casual exchanges. Lastly, these bilinguals agree that swearing is a negative aspect of language use, nevertheless, it serves its purpose in expressing feeling as it is intended use and the presence of cross-lingual swear words has indeed made bilingual interaction interesting, unique, and special in ways that make Malaysian culture stand out as a multilingual society.

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The Level of Awareness and the Level of Understanding of Food Standard and Food Safety Management System among Malaysian Food Manufacturer, through Audit to Produce Safe Food

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Abstract: The study aimed to investigate the awareness and understanding of Malaysian food manufacturer on the food standard and safety management in their company, to investigate difficulties to implement food safety management, to study the review on the audit report on the current food safety management system they have, to access with certification bodies/consultancy firm on the industry implementation on food standard and safety management (government versus private) and to study the rate of success to get certificate in food safety management system (government versus private). This study will be beneficial to Malaysian food manufacturer who intends to implement food safety management system in their premise. Also, for academia, they will benefit in the way of understanding the current understanding and awareness in food manufacturer towards food safety management system. Through this, the end user/customer will get best food products from the food manufacturer which successfully implemented food safety management. Thus, a conceptual framework based on above model are developing to apply in Malaysian context. This conceptual framework will seek the level of awareness and understanding of food standard and food safety management system among Malaysian food manufacturer, through audit to produce safe food. Researcher will use validated questionnaire to conduct a cross sectional research in Malaysia and target population will be Malaysian food manufacturer.

Keywords: Malaysian food manufacturer, awareness and understanding, food standard, food safety management system, audit, safe food

1. Introduction

Food manufacturers are those companies that turn raw materials (or intermediate products into finished products – the ones we see available on the grocery store shelves (Hartel & Klawitter, 2008). With an annual export value of more than RM 11 billion, Malaysian processed foods are exported to more than 200 countries (MIDA, 2012).

1.1 Background of the Study

In recent, food safety awareness has become one major issue in food producing industries. Further, there is limited literature on the status, benefits, and barriers of QM practices in SMEs operating in the food sector (Dora et al., 2013). The reason may be attributed to the complexity of the food production chain and the resource constraints of SMEs; and it is evidential that food and its production process have special characteristics such as short shelf life, heterogeneous raw materials, seasonality, and varied harvesting conditions (Dora et al., 2013). The majority of the studies in the food SMEs category are focusing on quality assurance (HACCP, BRC, ISO). The primary objective of these studies is food safety which is just one part of the broad quality management system (Dora et al., 2013).

1.2 Problem Statement

Quality control has become a cornerstone of food safety policy over the past decade in the food industry. Much of the focus has been on integral quality management systems. Additionally, the sector lacks necessary compliance with world hygiene and safety standards such as Hazard Analysis and Critical Control Points (HACCP) and Good Manufacturing Practice (GMP), preventing the local products from being accepted and trusted in domestic and international markets. Such compliances are important as the certificates have been internationally recognized to indicate that the food product is of good quality and safety. As reported by Spiegel et al. (2005), bakeries apply QA systems such as Hygiene code, HACCP (Hazard Analysis Critical Control Points), ISO (International Organization for Standardization) and BRC (British Retail Consortium), but for them to be able to decide which system suits their specific situation (i.e. context) most and how this system should be implemented, they lack the necessary insight into the interdependence of contextual factors of bakeries and the quality management level at which these bakeries operate.

1.3 Research Objective

The objectives of the study are as follows:

- a. To investigate the awareness and understanding of Malaysian food manufacturer on the food standard and safety management in their company
- b. To investigate difficulties to implement food safety management
- c. To study the review on the audit report on the current food safety management system
- d. To access with certification bodies/consultancy firm on the industry implementation on food standard and safety management (government versus private)
- e. To study the rate of success to get certificate in food safety management system (government versus private)

1.4 Research Questions

In order to achieve the above objectives, the following research questions were posed for this study:

- a. How high is the level of awareness and understanding of Malaysian food manufacturer on the food standard and safety management in their company?
- b. How difficult to implement food safety management?
- c. What is the review on the audit report based on the current food safety management system they have?
- d. Which one certification bodies they will choose to be used in food industry?
- e. What is the rate of success among government certification bodies and private certification bodies?

1.5 Significance of the Study

This study will be beneficial to Malaysian food manufacturer who intends to implement food safety management system in their premise. Also, for academia, they will benefit in the way of understanding the current level of understanding and awareness in food manufacturer towards food safety management system. Through this, the end user/customer will get best food products from the food manufacturer which successfully implemented food safety management.

1.6 Delimitation of Study

This study will be conducted in Malaysia and limited to food manufacturers, specifically food manufacturers-SMEs who has implemented food safety management system (Mesti, Halal, GMP for food, HACCP, and ISO 22000).

2. Literature Review

Food is any substance which when consumed provides nutritional support for the body (Edith & Ochubiojo, 2012). In recent years, manufacturing companies have been faced various challenges related to volatile demand and changing requirements from customer as well as suppliers (Demartini et al., 2018). Assurance of food safety and quality in the food chain are of major importance in building customers' trust (Djekic et al., 2016). Similar study also shown that customers demand better quality, lower prices, and quick response, improving the product and service quality of an organization is essential for business development, thus, implementing total quality management helps to increase the market share of companies and to improve their competitive capacity (Bolatan et al., 2016).

Literature indicates that the implementation of Quality Management (QM) depends on organizational factors such as the size of organization, the type of suppliers and customers, the degree of automation, the type of products, quality assurance requirements and importantly the top management's commitment (Dora et al., 2013). According to Dora et al. (2013), the challenges in establishing an appropriate QM system are more intense for the Small and Medium Enterprises (SMEs) due to a lack of resources, competencies, and diseconomies of scale. In addition, there are significant differences between SMES and large manufacturers with respect to structure, policy making procedures, resource utilizations, staff patterns, culture, and patronage.

2.1 Food Safety Management System

The International Organization for Standardization (ISO) defined "Food Safety" as the concept that food will not cause harm to the consumers when it is prepared and/or eaten according to its intended use (Rafeeque & Sekharan, 2018). A "management system" is a set of interrelated or interacting elements to establish policy and objectives and to achieve those objectives. Food Safety Management System standards can be broadly classified as global, international, national, private, and proprietary standards (Rafeeque & Sekharan, 2018). In the study done by Dora et al. (2013), they identified the top three barriers: 1. Inadequate process control techniques, lack of training and lack of resources. Dora et al. (2013) also reported that the food companies which initiated QM could reduce production costs and increase productivity as well as profitability. They also revealed that the size of the company is a significant factor with respect to quality management implementation, however, medium size companies were doing better than their small and micro counterparts and there is a lack of knowledge of Food Quality Management (FQM) methods among the majority of the micro-, small- and medium sized food companies in Europe (Dora et al., 2013).

2.2 Food Manufacturer

The food industry is operated at different levels by either local, national or multinational corporations that use either subsistence or intensive farming and industrial agriculture to maximize output (Edith and Ochubiojo, 2012). As defined by Dora et al. (2003), only SMEs according to the definition of the European Commission, who have less than 250 employees, a maximum of 50-million-euro annual turnover and a maximum of 43-million-euro annual balance sheet total were considered for the study.

2.3 Audit

Assessment of the performance of the quality/Food Safety Management System (FSMS) is essential since unsuitable systems may result in the prevalence of foodborne outbreaks (Djekic et al., 2016). Depending on the role of the organization requesting and audit, auditee and auditors, audits are classified as internal audits (conducted by the organization itself), second party audit (conducted by the customer or other organization having interest) and third-party audits (conducted by independent auditing organizations) (Djekic et al., 2016). Certification, auditing and analysis using various scorecards are methods in which suppliers can be evaluated and improved (Djekic et al., 2016). In the research done by Bolatan et al. (2016), the measures of quality performance used by them are product performance, product/service quality, productivity, on time delivery, product reliability, product

durability suitability of product design specifications, product standardization, the percentage of defective material from the supplier, total warranty cost, ratio of quality control inspectors to direct production operators, the percentage of total waste product, suppliers' delivery time, the cost of reproduce and waste product.

2.4 Conceptual Framework

As mentioned in the research objective, the level of awareness and understanding of Malaysian food manufacturer on the food standard and safety management to produce safe food will be studied, and to get the food safety management system certification usually will done by accredited certification bodies, where similar literature review has been done by Djekic et al, 2016; Casolani & Signore, 2016; and Dora et al, 2013. According to Djekic et al. (2016), in a long-term perspective, researchers identified that second party audits are effective tools in directing companies toward improvement on the effectiveness of quality and/or food safety systems. Similar findings also can be found in Arpanutud et al. (2009), Thai food firms display variable responses to pressures to adopt food safety management systems-despite the fact that they are all subject to the same mix of incentives and sanctions. As tested in the model of Arpanutud et al. (2009), a number of hypotheses are proposed and categorised under the headings, i.e. (1) Motivation; (2) Context and (3) Organizational factors.

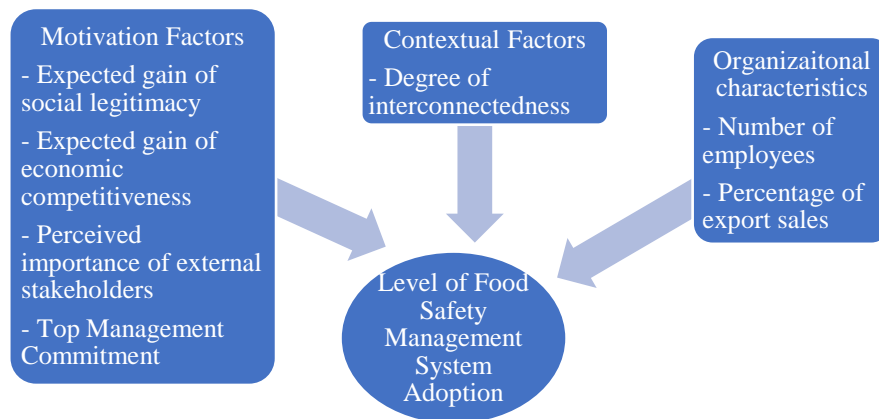


Figure 1. A Model of Food Safety Management System Adoption (a tested model) by Arpanutud et al (2009)

Thus, a conceptual framework based on above model are developing to apply in Malaysian context. This conceptual framework will seek the level of awareness and understanding of food standard and food management system among Malaysian Food Manufacturer, through audit to produce safe food.

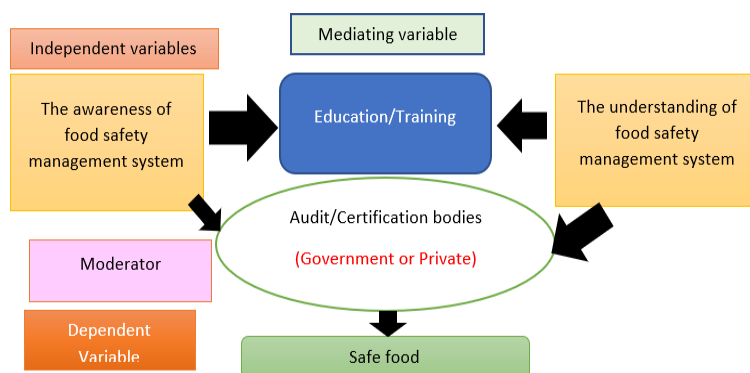


Figure 2. Conceptual Framework of the Study

2.4.1 The Gap of Study

At present, to the best of our knowledge there have not been any attempt to determine the level of awareness and understanding of food standard and food safety management system among Malaysian food manufacturer through audit to produce safe food. Woh et al. (2016) reported that previous studies on food safety knowledge in Malaysia have all focused on specific groups such as youth and local food handlers. Wallace and Powell (2015) said it is necessary to establish ways of measuring HACCP effectiveness that are not based solely on retrospective analysis of outbreak data when the HACCP system has been applied correctly. The aim of the study pertaining to HACCP assessment by Wallace and Powell (2015) were establish strategies for the assessment of HACCP effectiveness; develop and validate tools to measure HACCP effectiveness; determine the validity of HACCP plans developed by trained HACCP teams and evaluate the implementation, verification and maintenance of HACCP plans.

2.5 Hypotheses

In order to achieve the research objective, the following hypotheses were posed for this study:

- H1 : The level of awareness and understanding of Malaysian food manufacturer on the food standard and safety management in their company is high.
- H2 : It will have difficulties for Malaysian food manufacturer to implement food safety management system.
- H3 : The review on the audit report based on the current food safety management system Malaysian food manufacturer has helping to improve in their business.
- H4 : Malaysian food manufacturer will choose private certification bodies in food industry.
- H5 : The rate of success will be higher on private certification bodies compared to government certification bodies.

3. Methodology

This chapter describes the method used for the descriptive, survey research study. The purpose of the study was to determine the relationship of the awareness of food manufacturer and the understanding of food manufacturer towards food management safety system and their selection of using private or government certification bodies to produce safe food. The research design will define the type of research design, target population and sample size, instrumentation, pilot study and procedures. In data analysis, the variables used in the study will be defined, as well as the statistical analysis process of the study. In the end, researcher will focus on the reliability and validity of the instruments, as well the research study as a whole

3.1 Need of the Study

The review of literature has enabled carve out the grey area connected with studies on the awareness and understanding of food standard and food safety management system among Malaysian food manufacturer to produce safe food. Most of the studies on food standard and food safety management system have concentrated on the factors influencing on HACCP applications (Casolani & Signore, 2016) and the outcome of the audit towards to food safety management system (Djekic et al., 2016; Dora et al., 2013). Thus, this raising interest for researcher to do study on analysis on the awareness and understanding of food standard and food safety management system among food manufacturer to produce safe food. In order to achieve the above objectives, the following research questions were posed for this study:

- a. How high is the level of awareness and understanding of Malaysian food manufacturer on the food standard and safety management in their company?
- b. How difficult to implement food safety management?
- c. What is the review on the audit report based on the current food safety management system they has?
- d. Which one certification bodies they will choose to be used in food industry?
- e. What is the rate of success among government certification bodies and private certification bodies?

3.2 Research Design

A descriptive, survey research was chosen to investigate the awareness and understanding of food standard and food safety management system among Malaysian Food Manufacturer to produce safe food. Similar design has been used by Casolani and Signore (2016) and Dora et al. (2013). The major purpose of descriptive research is description of the state of affairs as it exists at present (Kothari, 2004). The main characteristic of descriptive research is that the researcher has no control over the variables; he can only report what has happened or what is happening (Kothari, 2004).

3.2.1 Population and Sample

The target population for this study are Malaysian Food Manufacturers who doing food processing. In Malaysia, food processing contributed about 10% to total manufacturing output (Muda, 2015). More than 3200 establishment, more than 80% are small and medium enterprises and predominantly Malaysian-owned establishment (Muda, 2015). The selection was made based on the focus of the research of study, which focus on Malaysian Food Manufacturer which involved in the food processing.

Estimation of sample size in research using Krejcie and Morgan is a commonly employed method (Chuan, 2006). The following formula used by Krejcie and Morgan to determine sampling size: $s = \frac{X^2NP(1-P)}{d^2(N-1)+X^2P(1-P)}$, whereas s =required samples size; X^2 =the table value of chi-square for one degree of freedom at the desired confidence level; N = the population size; P = the population proportion (assumed to be 0.50 since this would provide the maximum sample size); d = the degree of accuracy expressed as a proportion (0.05). The sample size planned to get for this study is 686.

3.2.2 Instrumentation

The study designs of the survey will be cross sectional surveys. Cross sectional surveys involved the collection of data at a single point in time from a sample drawn from a specified population (Visser et al., 2000). In this study, researcher will use online surveys. The benefits to use online surveys data collection is quick and easy, and tracking where respondents break-off in the survey is possible due to data piping-in to a database in real-time (Research Lifeline, 2012). Cross sectional surveys do offer the opportunity to assess relations between variables and differences between subgroups in a population (Visser et al, 2000). In practice, one rarely comes across a case when one questionnaire relies on one form of questions alone and the various forms complement each other (Kothari, 2004). The type of questions will be asked in the closed ended questions, open-ended questions and 7-points Likert scale.

3.2.3 Pilot Study

The term “pilot studies” refers to mini versions of a full-scale study (also called “feasibility” studies), as well as the specific pre-testing of a particular research instrument such as a questionnaire or interview schedule (Teijlingen & Hundley, 2001).

To increase the reliability and validity of this study, researcher will conduct a pilot test with five (5) Quality Assurance personnel. Similar validation has been done by Dora et al. (2013) where they have asked two operations managers, two consultants and an academician to complete the pilot study. The validity will be run through SmartPLS 3 program. Based on the pilot study, researchers are able to modify some questions and alternative answers. Also, through pilot study, researchers are able to get responses from the respondents towards the pre-tested survey questionnaire. One of the advantages of

conducting a pilot study is that it might give advance warning about where the main research project could fail, where research protocols may not be followed, or whether proposed methods or instruments are inappropriate or too complicated (Teijlingen & Hundley, 2001).

3.3 Data Collection and Procedures

Simple random sampling will be used in this study. According to Visser et al (2000), simple random sampling is the most basic form of probability sampling. Sampling will be made among 3200 food manufacturers. Researcher will distribute the survey questionnaire via online to the respondents and getting response from the respondents. Researcher will do analysis and answer the research questions. Researchers need to be awarded an approval from the university to do this study.

3.4 Data Analysis

Data will be key in and analysed through SmartPLS 3. With SmartPLS 3 program, the frequencies of respondents to numerous questionnaire items are tabulated for a large number of respondents. Basic descriptive statistic, i.e., mean and standard deviations and frequency distribution are computed for each variable.

3.4.1 Statistical Analysis

In this study, the statistical tool that are used for the analysis of the primary data are:

- a) Factor analysis: factory analysis is to summarize data so that relationships and patterns can be easily interpreted and understood and normally used to regroup variables into a limited set of clusters based on shared variance (Yong & Pearce, 2013);
- b) Graphical method: After the measurements the gathered data are organized, examined and displayed by using different graphical techniques, i.e. bar charts, histograms, scatter figures and pie charts;
- c) Simple percentage analysis: the analysis of simple percentage is used in comparing between more than two collections of data. In this method the percentages are used to represent relationship percentages can be used to compare similar terms;
- d) T-test: a t test is a type of statistical test that is used to compare the means of two groups and one of the most widely used statistical hypothesis tests in pair studies (Kim, 2015); and
- e) Regression analysis: regression analysis is used to predict the future course of development, support planning decision, correcting errors and provide new insights (Jain et al, 2016). Casolani and Signore (2016) use test of variance (t-tests when the variables were two) were performed to compare result of Re/Ho and bar including variables such as gender, age, education of managers and number of employees of food business.

3.5 Ethical Consideration

Ethic is an important aspect in research and there must be some basic ethics to be adopted. In this study, ethics is handled by the researcher by keeping the answers acquired strictly confidential. Besides that, the researcher will take a prior permission from the university to run the research and getting permission from the target respondents before conducting the research.

3.6 Conclusion

Since the study is a sample based and undertaken in Malaysia, the findings of the study may have the limitation of generalization to the entire population. As such, the conclusion may or may not generalized since the study is confined to Malaysia only.

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A Systematic Review of Cost-effectiveness Model for Patient Navigation in the Eco-structure Healthcare Setting

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Abstract: Patient Navigation (PN) systems boost patient satisfaction and quality of life while lowering treatment time. The cost-effectiveness of such programs is questionable. This systematic study examined scholarly literature to determine the cost-effectiveness of PN programs for patients. Researchers are synthesizing patient navigation (PN) literature to advance the field and guide future care models. Recent cost-effectiveness analyses in the field have focused on specialties, neglected grey literature, and focused on adults over 18 rather than adults with complex needs. They're limited to primary care. Without respect to time, we search PubMed, Scopus, NCBI, and MDPI. Randomized controlled trials published in English on the cost-effectiveness of patient specific PN regimens were included. A manual search is also done. To identify and consolidate current knowledge, we reviewed existing PNPs. We performed a six-stage scoping review to find and evaluate relevant literature. Also, relevant ongoing or unpublished studies were contacted. Two reviewers will independently evaluate titles, abstracts, and full texts. Integrating PN services into general care could improve patient screening and diagnostic resolution. Our research shows that PN improves primary care treatment quality.

Keywords: patient navigation, economic evaluation, efficiency, healthcare, service design

1. Introduction

Many businesses have been reshaped and disrupted by the enormous forces that are generated by ecosystems. Personalized and integrated experiences for patients, improved provider productivity, involvement of official and informal caregivers, and improved results and affordability are all possible outcomes in healthcare (Pidun et al., 2021). Our definition of an ecosystem is a collection of capabilities and services that integrates value chain participants (customers, suppliers, platform, and service providers) via a common commercial model and virtual data backbone (enabled by seamless data capture, management, and exchange) to create better and more efficient experiences for consumers and stakeholders and solve significant pain points or inefficiencies.

A patient navigation defined to help people get the health care and other resources they need in order to stay healthy. According to research that shows that patient navigator programs can help improve access to and continuity of treatment, they may offer a potential strategy for greater healthcare integration (Budde et al., 2022). Numerous patient navigator projects have been implemented across Europe despite different levels of success (Busse et al., 2019). Countries may benefit from each other's experiences, whether they are their own or those of the United States. Cancer care, transitional care, and care for vulnerable and disadvantaged populations, such as migrants, ethnic minorities, homeless, or uninsured persons, are some of the areas where patient navigator programs now focus.

A good example of a skill-mix innovation is the implementation of new jobs or methods of functioning, such as patient navigators. Navigators can come from a variety of professions, including nursing and social work, or they might be well-trained laypeople recruited within the target population. The patient navigators' abilities and knowledge are critical to their jobs. Individual requirements and impediments to treatment, education of patients and their communities, and referrals to other care providers are among the typical activities (Budde et al., 2021). A professional navigator may do more complex (and even clinical) responsibilities. Advocates for patient navigator programs should consider macro, meso, and micro elements that all affect the program's eventual rollout. Patient navigator programs must have

long-term financing and suitable training requirements developed to maintain their long-term viability. This will require the cooperation of key stakeholders (Budde et al., 2022).

2. Patient Navigation

Patients' quality of life and other outcomes can be improved by using the patient navigation concept, which can help smooth the transfer from one care setting to another. Patient navigation (PN) is a scientifically supported strategy that includes identifying and removing personal obstacles that patients have when seeking medical treatment. PN has been proved to be helpful in multiple studies, but many healthcare organizations have the capacity to establish successful, long-term PN programs (Pratt-Chapman et al., 2021). By advocating and coordinating care, patient navigators can help underserved populations get better access to high-quality health care, while also addressing the root causes of distrust in medical professionals and the healthcare system, which can lead to health problems and noncompliance with treatment recommendations (Kokorelias et al., 2021).

3. Economic Evaluation

Cost Effectiveness (CE) healthcare is an economic evaluation that compares the costs and consequences of various interventions in terms of cost per unit of health outcome (Turner et al., 2021). When evaluating health care interventions, CE is currently the most used tool (Kernick, 2003). Alternatives are compared in terms of their effectiveness in delivering the health-related project or program, as well as their costs and benefits in terms of a measurable or natural unit, such as lives saved, or deaths avoided. Cost-effectiveness is used to determine technical efficiency by comparing the costs and consequences of competing interventions for a given patient group within a given budget.

There are trade-offs between benefits, harms, and costs inherent in alternative options that can be assessed using cost-effectiveness (CE). Globally, reimbursement decisions, benefit designs, and price negotiations are increasingly being influenced using clinical evidence (Wettstein & Boes, 2020). Health care decision-makers frequently face difficult questions. Is it necessary for doctors to take the pulse and blood pressure of every adult patient? A new and expensive drug should be covered by the drug formularies of a health plan, right? In the event of a pandemic, how should vaccines and other treatments be priced? Choosing the best policy or health intervention requires a careful examination of the trade-offs associated with benefits, harms, and costs (Kim & Basu, 2021).

In order to help these vulnerable populations, additional support is needed throughout the care process (American Psychological Association, 2020). Patients may find patient navigation interventions to be a cost-effective way to help them get the medical care they need at a more affordable cost (Budde et al., 2022). Using this type of patient-centered intervention appears to be effective and has shown promising results in improving access to healthcare and promoting equity (Edgman-Levitan & Schoenbaum, 2021). When it comes to universal healthcare coverage, "leaving no one behind" serves as a framework for discussion, but it needs to be translated into action by making sure that the most vulnerable populations are included in programs and given special attention to their needs. Studies from Europe (e.g. Austria, Germany, United Kingdom) and Asia (e.g. Republic of Korea) as well as South Africa (e.g. South Africa) were also included in the systematic reviews identified by an overview of reviews. Patients with cancer or other long-term illnesses, as well as those in transitional care, were all included in the studies. Systematic reviews on patient navigators were found in nine out of the 11 studies.

Patients' access to care, coordination of that care, continuity of care, and effectiveness are just a few of the outcomes that systematic reviews of patient navigator interventions are looking to determine. The clinical outcomes of patients may also be included in some studies. There is a dearth of data on the effects on one's professional life (Budde et al., 2021). Thus, there are no interventions in the scoping review that link patient navigation and cost effectiveness (Peart et al., 2018). A thorough review evaluation of the cost-effectiveness of these initiatives has not yet been conducted. Therefore, the purpose of this systematic review is to objectively examine scientific literature to assess the degree of

evidence on the cost-effectiveness (CE) of PN programs for a cost-effectiveness patient-oriented eco-structured health care design model.

4. Discussion

Patient navigation and cost effectiveness are often treated as separate implementation frameworks in studies of implementation efforts, even though understanding the relationship between the two is extremely valuable. The absence of funding for PN services is a major obstacle to its long-term viability (Adam & Alarifi, 2021). It has been common practice to fund PN projects with short-term, one-time grants.

Patient navigation must be included into the standard of care to maintain its effectiveness. As PN sustainability is an issue, value-based payment schemes are an attractive solution. Medicare or Medicaid fee-for-service (FFS) codes have covered limited PN in additional illness areas (Maddox et al., 2020) They often focus on patient education regarding diagnosis or self-management, which restricts the flexibility of PN treatments and the patient populations eligible for services. On the other hand, because of the rigidity of FFS payments, likely PN programs are more interested in value-based choices. There are several advantages to using a fee-for-service (FFS) alternative for general practices than just focusing on specialties.

Patient navigation programs will only be sustained if organizations' leaders place a high priority on PN services, regardless of the funding source. It is possible to grow and sustain PN with the help of strong leadership. HCA's Sarah Cannon Cancer Institute has seen an increase in patient volume, fewer staff turnover, and improved patient satisfaction—leading to more support for an ever-growing PN portfolio of service (Kline et al., 2019). Their progressive management is a role model for the effective use of growth-supporting assessment data. When selecting whether to undertake public health services, extra information such as the cost-effectiveness and results of a randomized trial is critical. Patient navigation can both improve patient screening and eliminate socioeconomic inequities in health care delivery.

It is still too early to recommend to policymakers' replication of the intervention as carried out in this study because research on patient navigation is only at its beginning stages in many countries. Though the cost per additional person checked appears considerable, there is no recognized threshold for cost-effectiveness. Following framework would be a guidance for implementing a model for cost effectiveness patient navigation system in eco-setting hospitals as shown in Figure 1.

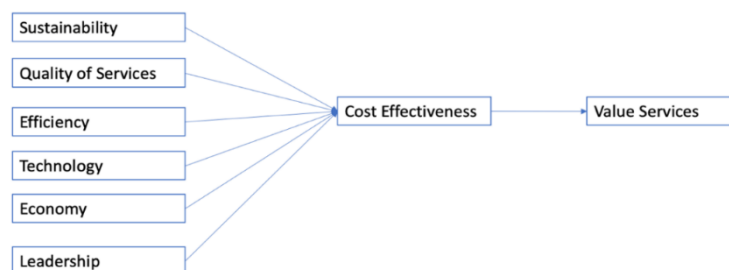


Figure 1. Cost-Effectiveness Model of Patient Navigation

Source: Author Illustration

From here, one way to increase the effectiveness of the intervention and/or reduce its costs is to draw on the medico social framework currently in place. These forms of collective action, such as neighborhood meetings, using local companies, working with associations, and so on, could not be used in this study due to the risk of contamination between the intervention and control groups. It's also possible to think of incorporating navigation into the entire treatment process, from screening all the way through to rehabilitation.

To determine the best approach to reach everyone who is disadvantaged, including those who cannot be reached by phone, and to define the best navigational modalities in terms of services supplied, more study is required. Patient navigation's effectiveness must also be monitored over the long run. To compare the costs of patient navigation with standard screening using different data over a longer time horizon, it is possible to model costs and effectiveness over an extended time horizon. Navigation can be compared against other health care solutions using such standardized metrics, allowing decision makers to decide whether to invest further resources in navigation based on their willingness to pay.

Until now, studies looking at the long-term sustainability of patient navigation programs have concentrated on proving that the services are cost-effective or even free (Pratt-Chapman et al., 2021). However, this financial analysis may neglect other elements that influence decision choice, such as the costs of maintaining patient navigation programs. Whilst Garfield et al. (2022) conducted a poll and discovered that three metrics of sustainability - the length of time a program has been running, the utilization of operating money, and involvement in merit-based payment models - have other programmatic qualities in common. Consistently identifying the expenses and describing the elements used in Quality Improvement Collaboration's (QIC) may lessen the perceived barriers to their adoption (Perrelle et al., 2020).

Publication bias may have prevented more research from being published that had poor results. Future studies should include economic analyses with societal perspectives on costs and savings and the cost-effectiveness of QIC components. Increasing efficiency and equity at the same time is both critical and important. A lack of action on rising health disparities has social and economic consequences that our policy evaluations do not consider (Avanceña & Prosser, 2022). Overuse of medical services and productivity losses amount to billions in extra medical care costs, and people who are ignored, undertreated, or abused by the healthcare system will always have a negative view of the system.

An innovation's influence on health economics is highly dependent on the gap between the technology's price tag and any shift in health care resource use that results from its clinical effect (Am et al., 2020). The cost-effectiveness of an application can be measured in terms of how much the application's value outweighs its implementation costs. The reductions in labor expenses, the greater efficacy of the staff, and the advantages of better care delivery quality can all be considered when calculating value. With cloud-based software, the cost and effectiveness of the service may be easily calculated. A cost analysis must consider all costs, including those that may be referred to as "hidden," if in-house computer applications are used.

When allocating healthcare resources, it is critical to conduct complete economic analyses (which explicitly compare the costs and consequences of the interventions or health policies in question with a comparator scenario). Furthermore, there needs to be a clearer understanding of the various forms of economic evaluations that are used to influence resource allocation decisions in the global health profession. Analyzing the cost-effectiveness and cost-utility of various healthcare therapies allows us to make direct comparisons between them when allocating healthcare resources (Kim & Basu, 2021). While cost-effectiveness and cost-utility studies can be used to compare interventions in different sectors, they may miss out on key non-health benefits, and it is difficult to make cross-sector comparisons.

In addition, cost-benefit assessments allow for cross-sectoral comparisons and can incorporate a wider range of benefits. When putting monetary value on health benefits, however, there needs to be more awareness of present methodologies and variances in approaches, and the possibility for outcomes to be misunderstood. As a practical matter, it is important to note that the economic benefits presented in these studies are often estimates; they are intended to represent the social welfare or productivity gains associated with improved health that can be expected by a community. Estimates of the economic advantages should not be construed as real or fiscal monetary gains for taxpaying individuals and organizations.

Strategic decision-making in the healthcare industry necessitates that hospital management have a comprehensive understanding of both the financial and operational components of the institution (Zajac

et al., 2021). As a result, it's critical that they not just focus on financial aspects of the company, but also on its clinical aspects, its mission, and its responsibility to address the needs of the community.

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The Impact of the Telecommunication Industry on Sustainable Development Goals in Developing Countries

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Abstract: The purpose of this paper is to examine the impact of the contribution by the telecommunication industry on sustainable development in developing countries. For this purpose, a thorough literature review is done, and a conceptual framework is presented. To confirm the proposed conceptual framework, we performed several case studies observing the companies in the telecommunication industry in several countries. These findings further enhanced the proposed conceptual framework developed for this research. However, it was observed that despite the telecommunications sector's contributions to Sustainable Development Goals, no research has been done to assess how these have impacted poverty alleviation and educational programmes in Sri Lanka. The overall aim of this study is to explore the effect of multinational telecommunication companies as a moderator on sustainable development goals through Poverty and Education initiatives. This study will use a positivist perspective. Since the researchers seek to draw conclusions based on the hypothesis developed on the questionnaire as part of the quantitative research process, the research strategy would be deductive. A quantitative method was used as the main method of data collecting. The findings showed that the telecommunication industry has played a major role in achieving sustainable development goals in many countries and the present study focused on developing countries with special reference to Sri Lanka. The key findings through a preliminary study confirmed that an interaction between the telecommunication industries is essential for the linkages and spill overs to occur that may benefit sustainable development in the countries. Also, our findings showed that by doing more contributions on education can be affected to eradicate poverty and to achieve the sustainable development goals in Sri Lanka.

Key terms: telecommunication industry, sustainable development, sustainable development goals, developing countries, society, environment, economy

1. Introduction

The telecommunications sector is essential to a nation's overall growth. In addition to promoting economic progress, it serves as a crucial platform for sustainable development by providing cutting-edge answers to social and environmental problems. On the other hand, it is one of the most significant industries that both directly and indirectly support the nation's economic expansion. Digital infrastructure underpins the communications sector. Fiber, telecommunications towers, active networks, and data centers are a few of them. Additionally, providers of fixed and mobile broadband, data centers, cloud computing, as well as other services including broadband connections, phone, video, e-commerce, and others. For private sector investors, the industry offers a number of exciting options. Significant Foreign Direct Investment (FDI) is being made in Sri Lanka's telecommunications industry. The overall fixed line and mobile telephone density has grown mostly due to an increase in mobile customers as communications consumption has been expanding at an alarming rate (Country commercial guide, 2021).

The telecommunications business has traditionally been excluded from significant COVID-19-related limitations, such as stay-at-home orders and quarantine requirements, in stark contrast to many other industries, since it is viewed as an important service. More individuals are working from home and relying on video conferencing to conduct meetings, which has resulted in a temporary surge in data traffic and higher usage of broadband services, which has benefited some telecom providers. In reality, traffic growth has shown a greater reliance on connection and digital services (World Bank, 2020).

Due to effects like supply chain disruption, a decline in international remittances, and a decline in foreign direct investments, among others, the COVID-19 pandemic has had particularly negative effects on the social and economic spheres in low- and middle-income developing countries, including Sri Lanka. In order to overcome the COVID-19 pandemic's problems, create a better world, and meet the SDG objectives, it is necessary for all countries to work together and in collaboration. With the pandemic, it is imperative to support the worst-affected industries that made up the majority of the economy and jobs, such as Small and Medium Enterprises (SMEs), export industries, the apparel industry, and tourism, in order for them to recover, but this requires the assistance of other nations. In this sense, regional organisations, the commercial sector, international financial institutions, civil society, and academia may all contribute significantly to the 2030 Development Agenda's success by energising action and supplying knowledge and funding.

The term "Sustainable Development" (SD) was first used in the 1987 Brundtland Commission report, which stressed the importance of society, the environment, and the economy in order to "meet the demands of the present, without sacrificing the ability of future generations to fulfil their own requirements." Agenda 21 makes the UN's implementation of SD and sustainable agriculture visible in Rio. In order to further social, environmental, and economic growth, Agenda 21 was created and put into effect concurrently with the improvement of the new CAP. Then, during the period of 2000–2015, these three SD pillars were expanded into eight millennium objectives, twenty-one targets, and sixty indicators (Jacob, 2017). The Sustainable Development Goals (SDGs) and objectives (169), which are currently firmly incorporated by the UN Agenda for SD, are measured by a considerably wider set of indicators (300+) to analyse their progress and effect (Dalampira & Nastis, 2020).

It demonstrates that the telecommunications sector kept up its obligations to the Sustainable Development Goals (SDGs) as according to GSMA (2021), It indicates that the mobile sector boosted its contribution to all 17 SDGs despite the enormous hurdles brought on by the epidemic. The strategy used thus far has been mostly driven by economic or commercial interests, even though the mobile communications community has acknowledged the significant role that mobile communications play in achieving the UN SDGs. There is a chance that a solely economically motivated strategy won't always benefit the underrepresented groups in the community. People who, for whatever reason, do not realize the importance of the Internet are an example. Community networks might instead be created when people see the value of connectedness, even though the economics are not yet there. Communities must thus be fully integrated into any entities responsible for formulating policy and making decisions in order to ensure that the opinions of real users are heard (Matinmikko-Blue et al., 2020).

The current COVID-19 pandemic outbreak has considerably pushed enterprises to digitise their operational processes. Although the use of digital platforms is not new, not much research has been done on how these platforms enhanced the integration of policy in the public sector. One of Sri Lanka's most dynamic industries, telecommunications play a vital role in investment, employment, productivity, innovation, and general economic growth both directly and indirectly. The nation benefits from and makes extensive use of the resources used by its global corporations (Country Commercial, 2021).

Sri Lanka's telecom industry with 22 million people served by cell providers, is oversaturated. Over the past ten years, it has expanded tremendously. furthermore, becoming increasingly popular as a worldwide IT Business Process Outsourcing (BPO) location in a number of crucial fields. The telecommunications sector was placed 25th among the top 50 worldwide outsourcing locations in 2019, according to Kearney. Currently, Dialog Axiata, SLT's Mobitel, Hutch and Airtel, Lanka Bell, and TATA communications are among the six foreign telecommunications companies with licences in Sri Lanka. The booming mobile and internet demand, rising buying power, and expanding consumer desire for smartphones, which have produced a favourable growth projection for the industry, continue to advanced Sri Lanka's telecommunications sector. Under their primary licences granted under Section 17 of the Sri Lanka Telecommunications Act No. 25 of 1991 as modified, only Dialog Broadband (Pvt) Ltd and SLT PLC are permitted to offer international telecommunication services.

However, it was observed that despite the telecommunications sector's contributions to 17 SDGs, no research has been done to assess how they have impacted poverty alleviation and educational programmes in Sri Lanka. The study also plans to look at how much the Sri Lankan telecommunications providers have contributed to such programmes. Studies on the obstacles preventing Sri Lanka's telecommunications sector from supporting sustainable development goals are also lacking.

Determining how the telecommunications sector might contribute to sustainable development in developing countries in the three areas of social, economic, and environmental sustainability is the purpose of the current study. Therefore, the overall aim of this study is to explore the effect of multinational telecommunication companies on sustainable development goals (Poverty and Education).

2. Literature Review

2.1 Countries Perspectives on Telecommunications and Sustainable Development Goals

The impact of digital infrastructure on reaching the Sustainable Development Goals (SDGs) in the 12 nations of the area of Latin America and the Caribbean was examined by Zaballos, Iglesias, and Adamowicz in 2019. According to the investigation, numerous SDGs are significantly and measurably impacted by digital infrastructure. Additionally, there is a discrepancy between the SDG objective and the indicator's level of achievement in the sample nations. Notably, the investigated nations are doing worse than average in the SDGs relating to income and education. Additionally, they advise that telecommunication can enhance access to information about work and education in a nation, increasing the likelihood that individuals can escape poverty / SDG 1. can also increase food security and agricultural sustainability / SDG 2. Additionally, communication may assist lower economic inequality by linking rural regions with cities, giving less developed nations and rural residents access to jobs, and facilitating free information / SDG 10.

Over 263 million children worldwide are not enrolled in school, according to Bello and Othman's report from 2019. Nigeria is not an exception to this global issue with basic education. Using Etisalat Telecommunication as a case study, they investigated how Multinational Corporations (MNCs) contribute to the development of basic education in Nigeria. The findings showed that Etisalat significantly influenced the growth of Nigeria's education sector, particularly basic education. Additionally, the intervention is in line with Sustainable Development Goal 4: Quality Education, which has increased school enrollment, infrastructure, and most crucially, learning quality.

In the study by Urama and Oduh (2012), the researchers looked at home per capita income, small company turn over, employment, and health in order to determine the effect of telecommunications development on household poverty level in Nigeria. The findings generally imply that improvements in telecommunication have a very significant beneficial influence on reducing poverty in Nigeria. It also suggests that telecommunications are a better way to fight poverty. Additionally, it is a certain method to expand the telecom industry and assure genuine competition, and it falls under the purview of the Nigeria Communication Commission.

According to a GSMA (2016) analysis, the level of digital connection affects how quickly the Sustainable Development Goals (SDGs) are achieved. The analysis concluded that the implementation of the SDGs in Sub-Saharan Africa has been hampered by insufficient finance, a lack of knowledge of ICT capabilities, a lack of technical skills, and the digital divide. Furthermore, research showed that the lack of infrastructure, affordability, relevance, and the significance of distribution network coverage in remote rural areas and less networked regions are the main causes of Africa's restricted broadband capacity. The degree of digital connection has an impact on how quickly the Sustainable Development Goals (SDGs) are achieved, according to a GSMA (2018) analysis. The analysis concluded that the implementation of the SDGs in Sub-Saharan Africa has been hampered by insufficient finance, a lack of knowledge of ICT capabilities, a lack of technical skills, and the digital divide. Furthermore, research showed that the lack of infrastructure, affordability, relevance, and the significance of distribution

network coverage in remote rural areas and less networked regions are the main causes of Africa's restricted broadband capacity. Additionally, by providing infrastructure and access to digital services that will promote development, efficiency, and sustainability, mobile communications can help to accomplish the SDGs.

In South Asian nations between 2005 and 2015, Latif et al. (2017) investigated the connection between telecommunications transmission and ecologically friendly growth. They discovered a clear link between the majority of the metrics and sustainable development and emphasised the contribution of the telecom sector to the achievement of the SDGs. For the economies of South Asia, the impact of fixed broadband was not determined to be statistically significant. Their research suggests that one explanation for this could be the region's low purchasing power, which makes it harder for people to afford their monthly internet fees.

In a similar manner, Ericsson and Earth Institute (2017) asserted that the SDGs' primary infrastructure platform will be the telecommunications sector, particularly mobile broadband. They list a few significant modes that will occur. These include (i) accelerate the upscaling of critical services in the fields of health, education, finance, smart agriculture, and low-carbon energy systems; (ii) reducing deployment costs while concentrating on urban and rural realities; (iii) improving public awareness and engagement; (iv) fostering innovation, connectivity, productivity, and efficiency across many sectors; and (v) hastening improvements in the quality of services and employment opportunities.

2.2 *How Telecommunications Linked with Sustainable Development Goals*

The UN Report (2019) states that this is especially true for economies where there are few services or inadequate service infrastructure already in place. Tiny-banking and micro energy grids are only a couple of the new opportunities and services that digitization generally may produce. "Leave no one behind" is the central principal of the agenda 2030, and mobile technologies are essential for connection and Internet access. The SDGs must be achieved, and it is widely acknowledged that universal access to information is essential.

Bertini (2020) asserts that the impact of the digital revolution on people's lives and business operations in both the non-profit and for-profit sectors. In essence, the demand for quick economic expansion has resulted in an alarming rate of resource exploitation, with technical advancements at the heart of these efforts. According to their analysis (Sachs et al., 2016), the role of ICTs in the implementation of SDGs in the period of 2016 to 2030 would gradually and fast advance due to digitalization and the integration of Sustainable Development Goals concern with policy effectiveness. The efficiency of implementing the SDGs' digitization is hindered by a number of problems. Some of these include a lack of digital infrastructure and digital tools for public sector managers and policymakers.

The Sustainable Development Goals (SDGs) initiatives of the Chinese MNE Huawei and the function of multinational corporations (MNCs) in achieving sustainability were investigated by Berning (2019). Results show that Huawei can support sustainable development globally in three areas: goods and services, business operations, and social contributions. Furthermore, it was discovered that a methodical framework had been developed to assist demonstrate potential MNC sustainability efforts and related key stakeholders. This study is valuable for both academics and professionals since it demonstrates how sustainability and corporate success may coexist as well as the possibility for MNCs to support sustainable development. According to Huawei (2017), the SDGs' ICT process was not generally given enough consideration when they were being written. As a result, it is difficult to accurately measure the digitalization process. Among the difficulties are regulations that prevent the use and implementation of ICT when public administrators are tasked with running information systems and the improvement of knowledge and skills among them. Moreover, the internet is expanding quickly, and the telecommunications industry is evolving. Numerous difficulties are encountered with the public sector's digitization, particularly with regard to the SDGs. primarily because it is difficult to immediately see how the SDGs and digitalization relate to one another.

Ojutkangas et al. (2020) studied the mobile communications community as a key player in fulfilling the objectives in their study. However, the comprehension of the options and range looked fairly constrained. Van Zanten and Van Tulder (2018). has stressed the enabling and empowering role played by the telecommunications industry, which is particularly addressed in SDGs 4, 5, 9, and 17. On the other hand, SDGs 8 and 12 were included in the list of SDGs that were determined to address the need for sustainable ICT. According to Wu et al. (2018), telecommunications are essential to achieving each of the 17 SDGs. They also stress the need of focusing on SDGs 5, 10, and 16, which are less evident. According to Matinmikko-Blue et al. (2020), mobile communications can be used as a communication infrastructure to promote local economic growth in underdeveloped areas, lower barriers to accessing financial resources by enabling access to mobile money and microloans and create employment opportunities for those who are living in abject poverty. Additionally, mobile learning has the potential to bring about a revolution in digital learning by enabling students to access learning resources at any time and from any location. Teachers may also utilise mobile devices to educate students everything from reading and math to interactive tutoring.

In order to better understand the situation in Sri Lanka, the current study examines the telecommunications sector's digitization and how the Sustainable Development Goals (SDGs) have been incorporated into public administration. In order to spread the word about the information that is accessible and foster the growth of new enterprises and knowledge, it is crucial to think about closing the digital gap for those who have been left behind due to a variety of inescapable situations. Therefore, the researchers are interested in learning more about the industry's potential to contribute to Sri Lanka's sustainable development in the areas of social, economic, and environmental sustainability.

2.3 Three Pillars of Sustainability and Interconnections of the 17 Goals

In 2010, Kang, Ryu, and Kim looked at three sustainability pillars, and from the ensuing four (at the point of overlap) they deduced connected sustainability domains (Figure 1). Furthermore, all seven of these domains have been considered. This methodology was created specifically for the telecommunications sector to assess the sustainability management of the Korean telecommunications sector using data from two mobile telecommunications providers.

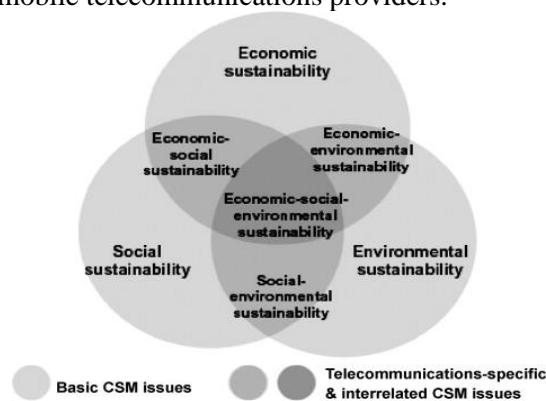


Figure 1. Three Sustainability Pillars (Source: Kang et al., 2010)

According to the United Nations, each aim connects the three spheres of economics, environment, and society, and their integration is crucial for ensuring that the new agenda's purpose was understood (Jacob, 2017). The once-simple concept of Sustainable Development (SD) with its three Agenda 21 pillars has grown more intricate. The UN's new perspective is represented in Figure 2 as a multi-dimensional framework of Sustainable Development Goals (SDGs) that overlaps the three SD pillars. While the General Assembly of the United Nations has presented the Agenda 2015-2030, a modern method that integrates each of the 17 goals into the economy, the environment, and society, and whose combined nature is of crucial significance in confirming that the new agenda's aim is realised (Dalampira & Nastis, 2020).

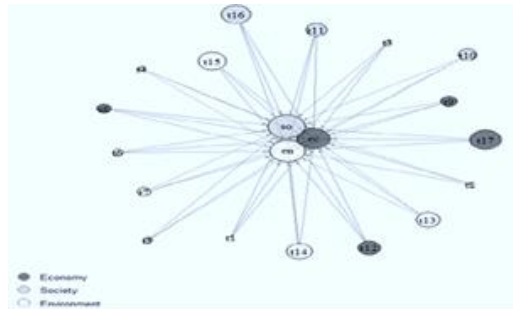


Figure 2. Multi-dimensional Framework of SDGs (Source: Dalampira & Nastis, 2020)

With a new design, the three-pillar Venn diagram for Sustainable Development (SD) has been increased to 17 goals in three dimensions. Brundtland Venn diagrams and other pillar-based graphics may not have the simplicity or strength of this new visual (Ali-Toudert & Ji, 2017), but its adoption by stakeholders is more challenging and complicated, putting its efficacy at risk (Huan et al., 2019).

Many theoretical models attempt to differentiate between the notion of SD and its definition; however, the Venn diagram consistently provided a clear, concise, and strong message in such a difficult and ill-defined area (Ali-Toudert & Ji, 2017). Radar charts have also been used to demonstrate the relationship between objectives and the SD's three pillars (Kostoska & Kocarev, 2019). The Sustainable Development Goals (SDGs) cannot, however, be successful on Sustainable Development (SD), at the level of a whole nation; rather, recognising a region's unique qualities and doing research on its residents may provide greater outcomes.

In the present study the researchers will thus concentrate on how Sri Lanka's sustainable development objectives are affected by the contributions made to SDGs by the telecommunications sector in the current study. In addition, the researcher is interested in examining the effects of these contributions on the social, economic, and environmental pillars of sustainability, namely SDG 1 /poverty and SDG 4 / education.

2.4 Proposed Conceptual Framework

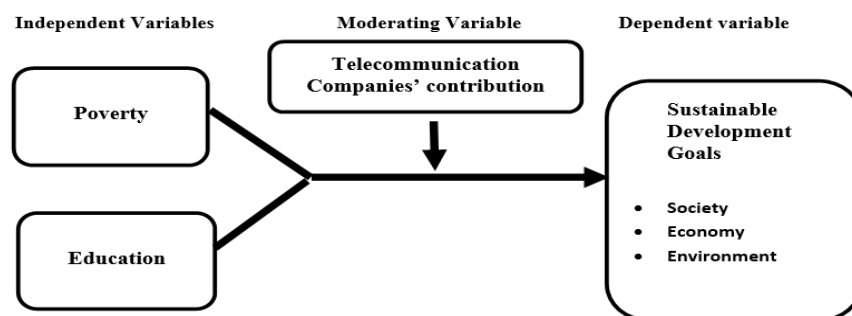


Figure 3. Proposed Conceptual Framework by the Authors

According to the literature review it was found that above key practices individually impact sustainable development and its goals. Therefore, the conceptual framework has been designed according to literature review (Figure 3).

The Independent Variables (IV) of this study are Poverty (IV1) and Education (IV2) which has been derived from SDG 01 and SDG 04 out of 17 SDGs. The Dependent Variable (DV) is the Sustainable Development Goals (SDG) which is connected to three pillars of sustainable development, the society, economy and environment. The telecommunication industry's contribution serves as a Moderating Variable (MV) in this framework. Thus, it has a strong contingent effect on the relationship of

Independent and Dependent variables. It modifies the original relationship between the independent and dependent variables in that the relationship holds true for some categories of the sample but not for the other categories. Using this proposed framework researchers will now be proposed hypothesis for the study.

2.5 Proposed Research Hypothesis

- H1a-** Poverty (IV1) has influence on SDG (DV1)
- H1b-** Telecommunication companies' contribution (MV1) has a moderating effect between Poverty (IV1) and SDG (DV1)
- H2a-** Education (IV2) has influence on SDG (DV1)
- H2b-** Telecommunication companies' contribution (MV1) has a moderating effect between Education (IV2) and SDG (DV1).
- H3a-** Poverty and education (IV1+ IV2) have influence on SGD (DV1)
- H3b-** Telecommunication companies' contribution (MV1) has a moderating effect between Poverty and Education (IV1+IV2) and SDG (DV1).

3. Methodology

By using a scientific research technique, this study aims to investigate the cause-and-effect connection between the independent factors and the dependent variable. This study will use a positivist perspective. Since the researcher seeks to draw conclusions based on the hypothesis developed on the questionnaire as part of the quantitative research process, the research strategy would be deductive. A quantitative method will be used as the main method of data collecting. The probability convenience technique for sampling is the primary focus of the research. The researcher plans to employ straightforward random selection as a sample strategy because there are categories included in the investigation. The research findings will be generalized into two groups using a sample of 384 people. The sample size will be established using the 95 percent confidence level and 5% estimated error estimate from Krejcie and Morgan (1970) study. 400 questionnaires will be distributed, and the most trustworthy ones will be chosen by the researcher. There will be two separate categories in which the questionnaire will be given. Additionally, to the College teachers, there are students (advanced level, undergraduate, and postgraduate levels). In addition, executives from the telecommunications sector and academics with Doctorate degree in socioeconomics will be interviewed as part of the preliminary investigation. Additionally, a statistical analysis program used to analyze the data.

4. Results and Findings

In order to achieve the findings, the researcher uses descriptive analysis to summarize the data consisting of graphs, charts and tables outlining the received responses. Primary data gathered through the structured questionnaires distributed was analysed using SPSS 25 and Microsoft Word Excel.

A sample of 70 respondents (50 students and 20 teachers) were selected to administer the research questionnaire in the study. The researcher randomly distributed a structured questionnaire using a Google form among the students above 18 years who are studying in High school, undergraduates, and postgraduates, to obtain valid responses. Also, the teachers in both public and private schools. The researcher has excluded the teachers who have not worked for more than 1-2 years due to their lack of experience.

4.1 Factor Analysis

In this study, all variables are greater than 0.5 have met the minimum requirements of the reliability (Table 1). The validity results of the Bartlett's test of Sphericity indicate that all the factors are significant at 0.000, which is less than 0.05 (Table 2). Also, the correlation shows that all the variables

have correlated with the dependent variable with the significant level 0.000 which is less than 0.05 (Table 3). Therefore, based on these results, the factor analysis is appropriate.

Table 1. *Reliability of the Study*

Reliability	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of items
Poverty	0.840	0.842	6
Education	0.753	0.775	6
Telecommunication companies' contributions	0.939	0.940	10
Sustainable development goal	0.969	0.969	17

Table 2. *Validity of the Study*

Validity	Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	Bartlett's Test of Sphericity		
		Approx. Chi-Square	df	Sig.
Poverty	0.757	164.688	15	.000
Education	0.723	130.337	15	.000
Telecommunication companies' contributions	0.855	486.040	45	.000
Sustainable development goal	0.910	1394.541	136	.000

Table 3. *Pearson's Correlation of the Study*

Variable	Poverty	Education	Telecommunication Contribution	SDG
Poverty	1			
Education	0.664	1		
Telecommunication contribution	0.238		1	
SDG	0.322	0.436	0.567	1
Sig.(2-tailed)	0.000	0.000	0.000	0.000

4.2 Findings

The researcher conducted an EPA (Expletory Factor Analysis) and the results of this analysis Kaiser-Meyer-Olkin MSA was 0.818. The four dimensions explained a total of 69.692 % of the variance among the items in the study. The Bartlett's test of sphericity proved to be significant, and all communalities were over the required value of 0.50. By referring to R square, that 19.2% (0.192) explained by current factors of the study. Poverty and Education, 19.2% of the total factors that affected sustainable development goals. The sub elements of the questionnaire and research model represent 19.2% while 80.8% affect by other variables that are not included in the model and questionnaire. In the correlations analysis, researcher has found that out of two independent variables, one independent variable (Education) has stronger impact on Sustainable development goals while the other variable (poverty) has a lower impact on sustainable development goals. Therefore, by looking at the results obtained in the study, the researcher been examined that poverty will not directly impact on sustainable development goals and by doing more contributions on education can be effect to eradicate poverty and to achieve the sustainable development goals in Sri Lanka.

5. Conclusion

In this study the researchers examined the impact of the telecommunication industry to sustainable development goals in Sri Lanka. The COVID-19 pandemic, especially impacts for the social and economic spheres in low and middle income, developing countries, including Sri Lanka. Those countries' SDG targets cannot be achieved on their own and needs cooperation and partnership. Also, in Sri Lanka with the COVID -19 the sectors that contributed the lion share to the economy and jobs such as export industries, apparel industry, were badly affected. In this regard, the telecommunication industry plays a vital role in a country. It is not only contributing to economic growth, but it is also an important platform for sustainable development by offering innovative solutions to overcome environmental and social challenges.

The researchers have observed that there is a connection between SDGs and the three pillars (Social, economic and environmental) too, which have been discussed widely. The conceptual framework proposed in this study was developed from the literature findings. Further, the researchers observed a research gap to this study based on the literature review. It was identified that there is a lack of research under the sustainable development goals in Sri Lanka on how the telecommunication industry contributes in this regard.

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Foreign Workers Employment and Management from the Lens of ESG in Malaysia

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Abstract: Environmental, social, and governance (ESG) concerns are currently at the top of the list for stakeholders across the whole company value chain. Every company in the supply chain is being pressured by partners, suppliers, and customers to show that it has ESG "knowledge." This study intends to conduct a critical analysis of the effects of foreign employment on Malaysia's economy and its ESG consequences in order to allay these worries. It evaluates the justifications for hiring foreign workers, the demand for them now and in the future, as well as how they are managed. To determine the effect of foreign workers on Malaysia's labour market, the industries in which they are employed, the factors that led to their importation, and the potential for replacing foreign workers with the local labour force and/or more advanced technologies, the research will conduct a rigorous and in-depth review of the current literature. Additionally, the study will assess how foreign workers are managed from an ESG standpoint, looking at the practises and regulations related to pay, welfare, working conditions, facilities, and general treatment.

Keywords: human resource management, forced labor, human trafficking, foreign employment, ESG.

1. Introduction

Human resources are one of the key tools for ensuring an organization's transformation, survival, and accomplishment of its goals and missions in today's competitive environment. Human resources are what, in the interim, give the change life and ensure the organization's survival. The idea of strategic human resource management is based on the crucial function of HRM, which highlights the strategic character of HR and the alignment of HR goals with organisational strategy. The strategic management of human resources is a method for choosing the intentions.

The definition of a foreign worker can vary depending on the research and academic focus. One definition depicts that a foreign worker is a person who works in a country other than the one of which he or she is a citizen (Siti, 2014). A group of foreign nationals with the legal right to work in a nation where they have been formally recruited may be referred to as "foreign workers" (Zehadul et al., 1999). Another definition views foreign workers as people from a variety of nationality groups who reside and work in a particular country with varying legal statuses (Miller, 1991). A foreign worker in this study is someone who is travelling from outside Malaysia and has a valid work visa.

1.76 million legally registered migrant workers from 15 different countries were present in Malaysia in 2018. (MOHA 2018). Together, migrants make over 20% of the workforce in Malaysia, according to the 2019 World Bank estimate of 1.23–1.46 million people in irregular status (ILO/UNCT 2019). Malaysia's need for migrant workers is projected to persist for the foreseeable future due to an ageing population and ongoing labour demand in industries like construction, domestic work, agriculture, and manufacturing. Both social and economic progress in Malaysia is facilitated by migrant labour. According to Malaysian World Bank figures, for example, a 10% net increase in manual or "low skilled" migrant labour may boost Malaysia's GDP by up to 1.1%. (World Bank, 2015). However, migrant labourers frequently face hostility from the general people. This study demonstrates how discriminatory

practises, such as limiting or denying access to services, excluding migrant workers from social protection legislation, and refusing to pay them the same wages as citizens, are ways that unfavourable opinions are conveyed.

2. Public Attitudes towards Migrant Workers in Malaysia

2.1 Perception towards Migrant Workers through Negative Representation of Malaysian Media

The main source of knowledge about migrant labour continues to be the media, particularly news stories and social media. The pronouns "we" and "them" are frequently used in newspaper stories to emphasise the dominance of Malaysians and foreigners (migrant workers). The pronoun "we," which refers to Malaysians, is also given an active part in the phrases. The pronouns "we" referring to "Malaysian" are activated to give the Malaysians the role of the saviour from the foreign danger, while the migrant workers are given a passive role, with the exception of when the action is tied to violence. Positive opinions of migrant workers that reflect the actual contributions they make to both the economy of their destination and their place of origin must be used to counteract negative attitudes. Otherwise, a rights-based approach to migration regulation where all workers are treated fairly and with respect will lose support in host nations.

The number of research on immigrants' depiction in the media is growing as a result of the worldwide diaspora. As a nation with a significant foreign population, local academics began examining press accounts of illegal immigration, powerful individuals' opinions of immigrants and asylum seekers in Malaysia, as well as media accounts of the surge of foreign labour in Malaysia. The majority of researchers concurred that foreign nationals frequently appear in crime news stories as criminals. This can be considered a minority meaning. It is suggested that newspapers included information on the nationality or immigration status of those involved in crimes in the news headlines or the lead sentence. The act is thought to enhance the drama, worth of the crime news and readability.

2.2 Perceptions of Migrant Workers as Social and Cultural Threats

According to a poll by the International Labor Organization, the majority of Malaysians believe that migrant workers endanger the nation's culture and heritage, while a smaller percentage believe that migrant employees are unreliable and have bad work ethics as the results are shown below in Figure 1 and Figure 2 (ILO, 2020)

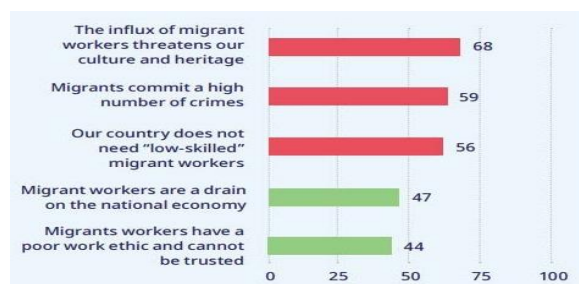


Figure 1. Attitudes about Migrant Workers – Support for the Following Statements (%)

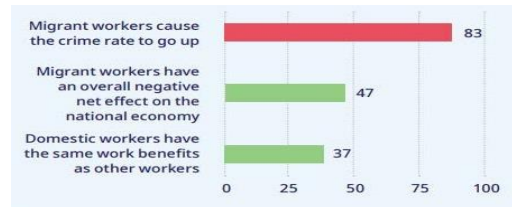


Figure 2. Misconceptions about Migrant Workers – Support for the Following Statements (5)

The assertion that migrant workers are more prone to commit crimes than the general population is not well supported by the available data. In reality, new research on the relationship between migration and crime shows that migrant workers in Malaysia have a negative influence on both violent crime and property crime. In Malaysia, 100,000 more migrant workers result in a 9.9% drop in crime (World Bank 2018). But the majority of Malaysians continue to believe that migrant workers are more likely to commit crimes (see figures 1 and 2). According to a survey of Malaysians, 59% believe that immigrants commit a lot of crimes. 83% believe that migration has resulted in an increase in crime.

According to a 2010 study, more than 80% of Malaysian respondents said that immigrants commit a "large number of crimes." In 2019, only 59% of Malaysians responded similarly, a decline from these levels. This is a development that is encouraging given the generally unfavourable perception of immigrants.

3. Work/ Starve (Foreign Workers are not Allowed to have a Choice to WFH like Corporate Employees do)

3.1 The Challenges Faced by Malaysia's Migration Workforce during COVID-19 Movement Restrictions

As previously established, Malaysia depends largely on the labour of both legal and unauthorised migrants, the most of whom are from Indonesia, Nepal, and Bangladesh. Due to a number of interconnected issues relating to the particular jobs they engage in and their immigration status, these workers are disproportionately impacted by the challenges presented by COVID-19.

The fourth-strictest limitation in Southeast Asia, Malaysia's Movement Control Order (MCO) was implemented countrywide on March 18, 2020, as part of global efforts to stop the spread of COVID19. This partial lockdown entails a complete ban on movement and assembly as well as the closing of both public and private companies, with the exception of those that offer necessities like transportation, energy, water, retail, and food supply. Malaysians are prohibited from leaving the country while non-Malaysians are prohibited from entering Malaysia.

3.2 Work or Starve

The majority of Malaysia's migrant labour is employed in so-called "low-skilled" jobs in the manufacturing, construction, plantations, agriculture, services, and domestic work sectors under employer-tied, temporary contracts. The majority of migrant workers do not have the choice to "work from home" during this pandemic due to the nature of their jobs. The only choices left to migrants are job loss or heightened health hazards. They are forced to continue working at a location where their safety may not be ensured if their workplace is left open.

The ILO predicts that Asia-Pacific nations will have the most global job losses as a result of COVID19, with a loss of 175 million full-time positions. The Malaysian Institute of Economic Research has calculated that, in the best-case scenario, Malaysia will lose 951,000 jobs, 68% of which will be

considered low-skilled. Foreign employees should be fired first if a layoff is necessary, according to Malaysia's Labor Ministry. Numerous migrant workers in the service, manufacturing, cleaning, and construction industries lost their employment over night as a result of Malaysia's MCO. Some sending nations, such as Bangladesh, have stepped in to supply food and essential supplies to some employees since they are unable to work or earn money during lockdown. Additionally, local non-profits are attempting to raise funds for immigrants who have lost their sources of income. Many immigrants will still be unable to get any assistance, though.

In addition to the authorised "critical services," additional businesses have requested exemptions in order to carry on with operations (19,000 construction companies applied alone). While the Malaysian government has mandated that all employees in companies that have been given permission to continue operating must undergo COVID-19 testing, there are worries about the working conditions that migrants are being forced to endure during the pandemic. For instance, labourers at the nation's timber mill today "feel like they're being forced to pick between COVID-19 or starvation," which has caused thousands of migrants to fear for their health and safety.

Two Malaysian businesses, WRP Asia-Pacific and Top Glove, were the subject of investigations by the US and the UK's National Health Service Supply Chain. As a result of these investigations, the US banned imports from WRP in October 2019 on the grounds of evidence of forced labour. The US withdrew the restriction in March 2020, claiming that forced labour was no longer a problem, however this was due to the present surge in demand for disposable gloves and other personal protective equipment (PPE). Additionally, Malaysian businesses have been given tax incentives by the EU to provide PPE. Governments appear to be putting PPE for frontline healthcare professionals ahead of persistent worries about the migrant workers' claustrophobic, "slave-like," overcrowded living and working conditions during this pandemic.

Finally, since some businesses apparently continue to run during the lockdown without government authorisation, migrants may be forced to continue reporting to work while having no assurances about their safety. 500 complaints have been made against businesses that have continued to operate despite the MCO, some of which apparently threaten to dismiss workers who don't show up for work, even in some non-essential factories.

4. Repression among Foreign Workers

Along with the typical difficulties of acclimating to a new environment, foreign employees must deal with the majority of the local population's generally unfavourable attitude toward them. Malaysians to some extent link foreign labour to criminal activity, illnesses, and a wide range of social issues. Of course, there are other factors that contribute to such issues as well. Thus, foreign workers are frequently welcomed with a cynical and hostile smile simply by calling. Some people, according to Datuk Shamsuddin Bardan, executive director of the Malaysian Employers Federation (MEF), even think that the country's rising crime rates are mostly the result of the influx of foreign workers.

Besides the common challenges to adapt to the surroundings in foreign land, foreign workers need to confront a generally negative attitude towards them by most of the local resident. To a certain extent, Malaysians associate foreign workers with crimes, diseases, and multitude of social problems. Obviously, there are other contributors to those problems as well. Thus, in many cases, simply by calling the foreign workers are often greeted with a smile cynical and negative. Malaysian Employers Federation (MEF) executive director Datuk Shamsuddin Bardan said some even believe that the influx of foreign workers is the main reason for rising crime rates in the country. This is untrue due to the fact that criminal cases involving foreign workers only make up less than 10% of all criminal cases in the nation (Teh, 2015).

The Malaysian government has introduced the legalisation programme as a means of registration and to ensure that they become a law-abiding population and workers due to the issue of the growing number of illegal immigrants and the challenges associated with them. Since their inception 25 years ago, legalisation programmes have emerged as one of the state's tools for keeping track of and managing the number of illegal immigrants living in their nations. These programmes are typically implemented in tandem with tighter internal and external border controls (Levinson, 2005). Legalization must be carried out in a way that is both cost-effective and accomplishes its main goal, which is to lower the number of illegal immigrants in a nation. Due to the need to reconcile conflicting objectives, legalisation may be contentious. Successful legalisation must achieve the twin objectives of reducing the number of illegal immigrants while preventing the resurgence of that population (Rosenblum, 2010).

The United States, Italy, France, and Spain, to name a few, were among the nations that had legalised. The Malaysian government also uses this approach to provide illegal immigrants living there legal status. Legalization is a key factor in determining whether there has been a decrease in repression of foreign workers in Malaysia in the research of legalisation and that population. Logically, granting legal status to illegal immigrants can help them find better employment, a better living, and more compensation. When foreign workers become legal, they should no longer experience oppression, exploitation, or abuse because they will have practically all the same rights as domestic workers.

Table 1. *Policy Implementation towards Foreign Workers in Malaysia*

Year	Policy/Regulation
1981-1984	Medan Agreement with Indonesia, may 1984
1985-1990	Legalization of Indonesian workers in the plantation sector.
1991	Regularization programme.
1992	Foreign Worker Policy (Requirement & Strategy)
Jan 1996	<i>Hari Raya</i> Amnesty for Indonesian illegal workers.
Aug 1997	Second Regularization exercise for illegal migrants from Indonesia, Thailand, the Philippines, Bangladesh and Pakistan.
Mar-July 2002	Amnesty programme.
Oct 2004	Illegal workers allowed returning on nationwide Amnesty.
July 2010	Introduction of 6P – Comprehensive Legalization Programme for Illegal Foreigners or the 6P Programme
Aug 1 – 31 Aug 2011	Registration of migrants using Biometric system.
Sept 2011 to 10 April 2012	Legalization and Amnesty exercise of 6P Programme.
10 April 2012	Monitoring, Enforcement and Deportation of 6P Programme.
December 2014	6P Programme officially ended.
July-December 2014	<i>Program Serah Diri Sukarela PATI</i>
15 February-30 June 2016	Rehiring Program For Illegal Foreign Worker

Repression is the least spoken and understood of the problems that international employees encounter. Because they are the most vulnerable, foreign workers are particularly susceptible to repression. Repression is the process of pushing thoughts into the unconscious and preventing painful or dangerous thoughts from coming to consciousness. It can also manifest as seemingly inexplicable naivety, memory loss, or a lack of awareness of one's own situation and condition (Furnham, 2015). Repression is, thus, the use of force to control someone or something, as well as the act of repressing an unconscious thought or urge within oneself. Due to their vulnerability and lack of protection, agents and employers may take advantage of international workers. In Malaysia, migrant labourers are not permitted to switch employment. The only options are to leave the country or get employment with the chosen employer. Due of this, some employers defraud and exploit their migrant labour (Charles, 2014).

Even in the present, there are still instances of exploitation and repression. This involves violations of the law regarding wages, safety, and rights. Construction, manufacturing, plantations, services, and agriculture all employ foreign employees. Without complaining to the company, they are required to put in more than 12 hours per day. Other than that, their pay is not comparable to that of their local counterparts. Foreign employees who engage in the construction industry may encounter dangerous and

filthy working conditions. Additionally, they work without protective gear or, worse yet, are required by some employers to buy even the most basic safety equipment, like as gloves or helmets, which workers frequently choose not to do to save money (Abu & Adil, 2016).

Foreign workers' passports and legal documents may occasionally be seized by their employers in instances of exploitation and rights violations by the employer. There are instances where the employer holds the passport because they do not want their employee to travel too far from the office. When the employers detain or confiscate the passport of a foreign employee, sometimes they are unaware that this is improper. They are under danger of assault and must work there to pay the loan. Maintaining a migrant worker's passport is another method of "imprisoning" or "capturing" them (Charles, 2014). According to research by the non-governmental organisation (NGO) Verité, the major causes of this "systemic" forced labour that keeps employees in low-paying occupations and prevents them from going home are debt bondage and the unlawful confiscation of passports and other identification cards. Due to their incapacity to leave the employment, migrant labourers experience further exploitation and abuse once there. Verité's investigations revealed that workers were made to live in dangerous and crowded conditions, some female workers had their supervisors sexually abuse them, and migrants were made to work excessive overtime or risk losing their jobs, which would leave them with enormous debts they would never be able to pay off (Annie, 2014).

5. Conclusion

The economy of the nation is now permanently dependent on foreign labour, making it difficult to address without working with industry stakeholders and taking a longer-term, more comprehensive approach. If a major fall in the number of workers led to a severe loss in output and production, several industries would suffer greatly. This will result in a significant slowdown in the nation's economic expansion. As a result, there is no quick fix, and the problem needs to be handled cautiously because it could have a big impact on the sector (Lim, 2017). Many foreign workers come to Malaysia because Malaysia's industries, particularly 3D (dirty, challenging, and hazardous) ones, are dependent on foreign labour. While some of them enter Malaysia legally, many abuse their work permits, which results in immigration offences. Those who enter Malaysia illegally run into issues since they lack the right documentation. These foreign workers are particularly weak and open to repression from the employer and others.

Other nations, like Malaysia, rely on migrant labour to sustain their economy, particularly Bahrain, Israel, Kuwait, Jordan, Lebanon, Oman, Qatar, Syria, Saudi Arabia, and the United Arab Emirates. These immigrants, however, do not have much access to legal protection and endure extremely severe living and working conditions. Domestic workers are cruelly exploited and are at the bottom of the migrant labour ladder. Employers in Saudi Arabia brutally assaulted four Indonesian women; two of them died as a result, and police were forced to take the other two away from hospitals (ITUC, 2008).

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Cultivating Leadership Competencies for Individual and Organizational Performance

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Abstract: The article offers a renewed perspective on the approach of cultivating leadership competencies for individual and organizational performance. In addition, it also identified the advancement of four key emerging leadership competencies, namely, visioning, and strategic thinking, leadership agility, adaptability and change, and relationship and collaboration. The methodological approach is based on the review of published literatures outlining on the significance of the leadership competency concept and the proposed four key advancing leadership competencies for organizational performance as stated. Findings indicated the importance of the competency concept which contribute to the quality of leadership. Specifically, the emergence and relevance of the four key leadership competencies for individual and organizational enhancement and progress. Leadership practice need to be updated. The review method of research is based on secondary data hence has its limitation. At the same time, due to the evolving dynamic contextual leadership landscape, some crucial leadership competencies may emerge over time in some geographical organizational context. Therefore, this necessitates the continual study and analysis of the evolving trend of the emerging leadership competencies in organizations. The article of such nature will contribute towards enhancing insights and knowledge on leadership development and practice principally the leadership competency concept. Other concepts discussed includes the competency definitions, competency model, skill-based model, and leadership brand. The research and discussion on the four key emerging leadership competencies adds to the value of the paper. Studies indicated that the competency paradigm is anticipated to be used in the future of leadership practices. There is evidence from reports that the competency framework result in individual and organizational performance.

Keywords: leadership, competencies, competency model, individual performance, organizational performance

1. Introduction

Over the course of time, organizations were using the leadership concepts as a system in functions in organizational planning and development (Boatman & Wellins, 2011; Goldman et al., 2017). Through the process, it facilitated the progress of the organization at the individual and group level. The incorporation of competencies added value to organizational leadership performance. The central importance of the leadership competency model is that they provided a blueprint for individual and organizational achievements (Kassai, 2022). Concurrently, leadership researchers posit that the leadership competencies promote the emergent of leadership brand build on the leadership competencies particularly when the competencies are oriented towards the future (Cardy & Selvarajah, 2006; Intagliata et al., 2006). Towards this end, this article further discusses on the theme of cultivating leadership competencies for individual organizational performance.

The leadership competency technique is a concentrated way of not only learning about leadership but develop effective leadership (Croft & Seemiller 2017; Kassai, 2022, Northouse, 2015). In using the term skill Martin (2018) stressed that skill is important in the modern economy. At the same time, it is evolving very rapidly due to the forces of change (Iordanoglou, 2018). Research survey showed that the drivers of the *quality of leadership* in performance are link to competencies. The essential driver of the excellence of leadership such as talent management has been linked to competencies. Talents and skills help create the stage for the system in the organization. In short, leadership competency reinforces the standard of leadership (Boatman & Wellins, 2022; Koestenbaum, 2002).

There is evidence that leadership for best practice continues to evolve (Iordanoglou, 2018; Pretorius et al., 2018). Researchers are keen to find out the models of leadership and the leadership competencies that are impressive for the current evolving organizational environment (Citaku & Ramadani, 2020; Iordanoglou, 2018). Therefore, it would be appropriate to consider the best approaches by focusing on the leadership competency concept for successful leadership practices (Gerard et al., 2017). Literature emphasized the calls for more studies on leadership including the emerging competencies in organizational leadership and management (Alonderience & Majauskaite, 2016; Iordanoglou, 2018). There is scarce research on the leadership competency concepts. For this reason, this article aims to review the associated concepts pertaining to cultivating the key leadership competencies for individual and organizational performance.

2. Methods

The review paper explores the related articles on the blending of themes of leadership competencies and organizational management trends in the electronic data base reported in English language. The process includes the process of evaluation, analysis, and synthesis of the progression of the proposed topic. The information was gleaned from secondary data sources such as journal articles, reports, and books which are listed in the *Reference* section.

3. Defining Competence and Competency

In recent times, the emphasis of the study on competency is connected to performance. The word competency originated from the Latin word *competentia* which means “is authorized to judge” as well as “has the right to speak” (as cited in Ashkezari & Aeen, 2012). The view of competency was introduced by the early Roman Empire when they profile good soldiers (Sengupta et al., 2013). In the 1970s, the competency approach is used as a selection tool in the corporate world. David McClelland, formerly a Harvard University professor was attributed to introducing the *competency concept* (Croft & Seemiller 2017). Other main figures of the competency concepts include Richard Boyatzis (1982), Spencer and Spencer (1993), and Ozcelik and Ferman (2006). In 1973, McClelland published his seminal paper on competence which triggered debates in the field of psychology. McClelland’s ideas of competency have challenged the traditional notion of evaluation based primarily on intelligence. In sum, to be competent means the manifestation of the evidence of these hallmarks of achievements. Organizations have been attracted on the relationships between competence and performance (Boyatzis, 2008; Sengupta et al., 2013). In view of the competitive environment, the focus is on leadership competency as central to competitive and strategic advantage (Cardy & Selvarajan, 2006).

Most definitions of leadership competency are invariably linked to superior performance and competitive advantage (Spencer & Spencer, 1993; Sutton & Watson, 2013). The table below are highlights of some definitions of the competency concept based on literature review. Additionally, the term competency is also used interchangeably with skills (Northouse, 2015). Some researchers postulates that the definitions of competency would likely evolve.

In view of the various definitions of competency as described, this article adopted Naqvi’s (2009) definition proposed at the Conference in Johannesburg, South Africa, in 1995. Competency, hence, is defined as “A cluster of related knowledge, skills, and attitudes that affect a major part of one’s job that correlates with performance in the job, which can be measured against well-accepted standards, and that can be improved with training and development” (p. 86). McClelland’s study has emphasised competency as the foundation that advance superior performance (Goldman et al., 2017). Furthermore, academic aptitude and knowledge do not necessarily forecast job performance.

Table 1. *Highlights of Some Definitions of the Competency Concept*

Authors	Definitions of the Competency Concept
Sutton & Watson (2013)	“Competencies are defined as a capability or ability” (p. 1024).
Sengupta et al. (2013)	“It is noticeable that all the definitions are linked with superior performance and competitive advantage” (p. 506).
Young & Dulewicz (2009)	“A person’s set of competencies only reflect his or her capability” (p. 795).
Cardy & Selvarajan (2006)	“Personal competencies are possessed by individuals and include characteristics such as knowledge, skills, abilities, experience, and personality” (p. 236).
Draganidis & Metzias (2006)	“A competency is a combination of tacit and explicit knowledge, behavior, and skills that gives someone the potential for effectiveness in task performance” (p. 53).
Moore et al. (2002)	“A competency therefore becomes a combination of relevant attributes that underlie aspects of successful professional performance” (p. 316).
Boyatzis (1982)	“An underlying characteristic of a person in that it may be a motive, trait, aspect of one’s self-image or social role, or a body of knowledge which he or she uses” (p. 21).

4. The Background of the Development of the Competency Concept

The term *competency* is connected to skills. In fact, some authors prefer to use the word skills in their commentary. Katz’s writings were credited with the teachings on skills, and it has an impact on management research. The classic work of Robert Katz, which was published in the Harvard Business Review in 1955 introduced the different sets of skills of technical, human, and conceptual. Basically, technical skills referred to an individual’s specific expertise. In addition, technical skills are not seen as a priority in management. Furthermore, human skills have to do with people relationship (Katz, 1974). While conceptual skills refer to the individual’s ability to see the big picture. It can work with abstract ideas. The other related skills used to describe those with conceptual skills are visioning and system thinking (Petersen & Van Fleet, 2004). Management scholars opined that as one rises in organizational positions, one would require more conceptual skills as compared to technical skills. However, human skills are always needed in any areas of organizational work. Katz’s article concentrated on the importance of the basic skills employed by managers to achieve a responsibility. Katz was essentially addressing leadership and managerial responsibilities as skill that can be cultivated (Northouse, 2015). It is the types of skills executives demonstrate in accomplishing their work responsibilities (Katz, 1974). Katz has suggested that skills can be develop and not necessarily inborn.

Another affiliated phrase used in the study of competency is the *competency model* (Goldman & Scott, 2016; Skorkova, 2016). The competency models are structured frameworks that specify the roles, types of experts, attributes, and competencies required by professionals in the specific scope and domain. The competency models served as a map for education and occupational training. It also captured the prescribed skills, knowledge, attributes, and behaviour that represent the ideal worker (Goldman & Scott, 2016; Skorkova, 2016). Different organizations may use different types of models or design their own models.

Katz taught the need to identify the right kind of skills for job performance in an organization. At the same time, the development of the skill of the candidate needs to be in line with the work or position.

The implication of the significance of Katz's three-skill concept indicated the vital place of skill to a leader's effectiveness. Katz's three-skill approach were further explored and refined in application to the analysis of leadership research by other scholars such as Mumford et al. (2007) and others. Invariably, the definition of the skill concept has evolved to the competency concept.

In the 1990s, there were a series of studies published recommending the idea that a leader's effectiveness derives from the leader's ability to solve challenging organizational issues. The studies have contributed to the *skill-based model* of leadership (Mumford et al., 2000a). The skills-based model suggested that leadership outcome were a result of leader competencies and individual attributes. The model is also known as the capability model. It explored the relationship between a leader's knowledge and skills and a leader's performance (Mumford et al., 2000a). According to Mumford et al. (2000b), the skill-based models will become a vital determinant of leadership performance in the 21st-century leadership. Similarly, there are reports that organizations from the private sector and public sector in the United Kingdom has developed and used the leadership competency framework for their organizations. One of the factors that emerged from these processes were the competency mapping. Competency mapping is about identifying key competencies of an organization and the jobs involved (Kaur & Kumar, 2013; Naqvi, 2009). Undoubtedly, there are indications of the viability of developing the competency concept for effective organizational leadership (Chow et al., 2017; Yammarino, 2000).

There is evidence that the competency model contributed to individual and organizational performance (Sutton & Watson, 2013). According to Sutton and Watson (2013) long term research of top leaders shows that "different sets of competencies were associated with high performance at different time point" (p. 1024). At the same time, studies of leaders in the British Royal Navy concerning their desire to use their competency to the maximum do result in outstanding performance. Researchers opined that it is preferable that the competency model is aligned to the organization's strategies, values, and goals (Cardy & Selvarajan, 2006). Based on the reports from the United Kingdom organizations, there are some lessons and advantages in the competency framework model. Essentially, the two strength of the competency framework is the *flexibility* of the approach and the *uniqueness* of the competency framework to accommodate the organizational objectives and values (Bolden et al., 2003). There was sufficient verification from the researcher's evaluation that repeatedly stressed that the competency approach does result in individual and organizational performance. Scholar's studies have projected that the competencies or skills approach was expected to be used in the future of leadership practices (Mumford et al., 2000b; Northouse, 2015; Szeto et al., 2015).

5. Emerging Leadership Competencies

The review on the emerging leadership competencies is relevant particularly for those keen to learn about leadership and those in management (De Beere & Hondeghem, 2009). The competency research in essence built on the researcher's early work on knowledge, skills, abilities, and cognitive intelligence (Boyatzis, 2009). The competency approach is inclined towards the perspective of leadership that is centred on the leader to be where the plan emphasizes leadership capabilities that can be learned, developed, trained, and coached (Dinh et al., 2014; Lussier & Achua, 2016; Yammarino, 2013). Plainly, leaders can be developed. Individuals can identify and access their developmental needs which leads to their contribution to organizational performance.

This study identified four emerging (or advancing) leadership competencies for integration in the leadership competencies framework. These four leadership competencies fall into the category of future competencies identified by Organization for Economic Cooperation and Development (OECD) countries to meet their leadership challenges of the 21st-century (Bird & Mendenhall, 2016; De Beeck & Hondeghem, 2009). The competency paradigm is predicted to be viable leadership practice for the 21st-century knowledge-based organization (Mumford et al., 2000b; Szeto, Lee, & Hallinger, 2015, Yammarino, 2000). The four advancing leadership competencies identified in this paper are: (1)

visioning and strategic thinking; (2) leadership agility; (3) adaptability and change; and (4) relationship and collaboration. The four advancing leadership competencies are being identified as relevant in the organizational leadership landscape (Chow et al., 2017). Some of these leadership competencies with the emphasis on collaboration and flexibility are considered as *progressive leadership* as they are useful in the context of knowledge, innovation, and adaptation. The drawback in the research of these key advancing leadership competencies is the lack of empirical research in journal articles.

5.1 Visioning and Strategic Thinking

Literature review established the fact that strategic thinking is an essential leadership attribute. Many organizations have acknowledged the importance of strategic thinking (Goldman & Scott, 2016). It is said that vision result from strategic thinking. In short, visioning is linked to strategic thinking. Strategic thinkers are visionaries. As leadership is the ability to define a compelling vision of the future, leaders then need to develop the visioning capability. Visioning and strategic thinking are important as it would enhance a leader's leadership abilities by providing strategic direction. An important role of leadership is to provide the future direction of organizations.

5.1.1 What is Visioning?

Visioning and strategic thinking is important to any organization because it produce strategies and direction for the organization. What is visioning? First, *vision* is a complex term and multi-dimensional concept. Some of the commonalities of the definitions of visioning included a mental picture of future orientation and direction. Holstius and Malaska (2014) defines a vision as “an ideal and unique image of the future” (p. 36). A vision is like a compass that points an organization towards its desired goal or *true north*. Some of the principal descriptions of visioning includes vision about the future, induces people to act towards a common goal, provides a direction, and important for strategic planning. Vision is like a signpost directing people towards the organizational goal (Kantabura, 1992). Research has demonstrated that visions contribute to organizational effectiveness. The task of the leader is to set the vision of the organization and make it known to the team members. Visions inspire and motivate the followers. Studies have also shown that organizations without clear vision fails to progress (Sibeko & Bernard, 2021). In vision planning or visioning the key components to be incorporated are the mission statement, core values, and strategic plan.

5.1.2 What is Strategic Thinking?

According to literature, the study on the strategy paradigm continues to evolve (Folarin, 2021). Strategic thinking essentially is defined as “a set of competencies that impacts strategy formulation and strategic action leading to business performance...” (Nuntamanop et al., 2013). Strategic thinking is also described as the ability to comprehend the evolving environment trends, market situations, competitive elements, their organizations in-depth and find strategic ways for results (Folarin, 2021; Spencer & Spencer, 1993).

The research by Claus (2021) states that strategic thinking is one of the leadership paradigms needed for leading organizations in turbulent times. A report by McKinsey states that 40% of firms fall short to execute strategy because of the lack of capacity, another 30% fail because of the lack of preparedness, and 17 % fail due to poor strategy conception (as cited in Folarin, 2021). Strategic thinking appeared to be lacking in leaders (Al-Qatamin & Esam, 2018; Goldman et al., 2017). Modern leaders are urged to develop and possess a strategic mind-set to sustain growth and progress (Al-Qatamin & Esam, 2018; Pisapia et al., 2005). Strategic thinkers are needed for the advancement at the organizational level.

5.1.3 Developing the Competency of Visioning and Strategic Thinking

The competency of visioning and strategic thinking can be learned and developed (Kazmi & Naaranoja, 2015). There are various learning exercises to spur thinking skills. Taking steps in practicing these suggestions help develop the skills of thinking and strategic foresight. Senge (1990) teaches about the practice of systems thinking in learning organizations. According to Kostenbaum (2002) who wrote on cultivating a strategic and systemic perspective by stating that understanding the inter-relationships within a big picture in one's vision orientation. Hence, seeing the big picture is, seeing the details of the inter-connectedness and linkages as well. Some of the learning processes where one can cultivate in developing the competencies of thinking is by looking at situations in new ways, apply analytical thinking, thinking big and being inspirational. The current leadership and management of today, need to acquire a strategic mind-set to be able to analyse situations appropriately (Folarin, 2021; Pang & Pisapia, 2012). Literature stressed that all individuals could develop in thinking strategically and not just those in leadership and management.

5.2 Leadership Agility

Today's global organizational environment is characterised as being unpredictable, competitive, and complex (Bennett & Lemoine, 2014). The demands are greater ranging from consumer expectations, technological developments, and product innovations to service improvements. As the shift increases, it creates the need for more than the competitive niche. Till date, many solutions have been proposed, and it requires leaders with a certain capability in dealing with such uncertain environment.

Leading in such an environment requires an advanced leadership capability that is both focused and flexible at the same time. Leadership characteristics that enable a leader to be well prepared and able to anticipate the trends and potential changes that are impacting the organization is the descriptions of an agile leader. Leaders need the quality of *agility* to navigate the challenges faced by organizations in this ever-changing world. The emphasis on agile leadership is based on the rise of the volatile, uncertain, complex, and ambiguous world (Bennett & Lemoine, 2014; Hall & Rowland, 2016; Tordrup & Engholm, 2022). In the move towards the 4.0 Industrialization Revolution (IR4) era, agile leaders are much needed.

5.2.1 The Concept of Agility

The study on the concept of *agility* is considered a relatively new field of research. Literature began recording on discussion and researching on the idea around the beginning of the millennium (Gren et al., 2015; Sarkis, 2001). According to Sarkis (2001), agility is an emerging theory in the study of strategic change in organizations. Though there have been various definitions for agility posited, the concept of agility is still being discussed by both researchers and practitioners. The common thread in the definitions emphasizes the *ability to compete in a dynamic situation* (Sarkis, 2001). The word, *agile development* first emerges in the software development and manufacturing (Tordrup & Engholm, 2022). The concept of agile manufacturing organizations encapsulates the idea of an organization thriving in a dynamic environment (as cited in Mclean, 2014). In the research conducted on leader readiness in a Volatile, Uncertain, Complex and Ambiguous (VUCA) business environment one of the themes that emerged in the findings is business agility (Rimita et al., 2020). The participants discussed about agility in every aspect in handling the VUCA environment. In the empirical research conducted by Sar-Lim (2020) on leadership competencies in turbulent environment, the results shows that a leader with the competency of agility is a positive asset in managing turbulent environment.

Research on the overview of the definitions of agility showed the two key characteristics of *flexibility* and *adaptability* (Sherehiy et al., 2007). The Oxford dictionary defined "agile as being able to move quickly and easily" ("Agile." (n. d.). Sherehiy et al. (2007) highlighted "the concept of agility possesses the ability to adjust and respond to change" (p. 445). Albert (2007) explained agility as "the synergistic

combination of robustness, resilience, responsiveness, flexibility, innovation, and adaptation” (as cited in Alberts, 2007). Pisapia (2009) postulated that “Agility is the capability to rapidly and cost efficiently adapt mentally to changes in your environment” (p. 46). Some of the common words used to describe agility are *speed*, *flexibility*, and *effective response* (Fernandez, 2006; Sherehiy et al., 2007). All these terms are used in the definition of agility in research for finding solutions faced by organizations in the context of these dynamic changing times (Gilley et al., 2009).

5.2.2 Developing Agility

Literature suggested that the term *leadership agility* began appearing in publications the past few years (Mclean, 2014). There is little empirical research about leadership agility (Mclean, 2014), however, senior leaders agree that the leadership agility is a significant leadership competency in organizations today. Leadership agility is the quality of a leader to lead effectively in a rapid changing and complex environment (Joiner & Josephs, 2007a; Joiner, 2017; Rimita et al., 2020). There are other researchers that postulated that strategic agility is an ability and flexibility to manage the changes and challenges in the business world which provides the leaders with corporate foresight (Doz & Kosonen, 2010; Vecchiato, 2015). Executives prefers the word agility in contrast to flexibility because agility implies an *intentional* and *proactive* stance. Hall and Rowland (2016) states “Agile leaders are responsive, innovative, and flexible but above all can anticipate change and are able to initiate action in work situations that feature rapid change and ambiguity” (p. 943). Leadership agility is the ability to navigate the complex situations in organizations thus sustaining the direction and stability of the organization (Bennett & Lemoine, 2014; Sar-Lim, 2020)

According to the study by Joiner and Josephs (2007a) only ten per cent of managers were able to exercise the level of agility for effective leadership in uncertain and unpredictable global economy. Also, these effective leaders exhibit four reinforcing agility competencies, namely *creative agility*, *context-setting agility*, *self-leadership agility*, and *stake-holder agility*. Each of these agility competencies worked in connection with one another and functions uniquely in coordination in solving specific problems. The competency of agility can be developed through one’s interest and leadership practice (Mckenzie & Aitken, 2012). Pisapia (2009) in his book, emphasised on developing the agile strategic mindset. At the same time, Pisapia (2009) added that mental agility is linked to the competency of strategic leadership. *Agility* is key to responding to the uncertain and unpredictable business environment (Bennett & Lemoine, 2014; Joiner, 2017). Agile leaders are found to be decisive and take a participative approach to solving problems. Joiner and Josephs (2007b) states that leaders with creative agility have the enhanced ability to make connections between the issues faced by the leaders and the possibilities of perspectives. Some other descriptions of agile leadership include the ability to cope in trying situations and the ability to grasp complex issues (McPherson, 2016). The quality of agility is an important factor in challenging organizational environment for those at the organizational and leadership level (Bennett & Lemoine, 2014; Fernandez, 2006). The leadership agility competency can be incorporated into the competency model.

5.3 Adaptability and Change

A review of literature showed the importance of the paradigm of *adaptability and change* (Rioux, Bernthal, & Wellins, 2001; Uhl-Bien & Arena, 2017). This new concept of leadership was anticipated by leadership visionaries some twenty years ago and the paradigm of leadership adaptability currently is an emerging area of research (Uhl-Bien & Arena, 2017). Adaptability is a leadership imperative and is linked to change, the inability to adapt and change with the times has dire consequences to leaders and managers as well as to the organizations (Khatri, Dutta, & Raina, 2022; Rismansyah, Adam, Hanafi, & Yuliani, 2021). There are demands for the 21st-century organizations to face adaptive challenges (Hickman, 2010; Jayan, Khuang, & Musa, 2016). The trends for leadership in the new era have evolved and changed significantly (Ivancevich et al., 2014; Pang, 2013; Van Wart, 2013). Leadership practices must be in line with the current time’s requirements which includes the inculcation of the emerging

leadership competencies, paradigms, and principles in organizational leadership. It is indeed a challenge for leaders to keep abreast with new leadership developments and concepts.

The paradigm of adaptability and change is vital at the personal level as well as the organizational level (Bennett & Lemoine, 2014; Bin Taher, Krotov, & Silva, 2015). This is the era of knowledge where there are constant evolutions and changes taking place. Considering the changes and evolution, a leader is expected to understand the importance of adaptation. The adaptation of one's leadership will facilitate and renew one's leadership skills and practices. The ability to adapt to changes in personal leadership style to suit the changing environment is crucial (Rismansyah et al., 2021). At the organizational level, developing the competency and skills in planning a tactical plan to fit the situation is paramount. Leadership researchers are proposing for the importance of organizational adaptability in view of the challenges of the organizational environment (Jayan et al., 2016; Uhl-Bien & Arena, 2017). The other aspects of the skills include the ability to analyse and organize information to create change in the desired direction. The paradigm of adaptability and change is *central* to other leadership competencies and organizational leadership. The competency of adaptability and change will enhance the practice of leadership, considering the many challenges faced by organizational leaders.

5.3.1 Adaptive Leadership

Leaders need to acknowledge that their knowledge, competencies, and skills are continuously progressing. Due to the growing body of knowledge on leadership, one can improve his or her leadership. Though leadership essentially is defined as a process that leads others toward the desired goal, a vital aspect of leadership skills is *adaptation*. Leaders need to understand the importance of adaptation and adapt to change and development. The inability to adapt has resulted in the leadership of organizations becoming stagnant and regress. Adaptive leadership positions the leader as well as the organization for further growth and development.

The concept of adaptive leadership was proposed by Heifetz (1994). According to the research by Cojocar (2008), adaptive leadership has emerged into a leadership approach and is being discussed for application in the academic and corporate world. The core of adaptive leadership is not about individuals but about understanding the adaptive dynamics at work and uses those insights in leading change (Cojocar, 2008). Hence, adaptive leadership assumes that leadership is a process rather than individual abilities (Randall & Coakley, 2007). Adaptation is the critical performance determinant to organizational effectiveness.

5.3.2 What is Adaptability and Adaptive Leadership?

Adaptability has been defined in numerous ways in the literature. However, the most basic definition as defined in the Business dictionary states, "Ability of an entity or organization to alter itself or its responses to the changed circumstances or environment. Adaptability showed the ability to learn from experience and improves the fitness of the learner as a competitor". The word adaptive suggests the ability to make changes thus rendering one's leadership and organization more *suitable* to a changing environment. Adaptability means being flexible when things change, other similar terms included agile, adaptable, flexible, and versatile (Yukl & Mahsud, 2010).

In today's complex and fast pace changing world, adaptability has become a necessary competency for leaders to be effective. Adaptability is not merely a needed competency, but it is a competitive advantage for a leader and the organization. In a survey of leaders conducted by the Center for Creative Leadership (2012) from the corporate and non-corporate sectors, adaptability is a key competence most important in the future (29%). A common reason for failure among leaders was the inability to adapt to change (Khatri et al'; 2022; Rismansyah, 2021; Spencer & Spencer, 1993). The shift in today's environment ought to compel leaders to consider the nature of leadership and organization. There is an unprecedented degree of change that has been taking place in since the last thirty to forty years, the changing environment necessitates a more adaptive leadership model.

5.3.3 Leading Change

It is said that one of the difficult challenges facing leaders today is driving change (Hunsaker & Knowles, 2022). The idea of change is described as a process of taking an organization on a journey from its current state to a desired future state. Along the way, the leaders must deal with problems that arise. It has been said that change leaders and organizations often underestimate the impact of change on people. They tend to focus only on putting change into effect. Studies have shown that seventy per cent of organizations have difficulties accepting change (Marques, 2015). Organizations today require leaders who are competent and skilful at implementing change and at the same time lead the process of change (Moran & Brightman, 2000).

There are several models one can use as framework on the concepts of leading change. One such significant model is the one proposed by Kotter and Cohen (2002). The model highlighted the eight steps which are the right vision, buy-in, increase urgency, guide the team, work on empower action, develop short-term wins, ensure change stick, and don't give up. These eight steps are essential to ensure the team members or employees commitment that results in successful outcomes (Bin Taher et al., 2015). The competency and skills of the change leader is considered added important factor. Leading change is said to be one of the difficult challenges' leaders face today (Hunsaker & Knowles, 2022). Some of the specific areas for continual awareness and development in the context of the competency of adaptability and change included the following: a leader is to navigate the environment. There is also a need for awareness of the impact of change on people, a related competency for application is the ability to address resistance to change is vital.

The literature showed the importance of the paradigm of adaptability and change (Khatri et al., 2022; Rismansyah, 2021; Uhl-Bien & Arena, 2017). It needs to be reiterated that adaptability is a leadership imperative and is linked to change. Adaptability enhances and propels change, the inability to adapt and change with the times has dire consequences to leadership and the organizations as shown in many case studies (Kotter & Cohen, 2002; Hunsaker & Knowles, 2022). The leadership practices must be *current* with the times which includes the inculcation of new emerging leadership paradigms, concepts, and principles in organizational leadership.

5.4 Relationship and Collaboration

Literature has indicated that the *collaborative leadership* paradigm is one of the new emerging leadership paradigms which started to appear in the mid-1990. Allen et al. (1999) postulated "This new emerging leadership paradigm has been called a number of different names: shared, participatory, collective, collaborative, cooperative, democratic, fluid, inclusive, roving, distributed, relational, and post-heroic" (p. 248). In a research survey conducted on the important skills for future leaders based on five European countries (Greece, Latvia, Lithuania, Cyprus, and Bulgaria, three competencies proposed in this paper emerged in the findings that are adaptability, strategic thinking and planning, and collaboration and teamwork (Iordanoglou, 2018). Research has also indicated that the collaborative leadership and culture is preferred in contrast to old leadership practices or hierar-chical leadership style (Ibarra & Hansen, 2011; Page, 2008; Pisapia, 2009). Patterson et al. (2007) in their research has listed collaborative leadership as one of the transnational competencies which build strategic relationships.

As the term suggest, *collaborative leadership* focuses on relationships and the needs of people. Leadership is about the relationship. These key emerging leadership paradigms of relationship and collaboration are inclined towards being people focused. As these key emerging leadership paradigms become well known and popular, the old leadership style such as command-and-control will be challenged to change. This emerging leadership paradigms of relationship and collaboration are transforming the conceptual framework of leadership and the understanding of effective leadership.

Collaborative leadership uses the approach of engaging the respective participants by working constructively (Archer & Cameron, 2009). The collaborative approach uses an integrative solution where both sets of concerns by the leaders and collaborators are not compromised. It works towards a consensus by incorporating the concerns of the parties respectively (Robbins & Judge, 2012). The

central task of collaborative leaders is developing coalitions, alliances, and partnerships (Archer & Cameron, 2009). It has been said that the culture of collaboration leads to better results as there are more involvement and the element of shared leadership (Black, 2015). Hence, it is an asset for leaders to develop the skills of collaborative leadership. According to research on leadership requirements conducted by Gentry and Leslie (2007), the leadership competencies most favored in organizations includes listening, building relationships, and drawing the best from people (as cited in Visagie et al., 2011).

5.4.1 *Developing Relationship and Collaboration*

Collaboration involves the interplay of various types of relationships. These relationships are communication, coordination, networking, cooperation, and collaboration. Collaboration is said to be the most challenging type of relationship, in collaboration people need to communicate, cooperate, and network with each other. Other factors include the sharing of information, and resources, harmonizing activities, and enhancing potential or capacity. These characteristics serve as a guide to the core responsibilities of a collaborative leader. According to James (2011), the collaborative forms of leadership are better suited for the contemporary organization challenges.

In collaboration, individuals are being enrolled into a partnership to share in leadership and responsibilities. As the new information age era, the answer to the complexity of the future lies in the community. The pattern for the future of leadership involves diverse leaders working collaboratively to solve problems. Developing collaborative leadership capacity is essential in the new era, hence, the collaborative leadership plays a vital part. Yammarino (2013), has alluded to the fact that these leadership approaches are more suited for the “technological driven organizations” of today’s world (p. 153). Some scholars are exploring the concept of relationship and collaboration for application to a wider scope involving organizational, leadership, cultures, and business cultures in the various sectors (Coulson-Thomas, 2005; VanVactor, 2012). Collaboration is critical to success.

6. Competency Development

Traditionally in the past, organizations relied on educational institutions to educate students in the field of professional development of their choice in preparation for the workforce. However, competency development need not be limited to a method but instead it should be adopted to wider approaches particularly in the current situations. The study by Savaneviciene et al. (2008) proposed the following five considerations of development activities: (1) formal studies; (2) coaching and mentoring; (3) training and seminars; (4) learning in the workplace; and (5) self-studying.

As explained, leadership competencies can be learned, trained, and developed. *Identifying* the required competencies is the first step, there is also the need to translate one’s knowledge into action (Cardy & Selvarajan, 2006). Based on the field of sports education, skills are enhanced through the process of practice and repetitions (Norzailan et al., 2016). Learners developed themselves through practices to achieve mastery, the term used for such learning is termed as *deliberate practice* (Norzailan et al., 2016). Similarly, leaders can develop the competency of leadership through deliberate practice. The development of leadership competencies will result in a high-quality person or a skilled professional (Koestenbaum, 2002). The qualities of leadership should not only be limited to those at the top leadership but extend to all personnel in the organizations (Lusthaus et al., 2002).

7. Conclusion

Most researchers and literatures relate competency to performance positively. In other words, competency is linked to effective performance or superior performance (McClelland, 1973; Mumford et al., 2000b; Iordanoglou, 2018; Sengupta et al., 2013). Thus, the leadership competency concept is a recommended viable leadership approach for leadership development and practice (Northouse, 2015; Mumford et al., 2000a). Additionally, based on the experience and evidence from organizations in the

United Kingdom, the competency framework results in organizational performance (as cited in Bolden & Gosling, 2006). There is sufficient evidence to state that “competencies form the base for effective and superior performance” (Vazirani, 2010, p. 121). As such competencies is a viable concept or platform to help prepare the current and future workforce in meeting job requirements.

This study on the emerging leadership competencies is also based on the same competency framework as discussed in the literatures though the key advancing leadership competencies highlighted in this study were discussed in time past. Although the competency movement was proposed for almost four decades since David McClelland first suggested the idea in 1973, there is still lack of empirical research on the leadership competency framework and performance (O’Connell, 2014). More studies are needed on linking competencies to leadership performance particularly the emerging leadership competencies (Boyatzis, 2008, 2009; Mclean, 2014). At the same time, researchers are reiterating for more studies on the relationship between leadership behaviour and organizational performance as well (Jing & Avery, 2008).

As presented, this paper focussed on the leadership competency concept as a model of successful leadership for performance. Literature affirms that the competency approach forms the basis for the excellent of the standard of leadership at the individual as well as organizational level. Hence, the study proposes the approach of cultivating these competencies of visioning and strategic thinking, leadership agility, adaptability and change, and relationship and collaboration for individual and organizational performance. There are theoretical and practical implications on leadership development from the outcome of this review paper. The contributions include insights on the leadership competency model and its various beneficial factors. The competency concept is anticipated to contribute towards the quality of leadership for the 21st-century organizations. Furthermore, the paper outlined in detail the descriptive insights of the four proposed key leadership competencies and how it can enhance individual and organizational performance. Indeed, leadership can be learned, develop, train and coach.

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Operational Changes for Work-Life Balance

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Abstract: In this paper, we are discussing about how operational changes will give impact to the operational excellence as well as work-life balance. Change in operational is a crucial factor to be considered by organization to stay relevant in competition. The environmental changes are forcing the organization to adapt with current work culture which is remote working rather than spending 8 daily working hours in office. This is believed to contribute to a better work-life balance. Previous research explored a linkage that the management of change factors are likely to contribute positively to the operational excellence whereby the employees are committed in management of change efforts. Specifically, current pandemic forced the organization to change their operation style for almost one year and generally adapted well. Resulting from this, Flexible Work Arrangements (FWA) has been introduced under amendment of Employment Act 1995, allowing employees to apply from their employers. The digitalization that always been highlighted also be the strong supporting reason on these changes.

Keywords: work-life balance, operational changes, flexible work arrangement

1. Introduction

There are many research done on organizational change and yet, many firms are struggling in achieving the changes that they have sought to implement. Beginning with the fundamental 3 - step change model developed by Lewin (1951), where firms were instructed to undertake change by first preparing the organization for change (unfreezing), then engaging the organization in the change (movement), and finally anchoring new methods into the organization's culture (re-freezing), critics were quick to condemn it for being overly simplistic. Kotter (1996) developed a more complex approach with his popular 8-step change model, incorporating elements such as leadership and employee involvement. However, the strategies adopted by this and essentially all other change models have not translated consistently into successful implementation (Rosenberg et al., 2011)

Several theories and concepts on various approaches are influencing the organizational changes to be successful. However, the right approaches in implementing the changes will drive to a successful change that will add some good values to the organization. Routine implementation in managing the organization will limit the development of organization as well as human relations (Pollack & Algeo, 2014). Early stage of change approaches should stress on the capability of the organization and were influenced by the human relations movement.

Changes are hard to be implemented especially when people already comfortable with what they are currently doing. This might be the contributing factors to the implementation failure. Failure rate of 70 percent was estimated when it comes to organizational change (Maurer, 2010). Clearly, the problem is not a deficiency of organizational models; rather, it is important to recognize that some firms are better designed for implementing change; and as a result, they can do a better job of overcoming the barriers to change that exist in so many other firms. There have been a number of management case studies written on firms, like GM and Xerox, who have been slow to change in a dynamic environment, while others have been written on firms, like Apple and Netflix, who have made innovation a cornerstone of their business models.

Implementation of changes might be easier and acceptable by people when they were forced to face it initially until it becomes their routine. Specifically, world pandemic situation in 2019 are forcing the organization to change their operation style to be more flexible or freeze the operation if they are not

willing to change. Business minded surely will not stop the operation yet do all they can so that the operation can be run as usual. It happens for almost one year where most of the industry were operated remotely since they are not allowed to run physically. The changes that initially get hard objections finally been accepted and adapted quite well. Resulting from this, Flexible Work Arrangements (FWA) has been introduced under amendment of Employment Act 1995, allowing employees to apply from their employers, effective from 1st September 2022. The digitalization that always been highlighted also be the strong supporting reason on these changes.

2. Literature Review

Adaptation to changes always start with the leaders. A promising and comfort leader will influence the employees to follow and adapt with the changes well. Leadership requires more than the ability to inspire individuals and guide the work of teams as business strategies have become more complex over time. The problem is that strategy is easy, but execution is hard as per suggested by Getz et al. (2009). While poor strategies are clearly cannot deliver good results, good strategies also unlikely to achieve good results if it were poorly implemented. The further study will examine various reasons why execution of change strategy is so difficult, and it might unfold a number of suggestions to break down some of the resistance to change in achieving high productivity rate in various sectors of organizations.

Research concludes that based on the significant failure rate of organizational change, it is crucial that managers employ any change strategies that fit most in different situation (Rosenberg & Stuart, 2011). This further explained that none of the strategy might be suitable with all cases or situation, making it very important to filter and establish set of strategies that might fit most of the organizational situation.

Research found that there is a linkage that the management of change factors are likely to contribute positively to the operational excellence whereby the employees are committed in management of change efforts (Fok-Yew et al., 2013). This can be interpreted as the right way of change implementation might contribute to employees' comfort that indirectly be the factor for better organizational excellence. This conclude that, if employees can be influenced to change and adapted well, performance of the organization will increase. Nevertheless, to overcome users' resistance, top management needs to give continuous commitment and support towards the change (Aladwani, 2001).

3. Conclusion

Changes commonly complicated to be implemented. This can be due to unwillingness to step out from the comfort zone, reluctant to face the risk and few other factors. However, when the changes are offering better work life balance such as remote working environment, flexibility in working hours, shorter weekly working hours, it is not impossible to be implemented.

Changes should be beneficial to both parties; employers and employees, so that it can be accepted and adapted well. Single sided changes that seem to be unfair will be facing hard objection by the least beneficial party. Proven achievement also be one of the contribution factors in adaptability of change. This is shown when the organization was indirectly forced to adapt any ways of change to make sure that they can continue with the operation while conventional physical workplace was not allowed to operate due to unforeseen circumstances like pandemic.

Additionally, changes should start with a good leader showing how the changes can be done and adapt effectively rather than asking the employees to apply the changes and put the operation at risk, especially in the critical part of organizational functions that is irreversible.

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Remote Working Intensity and Its Implications for Employee Motivation: Lessons from the COVID-19 Pandemic Era

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Abstract: Remote working or telecommuting dates several years back. However, the restrictions and lockdown measures taken by governments to minimize the spread of COVID-19 accelerated its adoption as people were forced to work from home during the pandemic. Confining entire population to their homes was suboptimal because the pandemic was multidimensional and complex – physical health, economic, mental health, political and so on. Taking steps to address one of these and neglecting the others only aggravates issues in the other areas. The importance of this paper is underpinned by its examination of a research gap that existed in the application of Self Determination Theory (SDT) during periods characterized by fear and externally induced stress. This paper looks at how remote working intensity affected employee's motivation during the pandemic from a self-determination standpoint with organizational factors and employee individual situation as mediating variables, and basic psychological needs (autonomy, competence, and relatedness) satisfaction as moderating variable. Descriptive statistics, exploratory factor analysis and structural equation modelling were adopted. An examination of psychosocial risk factors during the prolonged lockdown showed that stress level increased, and mental health suffered. The moderation role of basic psychological needs (PN) satisfaction was confirmed. The findings showed that employees who could influence their work schedule were more motivated. Higher levels of support from managers during the lock down enabled individuals achieve better results and motivation level amidst the uncertainties created by the pandemic. Employees in organizations that found innovative ways for social connection and had regular check-ins by managers were more engaged and motivated because managers' support was found to be empowering, produced better psychological health and helped employees feel self-determined. The study concludes that, as good as remote working may seem, the enforced confinement led to increased stress level, more mental health challenges and lower motivation. However, the degree to which it would change in the post pandemic era remains unclear and should be an area for further study since motivation exists in a spectrum.

Keywords: remote working intensity, COVID-19, employee motivation; basic psychological needs, self-determination, psychosocial risk

1. Introduction

The COVID-19 global pandemic brought fear, panic, anxiety, and alteration of people's ways of lives. Several measures were taken to cope with its ravaging effect (Mahmoud-Saleh & Karia, 2020). Some of the measures taken to curtail the spread of the pandemic included quarantine and social distancing created other problems such as loneliness and social isolation (Grigoropoulos & Daoultzis, 2022). The pandemic had health, social and economic implications. Efforts to address one of these had implication for the others.

According to van Zoonen et al. (2021), a number of factors came into play as a result of remote working – structural factors (independence and job clarity), relational factors (trust and social isolation), work contextual factors (location and how work is performed) and communication factors (using communication technology to adjust to remote work). As self-isolation and social distancing became ubiquitous practices and were embraced as the new trend (Nagel, 2020; Vindegaard & Benros, 2020), it became important to investigate the impact of social isolation on employee motivation. Meanwhile, knowledge of the impact of social isolation on vulnerable individuals will be helpful to organisations

and governments of the world in formulating post-COVID-19 policies needed to actualise the UN Sustainable Development Goal (SDG) 3 (Good Health and Well-Being) in the light of the recent global health pandemic.

The lockdown policies adopted by governments to contain the spread of the pandemic unintentionally led to an economic recession globally (Singh et al., 2020). Motivation and direction suffer due to economic recession (Eich, 2012). With remote working, there is a loss of personal connection which cannot be replaced using technology (Oliver et al., 2010; Evans & Bray, 2016). The most recent global pandemic before COVID-19, according to Arnold (2018), was the Spanish flu of 1918. This reportedly led to an outbreak of murder suicides due to the depression. With recent loss of jobs, pay freeze, financial uncertainties, and loss of loved ones, we can expect a repeat of the aftermath of the 1918 Spanish Flu. The actions taken by organisations and the managers within organisations have a critical role to play in helping employees navigate these difficult times and adjust to remote work. van Zoonen et al. (2021) see this adjustment as an overall adaptation to environmental demands and conditions in which employees' satisfaction with the conditions of remote work, job performance due to remote work and work-life balance are key considerations.

Considering that the COVID-19 pandemic affected countries of the world (Dayrit & Mendoza, 2020; Burke & Cocoman, 2020), including Nigeria, it is important to assess the relationship between remote working and employee motivation during the pandemic in the Nigerian context. This is important knowing that empirical research on the impact of the COVID-19 on business and mental health abound in other jurisdictions, whereas studies on the subject are limited in Nigeria.

1.1 Current Research Gap

Ryan (2012) adduced three reasons for the renewed interest in the psychology of human motivation - the theoretical depth and interdisciplinary nature of the field; methodological innovations that have opened new avenues of inquiry, and the practical importance of motivation research as a translational science and for improving individual and community wellness through empirically supported interventions. He further posits that, beyond the theoretical perspectives of motivation and social psychology, there is a range of modern issues and unanswered questions which research on work motivation needs to address, namely motivation of people in groups and organisations, motivation over some period, motivation as well as creativity, and the effects rewards have. Some of these unanswered questions provide a gap which is part of the motivation for this study. Also, most documented studies on the application of the self-determination theory of motivation have been in developed economies and more importantly, during times outside of a global pandemic.

Wang et al. (2020) believes that what is known about remote working can be questioned in an extraordinary pandemic context. Therefore, this research aims to close an existing research gap in the application of the self-determination theory by examining the role of externally regulated remote working on motivation during the COVID-19 global pandemic from the lens of the self-determination theory. This study examines whether and how much the degree of autonomy, competence and relatedness enjoyed by employees during the pandemic affected their motivation i.e., considering the moderating role of basic psychological needs satisfaction. It also aims to identify the mediating roles played by organisational factors and employee individual situation. According to Wang et al (2020), the challenges of remote work challenges mirrors workers' immediate psychological experiences in accomplishing tasks. It is also about their interpersonal collaborations and social interactions with family and friends. Given that remote working has come to stay, building on the existing body of knowledge and closing existing research gap on this subject is an academic imperative.

1.2 Literature Review

Some work has been done by various researchers and practitioners on motivation and the self-determination theory. This forms the building blocks for much of what is covered in this paper.

1.2.1 Theoretical Framework

This study has the Self-Determination Theory (SDT) as its theoretical framework. The theory originated from the work by Edward Deci and Richard Ryan and was first made popular in their book: *Self-Determination and Intrinsic Motivation in Human Behavior* published in 1985. SDT suggests that people are motivated by fulfilment and growth needs. According to Ryan and Deci (2017), human behaviours are influenced in large part by personal and contextual motivational factors. The theory believes that psychological growth is driven by three components – autonomy, competence, and relatedness. Autonomy simply means the need for self-volition, personal choices, and critical thinking. Competence is about a person learning skills and having the capability needed for success and seeing oneself as being able to overcome difficult challenges. Relatedness is about connection, attachment, belonging, being cared for, and caring for others.

Szulawski et al. (2021) believe that these three basic psychological needs (autonomy, competence, and relatedness) contribute to the development of human being's intrinsic motivation towards striving, well-being, and performance.

According to Ryan and Deci (2000), most research on the effects of environmental events on intrinsic motivation has focused largely on the issue of autonomy versus control rather than that of competence. Motivation is a psychological construct used to describe the mechanism by which individuals and groups decide on a behaviour and persist with it (Boddy, 2012). It is about investigating the energization and direction of behaviour (Deci & Ryan, 1985). Energy is at the core of human needs and consists of the needs to be met for humans to remain healthy, and those obtained from interacting with one's environment. On the other hand, behaviours are the methods by which humans respond to internal and external stimuli (Cantarero et al., 2020). Motivation is about the why of behaviour. The concept of human behaviour and motivation is well explained by the self-determination theory. The core of the theory are the conditions that support or hinder human success in general and in specific areas of human endeavours including education, parenting, work, psychotherapy, and wellbeing. These conditions could be social, cultural, or biological. Šakan et al. (2020) believe that basic psychological needs are essential nutrients of well-being and that a person's basic psychological needs (need for autonomy, need for competence and the need for relatedness) must be satisfied for the person to be fully functional.

Ryan and Deci (2017) believe that even though the human inclination to be motivated intrinsically is innate, this natural tendency could be readily diminished in many contexts such that persons who otherwise might be active become passive. This is important in the context of the new normal where people work remotely. To explain this disparity, research on Self-Determination Theory has extensively investigated the effect of social context on intrinsic motivation against the backdrop of the hypothesis that some social conditions support active engagement whereas others thwart it. Legault (2017) posits that self-determination theory is premised on the belief that the individual is involved in a dynamic interaction with the environment continuously. This interplay between the person and the environment makes people become either engaged, curious and connected or demotivated, ineffective, and detached. Ryan and Cornell (1989) posit that one central issue for motivation theories relates to the perceived locus of the variables that cause behaviour relative to the person. The concept known as perceived locus of causality (PLOC) was introduced by Heider (1958) in reference to the phenomenal analysis of how a person infers the motives and intentions of others. He concluded that there were two causations – personal causation (due to a person's intention) and impersonal causation (when the environment produces a given effect independent of a person's intentions). Enforced confinement or lockdown measures as seen during the pandemic is an example of external regulation requiring compliance. Violation invokes punishment. This is controlled, non-self-determined behaviour with an external perceive locus of causality could lead to demotivation.

1.2.2 Objective

With uncertainties, fear and stress arising from the COVID-19 pandemic and the ensuing government-imposed lockdowns, understanding what motivates employees who work remotely is critical. This is what this study is about especially since this is the biggest pandemic in the past one hundred years.

The understanding from this study will be critical when implementing remote working strategies even in the post-pandemic era.

The applicability of the self-determination theory has not been examined during a period of enforced confinement. Based on this knowledge, this study examines (1) the relationship between remote working and organisational factors; (2) how organisational factors affect employee motivation considering the moderating role of basic psychological needs satisfaction; (3) the association between remote working and employee individual situation and (4) how employees' individual situation affects their motivation. The main hypothesis for this study is in accordance with a previous study by Patanjali & Bhatta (2022) that suggests that autonomy, empowerment, and other organisational factors including independence to employees and supportive environment are important enablers even in remote working context.

2. Methodology

2.1 Research Design and Data Collection Method

This study adopted a survey research design because it affords the researcher the opportunity to gather quantitative data conveniently and economically from large number of respondents (Saunders et al., 2009). Data collection was also aided using questionnaire.

2.2 Population and Sample Selection

The target population for this study were professionals, white collar workers based in Nigeria. However, a sample of one hundred and two (102) respondents were randomly selected from amongst members of the Alliance Manchester Business School Alumni Association (Nigeria Chapter) and the Chartered Institute of Management Accountants. The study employed purposive sampling which is about getting all possible cases that fit the set criteria using various approaches.

The reason for this approach is that the sample frame for the study is unknown and the sample size is ambiguous (Buallay & Al-Ajmi, 2020). Furthermore, given the need for greater diversity, this sampling technique enables the use of judgement in deciding the cases that meet the set requirements and can answer the research questions and deliver on the research objectives (Adel, Hussain, Mohamed & Basuony, 2019). Diversity in this study was achieved along various dimensions: across different organisations and geographical locations. Prior studies have used a similar approach to achieve diversity (e.g., Perego & Kolk, 2012; Farooque & Ahulu, 2017; Lu & Wang, 2021). The respondents' profile showed that 55% and 45% were male and female respectively.

2.3 Research Instrument and Measurement of Variables

The research instrument used for this study is structured questionnaires. The use of structured questionnaires is consistent with the research design discussed above which entails survey as a way of gathering data from respondents. According to Babbie (2012), operationalisation is about specifying the meanings of all the variables involved in a hypothesis in order to test and measure the variables. Considering the sample size and the inherent advantages, self-administered fully structured questionnaires were selected. Hyman et al. (2019) agree that self-administered questionnaires is a relatively quick and cost-efficient way to collect large data from diverse and representative samples.

The questionnaire was divided into six sections. Four parts were developed using Likert five-point scale with the aim of obtaining information related to the independent, mediating, and moderating variables being considered. Specifically, these cover questions about remote working, organisational factors, basic psychological needs satisfaction and employee individual circumstances that affect their motivational outcomes. The fifth session is to gather general information about employees' disposition to remote working. The last part is to gather personal and demographic data about the respondents. All

the questions were based on factors and observed variables from previous studies. Measurement of variables is presented in Appendix 1.

3. Results & Discussion

3.1 Result Description

Descriptive statistics, exploratory factor analysis and structural equation modelling were used to analyse data. This study presents remote working and its implications for employee motivation looking at the mediating roles of organisational factors (such as employee mental health support and the provision of remote working resources) and the employees' individual situation (such as family situation, self-discipline and feeling of loneliness). The study points to the differences between behaviours that are externally motivated and those that are intrinsic. Notwithstanding this distinction, intrinsic and extrinsic motivation are additive and synergistically positive (Porter & Lawler, 1968). The results of the test are reported in Tables 1 to 10.

3.2 Remote Working during COVID-19 Pandemic (RW)

The results of the Exploratory Factor Analysis (EFA) test are reported in Tables 1a to 1d.

Table 1. *KMO and Bartlett's Test*

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.547
Bartlett's Test of Sphericity	Approx. Chi-Square	26.772
	Df	15
	Sig.	0.031

The significant p value of 0.031 in Table 1 confirms the factorability of Remote Working (RW) as a variable. The items measuring RW have high degree of extraction, as the item with the least extraction is .578 (or 57.8%). The total number of variances explained stood at 69.225%. 3 items loaded above a 0.50 threshold for exploratory factor analysis. These 3 items were therefore retained for further analysis of measures of Remote Working during COVID-19 pandemic (RW). The other items loading below the threshold were disregarded as they do not strongly measure the variable, RW.

3.3 Organisational Factors (OF)

Table 2. *KMO and Bartlett's Test*

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.596
Bartlett's Test of Sphericity	Approx. Chi-Square	96.956
	Df	36
	Sig.	0.000

The significant p value of 0.000 in Table 2 confirms the factorability of Organisational Factors (OF) as a variable. The items measuring OF have high degree of extraction, as the item with the least extraction is .601 (or 60.1%). The total number of variances explained stood at 71.856%. 5 items loaded above a 0.50 threshold for exploratory factor analysis and were therefore retained for further analysis. The other items loading below the threshold were disregarded as they do not strongly measure the variable.

3.4 Basic Psychological Needs Satisfaction (PN)

Table 3. *KMO and Bartlett's Test*

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.647
Bartlett's Test of Sphericity	Approx. Chi-Square	168.361
	df	36
	Sig.	.000

The significant p value of 0.000 in Table 3 confirms the factorability of Basic Psychological Needs Satisfaction (PN) as a variable. The items measuring PN have high degree of extraction, as the item with the least extraction is .527 (or 52.7%). The total number of variances explained stood at 69.642%. 6 items loaded above a 0.50 threshold for exploratory factor analysis. These 6 items were therefore retained for further analysis. The other items loading below the threshold were disregarded as they do not strongly measure the variable.

3.5 Employee's Individual Situation (ES)

Table 4: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.715
Bartlett's Test of Sphericity	Approx. Chi-Square	204.874
	Df	66
	Sig.	.000

The significant p value of 0.000 in Table 4 confirms the factorability of Employee's individual situation (ES) as a variable. The items measuring ES have high degree of extraction, as the item with the least extraction is .283 (or 28.3%). The total number of variances explained stood at 58.178%. 5 items loaded above a 0.50 threshold for exploratory factor analysis and were therefore retained for further analysis. The other items loading below the threshold were disregarded as they do not strongly measure the variable.

3.6 Employee Motivation

Table 5. KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.549
Bartlett's Test of Sphericity	Approx. Chi-Square	15.462
	Df	6
	Sig.	.017

The significant p value of 0.017 in Table 5 confirms the factorability of Employee motivation (EM) as a variable. The items measuring EM have high degree of extraction, as the item with the least extraction is .549 (or 54.9%). The total number of variances explained stood at 67.399%. 3 items loaded above a 0.50 threshold for exploratory factor analysis. These 3 items were therefore retained for further analysis. The other items loading below the threshold were disregarded as they do not strongly measure the variable.

3.7 Validity and Reliability

Validity was ensured by adapting measurements in literature to measured variables. Additional check on validity was established by conducting an exploratory factor analysis to check the loading of items of variables (Tavakol & Wetzel, 2020). The Cronbach alpha was used to assess reliability/ internal consistency. The result of the test is reported in Table 6.

Table 6. Reliability Test Result

Variable	No of items	Cronbach Alpha
RW	3	.656
OF	5	.718
PN	6	.839
ES	5	.795
EM	3	.653

From the result in Table 6, all items have a Cronbach alpha above the 0.6 recommended minimum to gauge internal consistency. Based on this result, it is concluded that internal consistency is not an issue (Shaughnessy et al., 2012).

3.8 Method of Data analysis

Descriptive statistical techniques such as frequency count, Mean, and standard deviation were used for analysis. Structural equation modelling was used to assess the interrelationship among variables.

3.9 Result from Model 1

Result from Model 1 on the complexity of relationship between the variables is presented in Figure 2 and Table 7

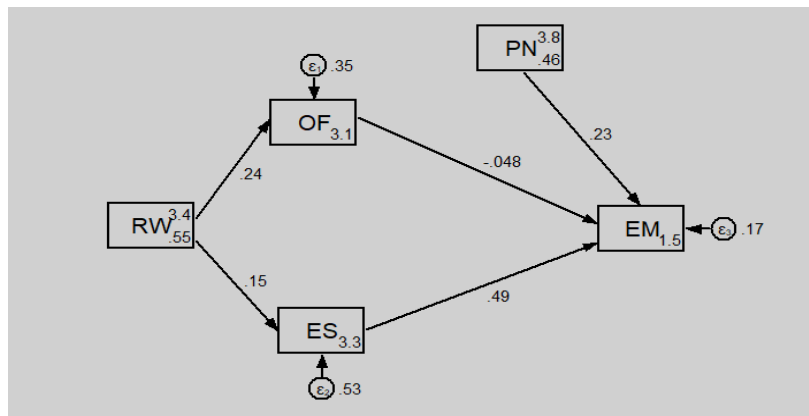


Figure 2: Model 1

KEY: RW = Remote Working during COVID-19 pandemic; OF = Organisational factors; PN = Basic psychological needs satisfaction; ES = Employee's individual situation; EM = Employee Motivation

Table 7. SEM Result on Model 1

Structural		Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
OF <-	RW	.2449156	.11506	2.13	0.033	.0194022	.470429
	_cons	3.050654	.402276	7.58	0.000	2.262208	3.839101
ES <-	RW	.1459297	.1422015	1.03	0.305	-.1327801	.4246395
	_cons	3.305543	.497169	6.65	0.000	2.33111	4.279977
EM <-	OF	-.0482189	.1367918	-0.35	0.724	-.3163258	.2198881
	ES	.4943334	.0849074	5.82	0.000	.3279179	.6607489
	PN	.2322881	.1286951	1.80	0.071	-.0199496	.4845258
	_cons	1.465022	.4631995	3.16	0.002	.5571675	2.372876
	var(e.OF)	.3486044	.0711586			.2336588	.5200961
	var(e.ES)	.5324669	.1086894			.3568962	.7944077
	var(e.EM)	.1722703	.0351645			.1154674	.2570166

LR test of model vs. saturated: $\chi^2(4) = 35.73$, Prob > $\chi^2 = 0.0000$

From the result of Model 1 (Table 7), RW has a significant positive impact on OF with the regression coefficient at 0.2449156, and the p value = 0.033 or 3.3% which is less than 5% (i.e., $p = 0.033 < 0.05$). In other words, the regression coefficient is statistically significant at 5%. The z value of 0.11506 implies the standardized value of the regression coefficient. The confidence interval of 0.0194022 to 0.470429 indicates the range of value that the regression coefficient (0.2449156) could assume. Taken together, the result shows that RW has a significant positive impact of. The error term of 0.3486044 for OF means that other factors, aside RW investigated in the study, are responsible for 34.86% of the variation in OF.

RW also has a positive impact on ES at 0.1459297; however, the impact is not statistically significant, although the range of the values for the coefficient is -0.1327801 to 0.4246395, and the z value is 1.03. The same interpretation applies to the relationship among other items indicated in the Model. In other words, RW does not significantly affect ES (since $p = 30.5\% > 5\%$), although RW has the potential to positively affect ES going by the positive regression coefficient of 0.1459297. On the other hand, ES and PN have a significant positive impact on EM. Specifically, PN impacts ES at a coefficient of 0.4943334 and the impact is statistically significant ($p = 0.0000 < .05$). The range of values are also positive, moving from 0.3279179 to 0.6607489. With respect to the impact of PN on EM, the result is also statistically significant 0.2322881 ($p = 0.071 < .10$) with coefficient ranging from -0.0199496 to 0.4845258. The z value is also positive at 1.80. However, the impact of OF on EM is negative and not statistically significant at -0.0482189. The coefficient also fluctuates around the value of -0.3163258 to 0.2198881, with a negative z value of -0.35. To confirm the fitness of the model and the reliability of the result for Model 1, Model diagnostics was performed, and the result presented in Table 8.

Table 8: Model 1 Robustness

	Fit Statistic	Value	Description
Likelihood ratio	chi2_ms(3)	4.407	model vs. saturated
	p > chi2	0.221	
	chi2_bs(10)	80.008	baseline vs. saturated
	p > chi2	0.000	
Population error	RMSEA	0.099	Root mean squared error of approximation
	90% CI, lower bound	0.000	
	upper bound	0.280	
	pclose	0.269	Probability RMSEA \leq 0.05
Information criteria	AIC	443.887	Akaike's information criterion
	BIC		Bayesian information criterion
Baseline comparison	CFI	0.980	Comparative fit index
	TLI		Tucker-Lewis index
Size of residuals	SRMR	0.082	Standardized root mean squared residual
	CD	0.161	Coefficient of determination

A Chi-square p value less than 5%, Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI) close to 0.95 (Hu & Bentler, 1999), a Root Mean Squared Error of Approximation (RMSEA) p value of < 0.05 (Schreiber et al., 2006), and a Standardized Root Mean Squared Residual (SRMR) close to 0 indicate good fit. The result in Table 8 satisfies all the recommended thresholds, confirming model fitness (Chi-square p value = 0.000; CFI = 0.980; TLI = 0.933; RMSEA $p < 0.05$; SRMR = 0.082). This leads to the conclusion that the result is reliable.

5. Conclusion

We confirmed that when people find activities inherently satisfying, it has a moderating effect on how motivated they become. However, even though one may expect that working remotely would automatically translate to higher motivation, this was not the case in the pandemic setting. This can be explained by the fact that remote working during the pandemic was externally regulated, and the enforced confinement added to the stress created by the pandemic. Also, for many, working from home

during the pandemic had negative implication for the management of the boundary between home and work.

Result shows that Remote Working intensity (RW) during COVID-19 pandemic has a significant positive impact on Organisational factors (OF). Further, Employee's individual situation (ES) and Basic psychological needs satisfaction (PN) have a significant positive impact on Employee Motivation (EM). Employees individual situation (ES) has a positive association with employee motivation. Stated differently, developments such as saving commuting time enabled employees to channel their energy and resources to getting the job done while at home (Burell & Morgan, 2019). The study found that remote working during the COVID-19 pandemic prompted the development of certain organisational practices including measures for mental health support for employees. The study concluded that the pandemic increased remote work intensity, and even though the infection rate of COVID-19 has abated, organisations are still open to remote working.

The result that basic psychological needs satisfaction (PN) has a significant positive impact on employee motivation corroborates the self-determination theory of motivation by Ryan and Deci (2000) which suggests that individuals have a natural tendency to grow and to self-organise. The satisfaction of psychological needs enhances the productivity of employees (Mullins & Christy, 2013). Adequate communication and information sharing with employees during the pandemic increased social connection and made them strive for superior performance. Furthermore, providing assurance of job security, work flexibility, income stability and conferring more responsibilities and confidence in employee during the pandemic were associated with increased motivation. Providing adequate training and allowing employees to use their initiative amongst other considerations, will naturally keep employees focused and committed to their job (Chartered Management Institute, UK, 2020).

The significant positive association between organisational factors and the satisfaction of psychological needs (Table 4.10; Model 2) implies that organisations have a responsibility to ensure the satisfaction of the psychological needs of employees. This is especially important during periods characterised by fear and externally induced stress.

6. Strengths and Limitations

One limitation of this study is that it was carried out during the COVID-19 pandemic. The study shows the association among remote working, basic psychological needs satisfaction and employee motivation during a crisis. How this motivation level varied amongst different working classes and demographic groups or the degree to which motivation would change in the post pandemic era remains unclear and should be an area for further study since motivation is not a unitary phenomenon.

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The Mediating Role of Professional Identity among the Teaching Motivation and Career Choice of Students Majoring in Preschool Education in Higher Vocational Colleges

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Abstract: The shortage and loss of preschool teachers have become a common social problem. For practitioners in various industries, professional identity is a necessary basic quality, and it is more necessary for higher vocational colleges to cultivate students' professional identity in teaching. In this study, a quantitative study was conducted to investigate the role of professional identity in teaching motivation, and career choice through a data survey. It is found that the mediating effect is established. At last, the study discusses the research results so as to put forward countermeasures for different subjects.

Keywords: professional identity, teaching motivation, career choice, preschool education

1. Introduction

People's emphasis on educational activities, along with the rapid development of social economy. The preschool period is the cornerstone of life development (Liu & Boyd, 2018), and the early childhood experience is the foundation for future development. As the foundation of educational activities, preschool education has also attracted more and more attention from all walks of life. However, instability in the preschool workforce is a social reality (Gezi & Abd Razak, 2021). This is related to the treatment of preschool education, but more importantly, there is no good professional identity cultivation in the preschool education and training stage.

Students majoring in preschool education in higher vocational colleges are the backbone of preschool education teachers in China, and their career choices as pre-service teachers in preschool education have a very important impact on the stability and prosperity of the preschool education industry. The educational backgrounds of preschool teachers in China have changed significantly since 2010. However, they are still mainly specialized. In 2018, teachers with junior college degrees accounted for 58.25%, 9.93 percentage points higher than in 2010. In 2019, teachers with junior college degrees accounted for 58.49%, 0.24 percentage points higher than in 2018. It can be seen that students majoring in college Preschool Education are still the main supply source of kindergarten teachers in China.

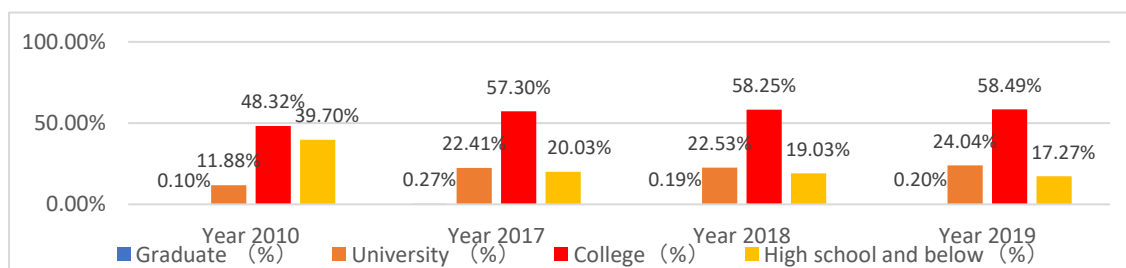


Figure 1. Percentage (%) of Kindergarten Teacher's Educational Attainment, 2010; 2017-2019, China

Therefore, combined with the above background, this study on the relationship between professional identity and teaching motivation and career choice will provide valuable guidance for policy makers and education experts. It is of guiding significance for the development of kindergarten teacher training project.

2. Literature Analysis

Motivation can be explained by the length of time they are willing to keep doing it and how hard they work (Han & Yin, 2016). Motivation usually seen as the energy or motivation that urges people to do certain things (Han & Yin, 2016). The teaching motivation of this paper refers to the internal reasons why students in higher vocational colleges choose to serve as kindergarten teachers. In teacher education research, career choice motivation can be seen as a personal need, which is the core determinant of teachers as a profession (Köse, 2019; Taimalu et al., 2021).

Professional identity refers to a person's professional self-concept based on his or her occupation, beliefs, values, motivations, etc., in the chosen field (John & Eric, 2018). Professional identity has a positive impact on career outcomes (Meijers et al., 2013; Trautwein, 2018).

In addition, the motivation for career choice is also important, such as the quality of learning opportunity utilization, the development of professional competence and teacher classroom behavior (Kunter et al., 2013). The research on teachers' teaching motivation will focus on the motivation of initially choosing teaching as a career (Han & Yin, 2016). Sinclair (2008) defines teaching motivation as what attracts individuals to teach, how long they stay in the initial teacher education course and subsequent teaching career, and the extent to which they are involved in the course and teaching career.

Fokkens-Bruinsma and Canrinus (2012) confirmed that teacher professional commitment is influenced by teacher motivation level. Canrinus and Fokkens-Bruinsma (2014) explained that pre-service teachers show a higher willingness and motivation to give back to the community before becoming trainee teachers. Lin et al. (2012) discussed the similarities and differences of pre-service teachers' initial motivation to choose teaching career, teachers' perception of teaching and their satisfaction with career choice between Chinese and American. Low et al. (2017) proposed the difference between "trigger factors" and "driver factors" in Singapore. The results of the study showed the difference, as well as correlation between "triggers" and "drivers".

The choice of higher vocational major is the beginning of one's career choice. Therefore, the choice of preschool education majors in higher vocational colleges is the beginning of their career choices. Teaching motivation has a direct impact on preschool students' career identity and career choice. Sinclair et al. (2006) proposed that the basis of teachers' professional commitment is teaching motivation, but they did not conduct further research on this proposition. Therefore, it has certain practical significance to explore the relationship between their professional identity, teaching motivation and career choice.

3. Data and Methodology

This study used quantitative research strategy, combined with statistical tools to collect data, analysis and measurement of survey results. This study uses teaching motivation as independent variable, career choice as dependent variable, professional identity as a mediating variable. The research model as flow:

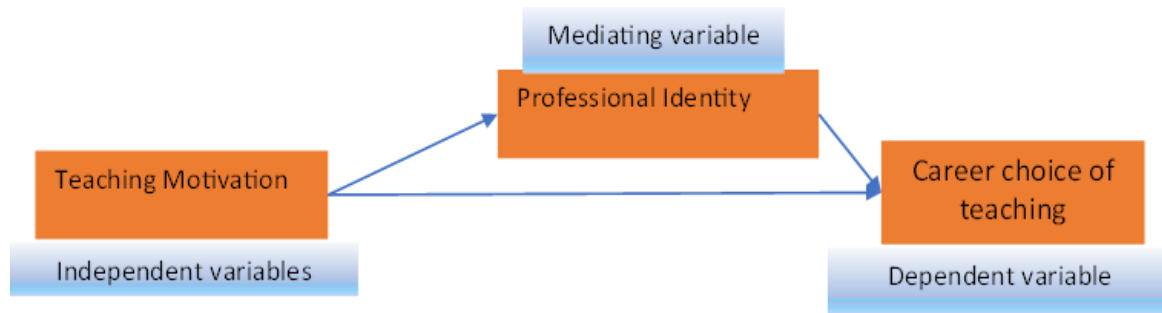


Figure 2. The Research Model

The present study included 630 students majoring in preschool education in higher vocational colleges (from enrollment in 2019 to graduation in 2022) in China. It also used a questionnaire to collect data. The questionnaire for this study has conducted through WJX.CN which is one of the most used survey methods in China. The reliability and validity of the questionnaire were found to be very good after small-scale pre-test.

4. Result

Cronbach α coefficient was tested for the total scale, the reliability of the total questionnaire in this study is 0.983, higher than 0.9, the scale of Teacher motivation is 0.948, the scale of Professional identity is 0.973, the scale of Career choice is 0.964, means that the reliability of the research scale is excellent.

According to the path coefficient, teacher motivation significantly affects professional identity (CR=6.728, $P < 0.001$), and professional identity significantly affects career choice (CR=15.315, $P < 0.001$). Meanwhile, teacher motivation has no significant effect on career choice.

This study mainly selects the PROCESS plug-in developed by Hayes for SPSS software to test the mediating effect of observable variables (Hayes & Rockwood, 2020). This study involves the detection of professional identity that mediates teaching motivation and career choice. In specific operations, professional identity corresponds to M, teaching motivation corresponds to X, career choice corresponds to Y. Then, for the mediating effect of M between Y and X, Model 4 mediating model is selected with confidence interval of 95% and bootstrap 5000 times for testing. After bootstrap 5000 times, the lowest value and the highest value do not contain 0, indicating that the mediation effect is significant and verifying the research hypotheses.

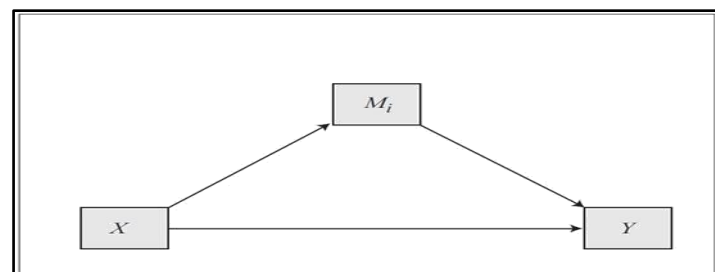


Figure 3. The Model 4

Table 1. Mediation Effect Analysis Table

X	Y	Total effect	se	t	p
Teacher motivation(X1)	Career choice	0.795	0.029	26.789	<0.001
		Direct effect			
Teacher motivation(X1)		0.145	0.029	4.894	<0.001
		Indirect effect(s)	BootSE	BootLLCI	BootULCI
Teacher motivation(X1)		0.650	0.038	0.574	0.724

According to the structural model path analysis and mediating effect analysis, teacher motivation (X) has no significant impact on career choice (Y), but there are indirect effects. Therefore, professional identity (M) plays a completely mediating effect on teacher motivation (X).

5. Discussion

Previous studies have shown that teaching motivation can positively influence the career choice of teachers. Preschool Education students tend to recognize the social value of kindergarten teachers' careers and want to make social contributions, serve society and give back to society through teaching (Kyriacou & Kunc, 2007; Liu & Qi, 2006). Although early motivation can influence the career choice of a teacher, it does not predict the long-term maintenance of enthusiasm for teaching (Watt & Richardson, 2012). Ushioda (2011) points out that teaching motivation is affected by several situational factors. Professional identity plays a mediating role in the influence of teaching motivation on career choice.

6. Recommendation

The learning motivation expected by modern elite education should come from individuals themselves, from discovering their own interests, endowments, and aspirations, to recognizing the development trend of disciplines and social needs, and then pointing to the noble and great value in human civilization. This gradual interest cultivation process is in essence a process of individual self-improvement and identity construction. In the stage of higher vocational education, individual interests and aspirations tend to be stable, and gradually begin to form expectations for future careers. Higher vocational education and teachers should strive to promote students majoring in Preschool Education to turn their interests into aspirations.

Empirical research results show that whether Preschool Education is the first choice and the mode of enrollment has a positive impact on professional identity and career choice. From the previous research results, it can be seen that teaching motivation affects career choice through professional identity. Therefore, students majoring in Preschool Education should actively participate in professional learning, strengthen their professional identity and improve their willingness and choice to engage in education. In actual teaching activities, it can be found that a large part of preschool education majors lacks sufficient understanding of preschool education itself or have a very big prejudice against preschool education. Due to the shortage of professional knowledge, students are negative in the professional learning process. And the lack of confidence in career development prospects has severely restricted their enthusiasm for engaging in preschool education. The study found that students who receive higher education or learn more about professional knowledge have a significantly higher recognition of preschool education activities than students who are new to higher vocational colleges. It shows that the cultivation of professional knowledge is of great significance to the cultivation of career identity, so high vocational colleges must pay attention to the professional training of students majoring in preschool education.

Vocational colleges must strengthen the teaching of professional knowledge education and professional awareness in the school education period, so that students can fully understand their own work responsibilities and social responsibilities and stimulate students' enthusiasm for learning. In the process of teaching, higher vocational colleges not only need to do a good job in school teaching, but also help students get more practical opportunities through cooperation with nursery schools, so that the students in practical activities can achieve a more comprehensive understanding of the preschool education profession, deepen students' awareness of preschool education activities, cultivate their strong sense of career belief, and ensure that they can actively participate in preschool education activities.

At present, the advancement of preschool education is very limited. The development of preschool education curriculum design in higher vocational colleges cannot meet the requirements of The Times,

and the methods of training talents are out of line with the progress of The Times. Over-emphasis on theoretical teaching makes school education seriously out of line with social needs and cannot improve students' practical ability. School education activities cannot let students quickly understand the current needs of early childhood education, early childhood education students are bound to face enormous pressure and heavy blow at the beginning of employment, which will inevitably have a huge negative impact on their subsequent careers. Hence, higher vocational colleges must design professional courses, absorb more modern teaching concepts, vigorously update the theoretical knowledge system of preschool education, vigorously improve the professional quality of students, and incorporate more practical activities into teaching among them, so as to help students adapt to preschool education activities more quickly.

7. Conclusion

The training of students majoring in preschool education is related to the training of the next generation. Therefore, it is necessary to strengthen the training of preschool education students' professional identity, starting from the students' professional identity, improve the professional quality of the entire preschool education industry, train more talents for the development of the industry, so as to effectively promote preschool education to a more professional road.

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The Effect of Online Retail Services and Website's Brand Equity on E-Loyalty in Vietnam

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Abstract: As competition becomes increasingly fierce, consumer "loyalty" is a significant factor in the success of online retail websites/ businesses. This study proposes a model with three factors of online retail service developed based on the research of Parasuraman et al. E-SERQUAL model. Those factors include product quality, electronic service quality, and electronic recovery service quality. These factors impact online customer loyalty through a mediator that is perceived value. This mediating variable has been studied in many other fields and investigated in online retailing of this study and it is confirmed to be significant. In addition, brand equity is also a factor proven to impact loyalty. The model was analysed with PLS-SEM software using primary data from 398 online consumer responses in Vietnam. The results confirm that the proposed model is consistent with the actual data. Thus, some new findings are accepted which are the separation of the factors of online retail services and the recognition of the role of brand equity with online loyalty. Finally, some implications are given to help the retail website' managers build solutions to improve loyalty for online consumers.

Keywords: online loyalty, brand equity, perceived value, E-SERQUAL

1. Introduction

Online retail websites or businesses in Vietnam now must compete with both other companies and the sale channels through social networks such as Facebook, Zalo, and Instagram. However, professionalism is still poor in the form of business via social media. According to VinaResearch statistics, 95.8% of people have purchased via social media; however, 48.1% of buyers say they have been deceived. Therefore, doing business through professional websites is still the proper direction for corporations today. As in the traditional retail market, competition in the online retail market is becoming increasingly fierce. In this market, consumer "loyalty" is an extensive element in the success of online retailers. The consideration of business entities for the provision of online services shows that if the services are provided properly, they can increase online customer loyalty in a more appropriate manner (Anser et al., 2021). Thus, the final meaningful goal that retail sites need is consumer loyalty because the cost to find new customers will be 05 times that of maintaining an old one (Kotler & Armstrong, 2012). Another study also cited that increasing the loyalty rate by up to 5% could increase profits to 85% (Li et al., 2015).

Previous studies have explored the different findings of online retail service quality that affect consumer loyalty through various intermediary variables. In general, the researchers have paid more attention to the satisfaction and trust of online shoppers; however, the investigation of online shopping loyalty still needs to be strengthened (Giao et al., 2020). Loyalty research in the context of online retail in Vietnam is no exception to the demands of new trends that look for other more variables that appropriate the context. Specifically, there are two documents directly studying loyalty. First, the research of Giao et al. (2020) still focuses too much on the factor of trust. Second, Chi n and Thanh (2017) considered conversion costs an intermediate variable in B2C retail, it may not be appropriate since this is often a meaningful intermediate variable in research models with B2B contexts or service sectors such as banking and telecommunications (Karlsen, 2008; Samudro et al., 2018).

This study brings together factors of online retail services affecting customer loyalty. The model is built including independent variables and a mediating variable suitable to the Vietnamese market context. In

the model, *perceived value* is inherited as a mediator connecting the factors of online retail services with *loyalty* (Jiang, Jun, & Yang, 2015; Parasuraman, Zeithaml, & Malhotra, 2005). Under highly competitive pressure from the market, brand equity is a variable that has increased importance and is considered by some of the above documents (Bhuanaputra & Giantari, 2020; Quan et al., 2020). Therefore, the model will take advantage of this new trend by adding a variable that impacts loyalty: *brand equity*. In addition, concerning online retail services, among three independent variables, there are two variables inherited from the E-Ser-Qual of Parasuraman et al. (2005): *e-service quality* and *e-recovery service quality*. *Product quality* is the third independent variable that appeared because the author found grounds showing the need to separate this variable from the two independent variables above. For customers, the quality of received product has a critical impact on whether they continue to buy products from businesses/e-commerce websites. The research model with a new structure, innovative variables, and some new scales is tested by primary data that is highly up to date in the current Vietnamese context. The analysis results on SPSS and Smart-PLS recognize the statistical significance of the scales, relationships, and variables for the proposed model.

2. Review of Literature and Hypothesis

2.1 Online Consumer Loyalty (LY)

In the context of increasingly competitive online business, customer loyalty is appreciated by entrepreneurs (Ting et al., 2020). Vietnam's online retailers are no exception, and gaining loyal customers is crucial for retail brokers because it is a meaningful driver of e-commerce success. Generally, in the online business context, four levels of loyalty apply to customer buying behavior (Hur et al., 2011). The first level is online customers who like the site (cognitive phase) and can develop the second level of positive attitude towards it (emotional stage). For the conative level, the consumer is expected to revisit the website and find the most favoured product available, but not necessarily engage in purchasing behavior. Finally, the highest level of loyalty occurs at the action phase, where the customer is ready to revisit the website and purchases the product online. Other than approaching the concept of loyalty by level, a more appropriate definition is online loyalty is the emotion or attitude that promotes positive memory and thus prompts customers to revisit the site for information, communication, or entertainment purposes or to buy back specific products or services from an online website (Li et al., 2015). Loyalty is generally associated with repeat buying behavior (Jeon & Jeong, 2017; Petcharat & Leelasantitham, 2021; Rao et al., 2011) and in some cases, may also manifest itself in other behaviours such as good word of mouth about the online retailer's products and services (Parasuraman et al., 2005; Petcharat & Leelasantitham, 2021; Rita et al., 2019).

2.2 E-Perceived Value (PV)

Perceived value is the customer's overall assessment of the product benefits based on the perception of what is received and what costs are lost (Zeithaml, 1988). Perceived value directly affects online consumer loyalty (Parasuraman et al., 2015; Tsao et al., 2016). In this paper, we will test these relationships with primary data in Viet Nam context recently. So, hypothesize is:

H1: Perceived value has a positive effect on online consumer loyalty.

2.3 Website's Brand Equity (BE)

E-brand equity refers to whether consumers can get acquainted with, recall, or recognize a brand or simply if they know it (Le et al., 2018). It is difficult to change customer loyalty to a website they are happy with, so, the site brand will remain a constant priority in their search list (Saglam & Jarrar, 2021). Some previous studies also confirmed that the brand equity of the website perceived by consumers affects their loyalty (Le et al., 2018; Quan et al., 2020); Therefore, the hypothesis in the proposed model of this study is:

H2: The brand equity of the retail websites has a positive effect on online consumer loyalty.

2.4 Factors of Online Retail Services

2.4.1 Product Quality (PQ) on the Website

Quality is the intrinsic attribute of the product. Some consumers consider product quality to be their first consideration when shopping online. Improving the quality of products positively influences consumers' perceived value demonstrated through traditional consumer shopping (Uzir et al., 2020). This correlation has not been mentioned by any research in the context of online business. Therefore, this study will develop and verify the above relationship regarding online retail via websites in Vietnam. The proposal hypothesis is:

H3: Product quality has a positive influence on online consumers' perceived value.

2.4.2 Electronic Service Quality (ESQ)

The study by Parasuraman et al. (2005) clearly distinguishes two groups of scales: the electronic service quality scale (E-S-Qual) and the electronic recovery service quality scale (E-Res- Qual); this paper uses the shorter notation to replace ESQ and ERSQ. ESQ involves four dimensions; efficiency, order fulfilment, system availability, and privacy, and ERSQ measures three dimensions: responsiveness, compensation, and connectivity. In the literature that follows, some documents inherit the distinction between ESQ and ERSQ (Ulkhay et al., 2017; Zehir & Narcıkara, 2016) but some studies go in the direction of pooling two groups of scales of a system (Rita et al., 2019). In the online business context of Vietnam, it is easy to find many prestigious and mainstream online newspapers that have reflected the situation of consumers who have many cases of poor product quality. Therefore, the need to return goods or other dimensions of ERSQ are critical issues to be considered separately. In this study, the author advocates the separation of two groups of scales corresponding to two independent variables ESQ and ERSQ for the expected research model.

Many studies offer different electronic service quality concepts. A typical definition: e-services quality is the overall assessment and judgment of customers regarding the excellence and quality of e-services provision in the virtual market (Ojasalo, 2010). The Parasuraman et al. (2005) definition is accepted and inherited by a lot of research: the quality of electronic services is the degree to which a website facilitates and effectively distributes products and services. Some studies confirm the link between ESQ and customers' perceived value in the context of online retail in developed markets (Parasuraman et al., 2005; Tsao et al., 2016). In the context of the online retail market in Vietnam, although there is a strong growth rate, yet still at a low level, the relationship between ESQ and the perceived value needs to be re-verified. Therefore, the next hypothesis is:

RH4: Electronic service quality has a positive influence on the perceived value of online consumers.

2.4.3 Electronic Recovery Service Quality- ERSQ

Parasuraman et al. (2005) interpreted three dimensions of e- recovery service quality: (1) Responsiveness: effectively handle issues and return goods through the site; (2) Compensation: the extent to which the site compensates customers for problems; (3) Contact: be available by phone or online representative. Thus, ERSQ is concerned with the issue of returning goods, refunds, and other assistance and advice to customers when exchanging goods and resolving arising issues. These activities are meaningful in helping e-commerce brokers foster relationships with customers. ERSQ affects the perceived value of online customers, as proved by several studies (Parasuraman et al., 2005; Tsao et al., 2016). In the context of this study, return goods and compensation issues should be considered in combination. So, in our proposed model, the ERSQ variable has only 2 dimensions: returns and compensation; contact. The final hypothesis of this study is:

H5: Electronic recovery service quality has a positive influence on the perceived value of online consumers.

The set of hypotheses forming the proposed research model is presented in the figure 1.

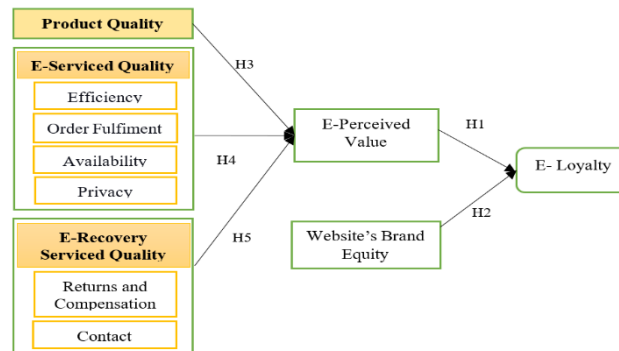


Figure 1. The Proposed Research Model

3. Research Methodology

3.1 Measures

In the main content of the questionnaire, based on several previous documents, we select the measurement items for each concept (or each implicit variable) of the model. A factor is reliable if it has three or more measurement items (Stevens, 2012). The list of developed measured items (Table 2) satisfies this requirement. The author inherited the loyalty scale from many previous studies (Amin, 2016; Jeon & Jeong, 2017; Otim & Grover, 2006; Parasuraman et al., 2005; Rao et al., 2011). In addition to the five inherited measurement items, based on the fact of thriving today's phone applications, the author added a new item encoded LT3.

From the synthesis of some documents with homogeneity or intersection of scales, E-Perceived Value includes four items (Jiang et al., 2015; Parasuraman et al., 2005) and the Website's brand equity also consists of four items (Agmeka et al., 2019; Quan et al., 2020). In the model, ESQ and ERSQ are second-order factors. Inherited from the research of Parasuraman et al. (2005) and some subsequent documents, the items of ESQ, ERSQ dimensions are on table 2. ESQ scales are divided into four dimensions which are also four first-order factors: effectiveness, availability, order fulfillment, and privacy. ERSQ scales are classified into two dimensions which are also two first-order factors: returns and compensation; customer connection and support activities. The measurement items for retail *product quality* via the websites should be associated with the online business characteristic. The author developed four items based on the research (Ahn et al., 2004; Hult et al., 2007; Ziaullah et al., 2014).

3.2 Data Collection

To use PLS-SEM tool, Hair et al. (2014) suggested that the minimum sample size should be in the ratio of 5:1 (i.e., five observations per item). The model of this study has 43 items for six latent variables. To give a more statistically significant regression, the author uses the actual sample size of this study of 398, which is much higher than the minimum given by Hair et al. (2014). The simple random sampling method is not repeated. The survey subjects are consumers who have purchased online through retail websites in Vietnam. Data collection is conducted entirely through the online questionnaire. After collecting the summary table and eliminating the defective answers misinterpreted by the respondents, the valid sample was 398 units with the characteristics shown in Table1. The characteristics of the sample illustrate that the proportion of young customers under 25 or students is higher than in other

groups. It is logical because they are Z generation people, and online shopping is becoming increasingly popular among people of this generation (Veybitha et al., 2021).

Table 1. Respondents Profile (n=398)

Characteristics	Category	Frequency	%
Gender	Male	137	34.4
	Female	261	65.6
Occupation	Student	144	36.2
	Staff-Teacher	121	30.4
	Engineer	37	9.3
	Manager	38	9.5
Age	Others	58	14.6
	< 25	194	48.7
	25 to <40	115	28.9
Income (VND)	≥ 40	89	22.4
	< 10	239	60.1
	10 to <20	107	26.9
Frequency of purchase	≥20	52	13.1
	1-3	116	29.1
	4-6	68	17.1
	7-9	39	9.8
	≥10	175	44.0
Total		398	100.0

3.3 Statistical Analysis

3.3.1 Evaluation of the Measurement Model

Based on the proposed research model, the study implements EFA according to the guidelines of Hair et al. (2014). EFA analysis was conducted for many groups: the first group includes 4 first-order variables of ESQ, the second group includes 2 first-order variables of ERSQ, the third group includes factors affecting PV, the fourth group with two variables (BE and PV) affecting LY. Performing EFA analysis by Promax rotation with Kaiser Normalization yields the results summarized in table 2. Factor loading is an indicator to ensure the practical significance of EFA that under this condition Factor loading is ≥ 0.5 (Joseph F Hair, Hult, Ringle, & Sarstedt, 2017). EFA results show that all factor loadings are more than 0.5, items all have practical significance. It is a significant basis for continuing to study the relationships in the proposed research model.

Table 2. Constructs and Indicators of the Model

Constructs and indicators	EFA Loading	Outer Loading	Mean	Std.
<i>Product quality (PQ)</i> Cronbach's Alpha =0.837				
The products offered are varied.	0.514	0.831	4.842	0.975
The quality of the product is precise as presented on the websites.	0.942	0.874	4.530	0.990
The rate of defective products is low.	0.913	0.856	4.540	1.000
There are many supplier options for the product you want to buy	0.647	0.734	5.191	1.013
<i>Electronic service quality (ESQ)</i>				
<i>Efficiency (EF)</i> Cronbach's Alpha = 0.929				
I can easily access all services and search for things according to my interests and needs on this site.	0.953	0.837	5.279	0.901

Trading on this site is easy and fast.	0.945	0.892	5.329	0.883
The information on this website is complete and meaningful: helps customers understand and compare...	0.814	0.869	5.141	0.892
This site navigates, making recommendations tailored to my needs	0.823	0.843	5.018	0.964
This site offers a variety of options for customers, including payment and shipping.	0.759	0.873	5.294	0.942
This site is well organized.	0.688	0.840	5.113	0.952
<i>Availability (AV)</i>	Cronbach's Alpha = 0.925			
I can always access this website.	0.877	0.911	5.402	1.081
This site loads and interacts quickly.	0.941	0.955	5.211	1.109
This site loads quickly, without errors.	0.948	0.932	5.043	1.120
<i>Fulfillment (FU)</i>	Cronbach's Alpha = 0.925			
This site provided the order as promised.	0.890	0.909	5.106	0.991
Fast delivery time, within the timeframe of the order, was convenient for me.	0.885	0.883	5.131	0.995
This site sent the correct item and quantity on order.	0.946	0.930	5.156	0.979
Packed well, the shipments I received were undamaged.	0.877	0.892	5.090	0.982
<i>Privacy (PR)</i>	Cronbach's Alpha = 0.915			
This site does not share my personal information with other retail sites.	0.906	0.921	4.829	1.017
This site protects my credit card information.	0.889	0.927	4.937	0.990
This site protects information about my online shopping behavior.	0.941	0.925	4.927	0.997
<i>Electronic recovery service quality (ERSQ)</i>				
<i>Returns and Compensation (RE)</i>	Cronbach's Alpha = 0.930			
This site provides customers with convenient options for returning goods.	0.914	0.882	4.812	0.948
This site handles product returns well.	0.894	0.893	4.769	0.990
This site offers good guarantees.	0.835	0.881	4.915	0.921
This site tells the customer what to do if the transaction is not executed.	0.776	0.857	4.912	0.909
This site compensates customers for problems caused by it.	0.870	0.899	4.671	1.009
Customers are compensated when orders do not arrive on time.	0.813	0.752	4.319	1.136
<i>Contact (CO)</i>	Cronbach's Alpha = 0.853			
The website provides a phone number for customers to contact.	0.683	0.852	4.766	0.995
The website is always ready to receive customer comments by online service means (such as chat windows).	0.946	0.893	4.992	1.000
The site offers the possibility to speak to a person directly if there is a problem.	0.942	0.893	4.837	1.048
<i>E-Perceived value (PV)</i>	Cronbach's Alpha = 0.897			
Using this website gives me an economical benefit.	0.940	0.805	4.646	1.047
The overall service quality of using this website is higher than I expected.	0.865	0.902	4.719	0.976
The extent to which the website gives me a feeling of being in control.	0.814	0.886	4.930	0.917
The overall value I get from this site is higher than my effort.	0.828	0.899	4.807	0.984
<i>Website's brand equity (BE)</i>	Cronbach's Alpha = 0.918			
This website is attractive	0.805	0.882	5.176	0.922
This website is well-known	0.995	0.909	5.425	0.980

I can easily remember the image and name of this website.	0.962	0.901	5.430	0.973
This website arouses my sympathy for online shopping.	0.765	0.890	5.191	0.985

Evaluating the measurement model using Smart-PLS software, we also obtained positive results. Regarding Outer Loading, if this coefficient is greater than or equal to 0.7 then the item is qualified (Hair et al., 2017). The analysis results (Table 2) indicate that all items were built to meet this standard. Regarding item reliability, this property is evaluated through two primary indicators, Cronbach's Alpha, and Composite Reliability. Reliability is ensured when Cronbach's Alpha is ≥ 0.7 , Composite Reliability CR is ≥ 0.7 (Hair et al., 2017). The results of the Construct Reliability and Validity coefficients obtained are satisfactory, so the reliability of the scales is guaranteed. The evaluation of convergence was based on Average Variance Extracted (AVE). A scale reaches a convergence value if the AVE reaches 0.5 or more (Joseph F Hair et al., 2017). The AVE coefficient results obtained are satisfactory. Hence, the model meets the convergence standard. About discriminant, the obtained Discriminant Validity coefficients also show that the model ensures differentiation (Fornell & Larcker, 1981). In addition, the study by Hair et al. (2017) cited that the value of the distinction between two potential variables is ensured when the HTMT is below the strict threshold of 0.85, and the analysis results of the model all meet this standard.

3.4 Structure Model

Table 3. Path Coefficients

Correlation	Original Sample (O)	P Values
BE -> LY	0.392	0.000
ERSQ -> PV	0.250	0.001
ESQ -> PV	0.276	0.000
PQ -> PV	0.203	0.005
PV -> LY	0.365	0.000

In Table 3, all P-values are <0.05 , so the impact relationships in the model are statistically significant. Thus, the hypotheses that the model has set are confirmed. When the dependent variable is loyalty, the most meaningful impact variable is *brand equity* with the highest coefficient (0.392), followed by the variable of *perceived value* (coefficient 0.365). The coefficient of multiple R (R^2) is 0.461 means that these two variables explain 46.1% of the variation of the dependent variable of loyalty, which represents a good correlation (Trọng & Ngọc, 2017). Regarding the impact on the mediator *perceived value*, there is a slight difference in the influence in the downward order of ESQ, ERSQ, and PQ with the coefficients 0.276, 0.250 and 0.203 respectively. The R^2 coefficient of 0.402 has explained that 40.2% of the variation of customers' perceived value is due to factors of online retail service. This ratio allows for evaluation of the correlations at the average level (Trọng & Ngọc, 2017). Regarding the Structural Model, the results of running bootstrapping at the 5% significance level are presented in Figure 2. The results indicate that the proposed hypotheses are accepted.

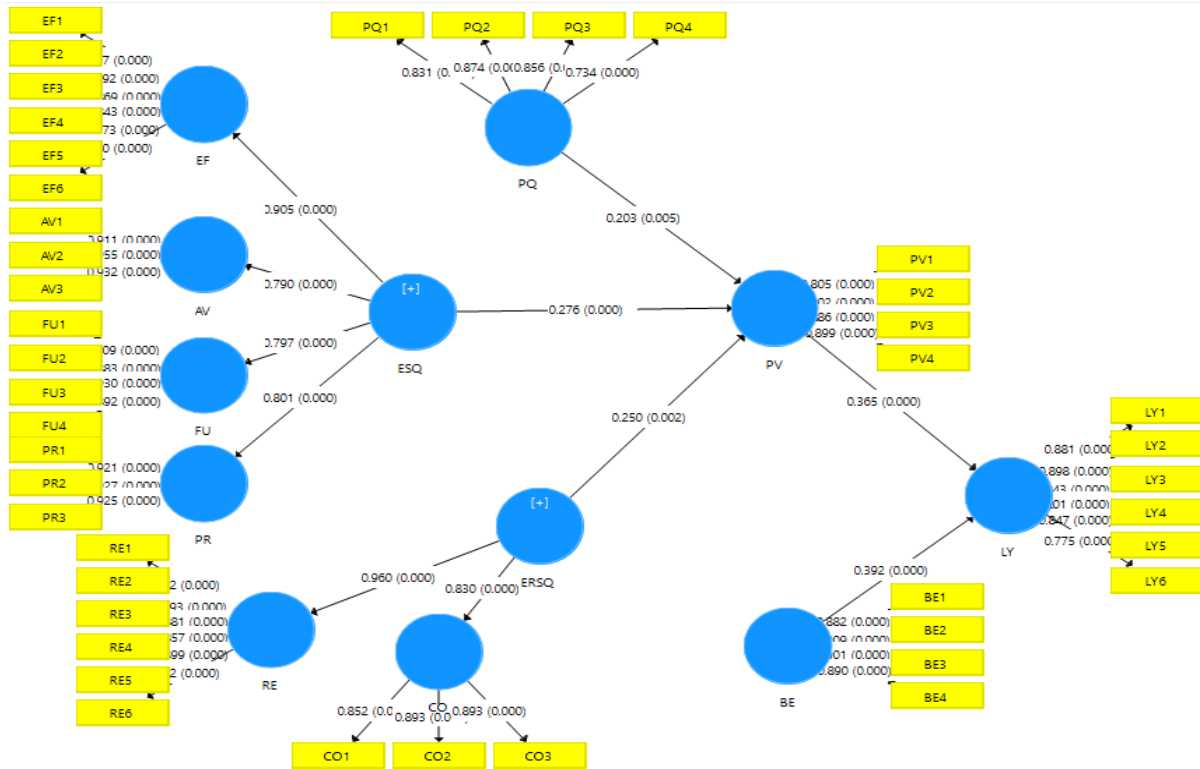


Figure 2. Diagram of the Structural Model

4. Discussion and Implications

The research results confirm the mediating role of *perceived value* to customer loyalty in the e-commerce business environment, it is consistent with the return of this variable in a few recent studies (Molinillo et al., 2021). In addition, *brand equity* influences *loyalty* in other contexts, such as online hotel booking services (Bilgihan, 2016) and our study confirms this relationship is also significant in the context of online retail.

The impact of three factors of online retail services has been confirmed to be reasonable and distinct from previous studies (Rita et al., 2019). Compared to traditional shopping, product quality issues are more significant in online shopping markets (Li et al., 2015), so the first variable of *product quality* is separated in this study. The role of this factor is to make e-commerce brokers aware of the importance of product quality in online retail. At the same time, the items for the product quality factor are other new points in the study that have also been confirmed as meaningful and accepted.

In exchange for e-commerce, customers cannot directly feel the product but can only feel it through the behavior and information provided by the sales enterprises. The fact that customers receive products as expected will have a positive influence on businesses selling e-commerce products and products/websites. The second implicit variable of online retail services is *electronic services quality*, which is still a foundational variable that promotes customer loyalty, consistent with the findings of some recent studies (ER et al., 2021; Zehir & Narcikara, 2016). The third implicit variable of online retail services is *e-recovery service quality* that is also separated from the *quality of electronic services*, which is different from many previous studies (Nanis Susanti et al., 2013; Rita et al., 2019). The impact of *e-recovery service quality* on *perceived value* is significant, which proves that the reason for separating the factors is relatively reasonable. Customers pay more attention to the return - refund policy and consulting - connecting services. With the return of goods, although this is a problem that brings many disadvantages to the seller, in the long term, it is necessary to seriously consider this policy to be able to maintain a good relationship with the buyer (Bower & Maxham, 2012). In case of any order problems,

the seller needs to actively call customer service (Ramanathan, 2011) with specific actions such as soothing, customer care, providing more information, implementing promotions.

5. Conclusion

The study has developed a model that synthesizes factors affecting customer loyalty to online retail services. Succession from E-S-Qual of Parasuraman et al. (2005) mainly, variable that directly impacts customer loyalty is *perceived value*, and the new variable in the online retail context (*brand equity*) are accepted. Some of the variables or items that make up the latent variables are developed or newly built following the market signs that have been recognized meaningfully in this study. From the above new point of view, the study makes a significant contribution to both theory and practice, suggesting to the administrator of the e-commerce websites some issues of concern to have the right policies, strategies, and management measures.

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Improving Job Satisfaction for Lecturers of Public Universities in Hanoi City

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Abstract: Lecturers has a pioneering role in innovation of higher education management. Job satisfaction of lecturers is an important factor and contributes significantly to the effective improvement of the education system. When lecturers feel satisfied, they are more likely to be creative, innovative, and initiate the breakthroughs that can increase their job performance. Evaluating the job satisfaction of lecturers is a fundamental step for universities to improve their quality. It also supports creating policies to attract and retain qualified lecturers. The aim of this study is to explore the factors affecting job satisfaction and propose several solutions to improve job satisfaction of lecturers. The study conducted a survey of 223 lecturers at 10 universities in Hanoi city. The results show that the satisfaction of lecturers is influenced by incomes, development opportunities, job characteristics and facilities. Specifically, incomes have the strongest impact on lecturer job satisfaction while facilities have the smallest impact on lecturer job satisfaction. The research on factors affecting job satisfaction of lecturers helps universities to develop appropriate policies in order to maintain and develop lecturers, as well as attract talent.

Keywords: job satisfaction, influencing factors, lecturers

1. Introduction

An important factor that determines the success of the university education system is the quality of lecturers who teach and research. Job satisfaction of lecturers is an important factor in improving the quality of researching and teaching as well as the quality of the education system. According to the theory of management science, employees' job satisfaction is based on the expectations of work results and these expectations depend on factors such as the nature of work, salary, benefits, promotion opportunities, management strategy (Duong Minh Quang, 2018). Hoppock (1935), job satisfaction is a combination of psychology, physiological circumstances and working environment, affecting employees during job performance. Spector (1997), job satisfaction is demonstrated as employees feel like the work they are doing, and they understand all aspects of their work. Job satisfaction is generally considered to be an emotional state caused by the employee's evaluation and attitude in the process of performing work or the returns from the job (Duong Minh Quang, 2018). If employees perceive these factors as positive, employees tend to do better work results. In addition, job satisfaction directly affects the productivity, attitude and working spirit of lecturers. When lecturers are satisfied with their work, they will be more engaged and devoted to their work (Spector, 1997).

Renovation of higher education management is a breakthrough, in which scale development must go hand in hand with education quality assurance. Lecturers have a pioneering role because the quality of higher education is always associated with the quality of lecturers (Hughes, 2006). Evaluating the job satisfaction of lecturers is a fundamental step for universities to improve the quality as well as attract and retain qualified lecturers. Therefore, understanding and properly evaluating the job satisfaction of lecturers is extremely important to the success of a university (Marzuki, Permadi, & Sunaryo, 2012). The job satisfaction of employees is based on expectations about job results and these expectations depend on factors such as the nature of the job, salary, benefits, promotion opportunities, management strategy, management (Duong Minh Quang, 2018).

Currently, the primary challenge in many universities in Hanoi is having enough highly qualified lecturers to sustain and develop the quality of training. Qualified lecturers who are well-trained and have good skills, are able to receive many good job opportunities. The shortage of qualified teachers

seriously affects the quality of training. The question of retaining and attracting qualified lecturers is interrelated in universities (Do Thi My Trang, 2019). Therefore, measuring the job satisfaction of lecturers is one of the fundamental steps to evaluate factors and find appropriate solutions. This article evaluates a number of factors affecting satisfaction, thereby helping to improve job satisfaction of lecturers of public universities in Hanoi city.

2. Literature Review

Job satisfaction is one of the most widely discussed issues in organizational behaviours and human resource management. There are many different definitions of job satisfaction. Specifically, Hoppock (1935) provided that job satisfaction is a combination of psychological, physiological and environmental circumstances which make a person feel satisfied with their work. Herzberg (1959) studied employee satisfaction and believed that it is workers' contentedness with their work or their effort to keep working. Smith (2007) pointed out that work plays a central role in many people's lives and job satisfaction is an important component in the overall happiness of employees. Lee (2007) defined job satisfaction as a state in which employees can feel and be contented when performing work with clear objectives and effective directions. He also provided that job satisfaction is influenced by three factors including expected value, working facilities and treatment of organizations.

Job satisfaction is an attitude towards one's job and it is basically the affective, cognitive and evaluative actions towards their job. Due to the popularity of job satisfaction within the field of occupational and organizational psychology (Spector, 1997), various researchers and practitioners have provided their own definitions of what job satisfaction is. Nonetheless, the two most common definitions describe job satisfaction as: "the pleasurable emotional state resulting from the appraisal of one's job as achieving or facilitating the achievement of one's job values (Spector, 1997); and "the extent to which people like (satisfaction) or dislike (dissatisfaction) their jobs".

Satisfaction can be understood as a state or feeling of one person coming from comparing value received from using a product/service with their own expectations. The level of satisfaction depends on the difference between received value and expectations. If the received value is lower than expected, the user is discontented and vice versa. The concept of satisfaction is unstable and difficult to quantify. Particularly, in the same working condition, the satisfaction level of each individual is different. With each individual, the level of satisfaction may vary in specific moments and depends on other subjective or objective factors. When workers are satisfied with their work, they will work hard and effectively. Struggles, conflicting opinions, and even silence might sometimes imply workers' dissatisfaction. Generally, job satisfaction is presented by contentedness with work, commitment with organizations, feeling proud of the organizations.

In education, Mussie (2012) conducted a study to examine job satisfaction of university lecturers' and pointed out 5 factors affecting job satisfaction: salary and fringe benefits, supervisors, relationship with colleagues, working environment and job characteristics. In Vietnam, the topic of job satisfaction is also mentioned in researchers and conducted studies. Specifically, Tran Kim Dung (2005) uses the job description index (JDI) proposed by Smith et al. (1969) to measure job satisfaction in Vietnamese conditions. The study points out factors affecting job satisfaction such as the nature of work, relationship with leaders, training and career path opportunities, relationships with colleagues, salary and benefits. Bui Thi Ngoc (2019) also pointed out that four factors that greatly affect the job satisfaction of lecturers are: facilities; job requirements, income, and development opportunities.

Based on literature review, each study examines different perspectives on the factors affecting job satisfaction of lecturers. Common factors include salary and benefits, working conditions regarding facilities, development opportunities, relationship with colleagues, and job characteristics. In addition, there are several specified factors such as job security, relationship with leaders, training and learning opportunities, communication environment, and organizational supervision. Vietnam is a developing country with slow development, poor financial situation, outdated facilities, primitive technology. Therefore, facilities and equipment are the important material foundation for the effective teaching

process. As a result, job characteristics are examined in this study. Last but not least, it is important for lecturers to have development opportunities regarding profession, academic and skills. Therefore, the fourth factor examined in this study is development opportunities. In short, 4 factors are selected in this study to investigate factors affecting job satisfaction of lecturers including facilities, job requirements, incomes and development opportunities.

3. Method

The study used survey questionnaires to collect data from 230 lecturers of 10 public universities in Hanoi city. From 230 survey questionnaires, 223 valid answers were obtained (accounting for 96.96%). This result shows that the percentage of collected votes accepted for analysis of valid votes obtained after distribution reaches from 30% satisfying the condition (Malaney, 2002).

In this study, the results of factor analysis, extracted variance and Cronbach's alpha coefficient were performed to assess the reliability of 4 factors on job satisfaction of lecturers. According to Hair, Anderson, Tatham and Black, the selection criteria to satisfy the requirements include: factor analysis value ≥ 0.5 ; extracted variance $\geq 60\%$, and Cronbach's alpha coefficient (Cronbach's α) ≥ 0.6 (Hair, 2009). Factor analysis was carried out through SPSS to identify underlying factors that explain the pattern of correlation within a set of observed variables and to simplify and reduce the data to identify a small number of factors that explained most of the variance observed into much larger manifested variables (Malaney, 2002). It was carried with principal component analysis along with orthogonal rotation procedure of varimax for summarizing the original information with minimum factors and optimal coverage. The statements with factor loadings less than 0.5 and eigen values less than 1.0 were ignored for the subsequent analysis (Hair, 2009).

4. Results

4.1 Research Models

From the above overview, it can be seen that each study considers different perspectives on the factors affecting the job satisfaction of lecturers. Common factors include wages and benefits, facility-related working conditions, development opportunities, relationships with co-workers, and job characteristics. In addition, there are a number of specific factors such as job security, relationships with leaders, training and learning opportunities, communication environment, and organizational supervision. The author selected 4 factors in this study to investigate the factors affecting the job satisfaction of lecturers including facilities, job requirements, incomes, and development opportunities.

Facilities: facilities may greatly affect job satisfaction of lecturers in universities as good facilities allow lecturers to develop their capacity, creativity at work as well as avoiding occupational diseases, ensuring physical and mental health in the long term. Facilities examined by Smith (2007), Spector (1997), Locke (1969), Henry (2013), Bui Thi Ngoc (2019) include lecture halls, classrooms, libraries, laboratories, office, teaching and learning equipment, health care and insurance, fire system.

Incomes: income is an important factor determining lecturers' commitment to universities. The criteria for measuring and assessing salary and fringe benefits are examined by Smith (2007), De Witte (2005), Spector (1997), Griffith (2000), Henry et al. (2013), Sharma et al. (2009), Mussie (2012), Hughes (2006) including: policy regime, calculation method of salary, amount of salary received by employees, pay periods, pay rise policy, bonuses, and other benefits that workers receive.

Job requirements: Teaching and scientific research are main tasks of university lecturers. Therefore, establishing regulations and policies related to teaching and scientific research as a framework for the operation of institutions is critical work of universities. In each country, there may be a common framework of regulations which may be adjusted and applied depending on specific characteristics of each university. The factor was mentioned in studies of Bui Thi Ngoc (2019), Henry et al. (2013), Smith (2007), Spector (1997), Rounds et al. (1987). Within the scope of this study, following main contents

are focused: developing training programs, managing and organizing higher education; making a learning plan for the entire course and each academic year, making timetables and teaching schedules, assigning and arranging teachers, arranging classrooms, organizing and marking examinations at the end of subjects and internships, managing student learning and training results, organizing compilation of lectures, curriculum, e-lectures and websites, connecting with companies in the training process.

Development opportunities: Related to the working environment is a broad concept covering what is relevant and directly affecting the activities and capacity development of each lecturer. Lecturers who are given many development opportunities are more likely to commit to their universities. Therefore, it is an important factor affecting the development, quality, and performance of a university. Hughes (2006) agreed that lecturers are concerned about the following issues: opportunities for development, opportunities for improving qualifications, noble titles of lecturers, opportunities to participate in research. The fact is that development opportunities of lecturers depend on each university in which the principal is the determiner. There are many different perspectives such as university culture is the root of development as each university builds its own culture and character emphasizing practical actions, human investment, and development, appreciating individual creativity, listening and selecting. Research of Smith (2007), De Witte (2005), Locke (1969) Rounds et al. (1987), Henry et al. (2013), Mussie (2012), Sharma et al. (2009).

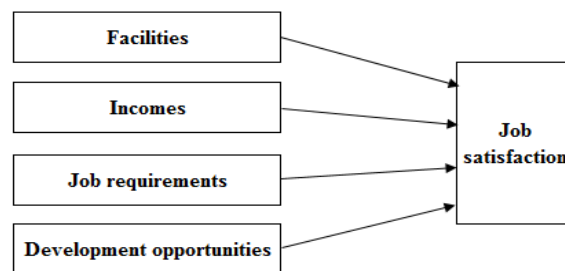


Figure 1. Research Models
Source: Compiled from the author's research

4.2. Research Results

4.2.1 Level of Job Satisfaction of Lecturers of Public Universities in Hanoi City

The results of descriptive statistics to answer the research question are shown in Table 1. This study used a 5-point Likert scale with 1 "strongly disagree" to 5 "strongly agree" respectively. Scale Likert 5 levels, we have a score of 3 as middle, if it's from 3 to 5 (3-5), it means that the respondents agree with the point of view of the given variable. Conversely, if the answer is from 1 to 3 (1-3), respondents disagree with the view of the variable.

Table 1. Factor Analysis, Mean and Standard Deviation on Job Satisfaction of Lecturers of Public Universities in Hanoi

Factors	Mean	Standard deviation
Facilities	3.55	0.923
Job requirements	3.50	0.971
Incomes	3.95	1.170
Development opportunities	3.85	1.063

Source: Compiled from the author's research

As the table results, the mean of the facilities variable is 3.55, the job requirements variable is 3.50, the incomes variable is 3.95, and the development opportunities variable is 3.85. We can see that all variables have the mean value in the range 3.5 to 4.0, so the lecturers agree with the point of view of

the given variable. This means that these factors all affect the job satisfaction of lecturers of public universities in Hanoi City.

4.2.2. Evaluation of the Reliability of the Scale and Exploratory Factor Analysis (EFA)

After collecting the required number of answers, the author cleans up the survey with 223 answers included in the analysis, determining the reliability of the measures by using Cronbach's alpha.

Table 2. Evaluation of the Reliability of the Scale

Describe	Total variable correlation	Cronbach's alpha coefficient
Facilities	0.641	0.876
Job requirements	0.664	
Incomes	0.778	
Development opportunities	0.745	

Table 2 shows that the facilities variable has a total correlation coefficient that is 0.641, the job requirements variable is 0.664, the incomes variable is 0.778, and the development opportunities variable is 0.745. All observed variables have an appropriate correlation coefficient (≥ 0.3) and Cronbach's Alpha coefficient is $0.856 > 0.6$. Thus, the data meets the requirements of reliability. Cronbach's alpha coefficient is $0.876 > 0.8$ which means that the scale of variables is very good

4.2.3 EFA Exploratory Factor Analysis

The purpose of Exploratory Factor Analysis (EFA) is to test the convergence of the component variables on its concept by the convergence validity, and at the same time to measure the discriminant validity to help ensure differences and no correlation between factors used. In this process, observed variables that do not meet the load factor requirements (<0.5) will be removed. The analysis is used by SPSS software version 20 and here are results:

Table 3. KMO and Bartlett's Test Table

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.927
Bartlett's Test of Sphericity	Approx. Chi-Square	1190.307
	df	153
	Sig.	.000

Table 4. Total Variance Explained

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	10.719	59.551	59.551	10.719	59.551	59.551	6.019	33.439	33.439
2	1.402	7.790	67.341	1.402	7.790	67.341	4.534	25.187	58.626
3	1.110	6.168	73.509	1.110	6.168	73.509	2.679	14.883	73.509
4	.779	4.329	77.838						
5	.588	3.264	81.103						
6	.524	2.912	84.015						
7	.460	2.555	86.570						
8	.438	2.434	89.004						
9	.400	2.225	91.229						
10	.282	1.569	92.798						
11	.262	1.458	94.256						
12	.233	1.295	95.551						
13	.183	1.017	96.568						
14	.171	.949	97.517						
15	.137	.760	98.277						
16	.112	.623	98.900						
17	.107	.593	99.493						
18	.091	.507	100.000						

Extraction Method: Principal Component Analysis.

- Load coefficients of all variables are bigger than 0.5 which meet the requirement
- KMO coefficient reaches 0.972 and it is bigger than 0.5, so EFA is appropriate for the data.
- Bartlett's Test has a Sig significance level of 0.000. So, the observed variables are correlated.
- Eigenvalues is 1.110 bigger than 1 which represents the variation explained by each factor, the results of factor analysis are appropriate.
- The result also shows that the cumulative variance is 73.509% (>50%), which explains 73.509% of the variation of the data.

4.2.4 Testing the Influence of Factors to Job Satisfaction of Lecturers of Public Universities

The author uses multiple linear regression analysis on SPSS to evaluate the influence of factors to job satisfaction of lecturers. From Table 5, we can perform the normalized regression equation as follows:

$$\text{Job satisfaction} = 0.382 x \text{ incomes} + 0.367 x \text{ development opportunities} + 0.318 x \text{ job requirements} + 0.303 x \text{ facilities} + e$$

Table 5. Normalized Regression Coefficients Table

Describe	Normalized regression coefficient
1. Facilities	0.303
2. Job requirements	0.318
3. Incomes	0.382
4. Development opportunities	0.367

It can be seen that the income factor has the greatest influence on job satisfaction of lecturers of public universities in Hanoi City. The next factor is development opportunities, job requirements and the last one is facilities. Specifically, when the variable incomes increase by 1 unit (in the condition that the remaining variables do not change), the variable of job satisfaction increases by 0.382 units. When the variable development opportunities increase by 1 unit (in the condition that the remaining variables do not change), the variable of job satisfaction increases by 0.367 units. When the variable job requirements increase by 1 unit (in the condition that the remaining variables do not change), the variable of job satisfaction increases by 0.318 units. When the variable facilities increase by 1 unit (in the condition that the remaining variables do not change), the variable of job satisfaction increases by 0.303 units.

4.2.5 Evaluate Regression Assumptions

Histogram, mean = $-1.76\text{E-}15 = 0.00000\dots$ is close to 0, standard deviation is 0.956 which is close to 1. Thus, it can be said that the residual distribution is approximately normal, assuming a normal distribution of the fractions, balance is not violated.

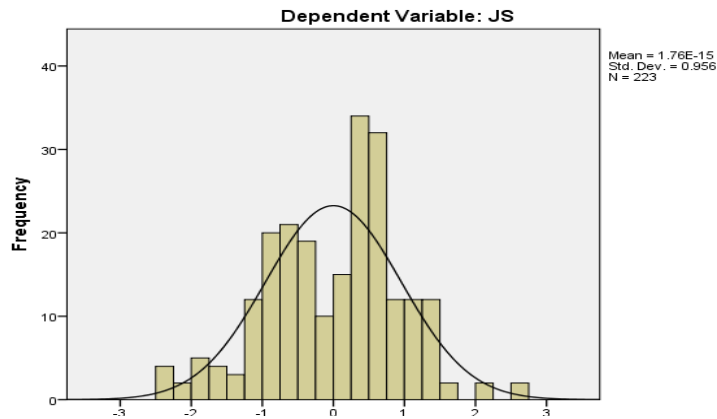


Figure 2. Histogram

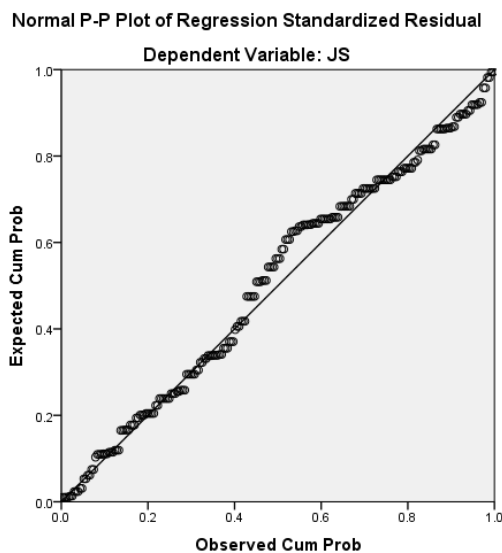


Figure 3. Normal P-P Plot of Regression Standardized Residual

The residual data points are concentrated quite close to the diagonal, so that the residuals have an approximate normal distribution, assuming the normal distribution of the residuals is not violated. The distributed normalized residuals are centered around the zero-coordinate line and tend to form a straight line, so the assumption of a linear relationship is not violated.

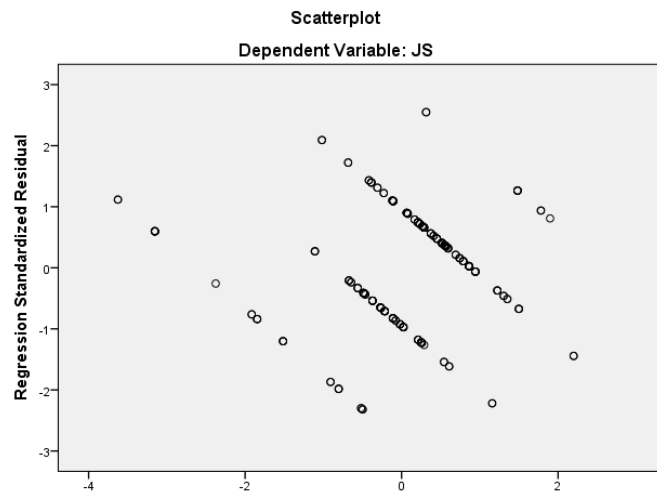


Figure 3. Scatterplot

The results of this study show similarities with previous studies of domestic and foreign authors. Suzanne's research (2018) shows that the satisfaction of lecturers is strongly influenced by income. According to the research team, this is a very important factor because when the lecturers are satisfied with their income, they will rest assured to devote themselves to their work and to the organization. Besides, good career development opportunities are also positive factors that increase the job satisfaction of lecturers (Bui Thi Ngoc, 2019).

The research results showed that incomes have a positive impact on job satisfaction (coefficient = 0.383). This result is consistent with the confirms the results of previous studies of Henry et al. (2013) and Smith (2007). In Vietnamese public universities, lecturers' income is calculated according to the state salary structure so there is no difference in salaries of universities. However, the benefits vary considerably depending on many different factors such as financial capacity, income distribution policy of universities.

The research results showed that Facilities has a positive effect on job satisfaction (coefficient = 0.303). This result is consistent with the conclusions of previous studies of Smith (2007), Spector (1997), and Locke (1969). As Hanoi public universities were established since the 1960s, the classrooms, equipment are outdated and damaged. In engineer and technical universities, laboratory equipment and practical equipment have been funded by the Soviet Union since the 1980s. The factor of development opportunities was removed from the regression model because it was inappropriate with the lowest correlation coefficient (0.368). Many universities encourage lecturers to improve their qualifications by providing time and funds for lecturers to study a Master program or PhD program; regularly organizing classes teaching foreign languages and research methods for lecturers. In addition to the policy of salary and benefits, each university should provide specific regulations on reward, discipline, training, retraining, promotion, appointment, and creating a friendly and cooperating environment among members of the organization. In addition, the leaders should make timely comments and assessments to the lecturers with constructive feedbacks to encourage teachers in performing professional tasks, committing to the educational career. Some recommendations for enhancing lecturers' development are explained as follows: Investing and developing human resources: Many universities focus on training new skills, enhancing knowledge and technology for lecturers, establishing a separate training fund for lecturers.

The research results show that the Job requirements are positively associated with job satisfaction of lecturers, this result confirm the consistent with the results of Smith (2007). This factor has the strongest impact on satisfaction level with coefficient 0.318. The fact is that most Hanoi universities are applying a new system called credit-based training. Depending on the training objectives, each university may adjust accordingly. Furthermore, academic credit system is a flexible training method, facilitating learners to be proactive in terms of time, study plan and selection of subjects and lecturers. The application of academic credit system to training lead to major changes in all aspects of training

including regulations related to training programs, curriculum, lectures, scientific research, and time to enter and exit the class, managing grades, registration, and enrollment of subjects. During the period of 2015-2020, universities are adapting to operate under new training system, therefore, facing many problems. It explains low satisfaction of lecturers. However, it is believed that universities can gain more trust and commitment of lecturers by conducting following activities: Reviewing and completing regulations and policies related to teaching and scientific research Truly considering scientific research as a standard of professional quality in assessment and classification of emulation of officials and lecturers. Organizing training courses for staff, lecturers to improving scientific research knowledge and skills in the following directions: academic training and applied research

4.3. Solutions to Improve Job Satisfaction for Lecturers of Public Universities in Hanoi City

Both public and private educational institutions should ensure the competitive salaries and timely promotions of teachers to make them satisfied and increase their motivation to stay in their profession (Nyamubi, 2017), positively supported by improved working conditions (Yayla et al., 2017). The education stakeholders and policy makers should put in place the appropriate mechanisms that will address the challenges around the attainment of teachers' job satisfaction in Kenya. From the above fact, in order to improve the job satisfaction of lecturers of public universities in Hanoi city need to influence the factors affecting the job satisfaction of lecturers. Specifically, there are four factors: Incomes, development opportunities, job requirements and facilities

4.3.1 Incomes

If the university wants to attract competent people to its organisation, it will have to offer them lucrative compensation and more of financial incentives so that they do not think they are underpaid. The recommendations of sixth pay commission should be implemented. This will improve their overall level of job satisfaction as well as life satisfaction. Universities can improve faculty satisfaction by considering the following policies regarding salary and fringe benefits:

- a. It is necessary to consider increasing salary according to work performance, not rigidly.
- b. Apply according to the regulations of the state salary increase every 3 years.
- c. Develop internal spending regulations in an open direction, depending on the performance of universities each year, develop policies on salary increase, bonus and annual policy adjustment.
- d. Awarding awards, funding to support scientific research, textbooks, articles, and individuals performing excellent projects that bring practical benefits to the university.
- e. Increase welfare spending for officials and employees during holidays, New Year, and leave.

4.3.2 Development Opportunities

Everyone appreciates getting development opportunities. The occasions to share the success of employees with others are almost limitless. The work of meritorious teachers should be given due recognition in the form of publicized recognition and financial and non-financial rewards. Socializing and interacting at personal level could enhance the bonding. This will act as motivating factor for teachers to keep on giving good performance and enhance their level of job satisfaction.

Some of the recommendations to enhance faculty development are explained as follows:

- a. Invest in and develop human resources: Many universities focus on training new skills, improving knowledge and technology for lecturers, and establishing separate training funds for lecturers.
- b. Emphasize personal creativity: popular leaders need to always appreciate and promote creative ideas and lecture suggestions to improve work.
- c. Listen and choose: universities should measure performance against real-world standards.

4.3.3 Job Requirements

Research results show that job requirements are associated with job satisfaction of lecturers. The fact is that most Vietnamese universities are applying the new credit-based training system. Depending on the training goals, each university can adjust accordingly. In addition, credit-based training is a flexible training method, enabling learners to be proactive in terms of time, study plan, subject selection, and lecturers. It is believed that universities can gain more trust and commitment of their faculty by undertaking the following activities:

- a. Review and finalize regulations and policies related to teaching and scientific research
- b. Really consider scientific research as a standard of professional quality in the evaluation and emulation rating of officials and lecturers.
- c. Organize training courses for staff and lecturers to improve their scientific research knowledge and skills in the following directions: academic training and applied research
- d. Encourage faculties to organize scientific seminars so that lecturers have the opportunity to meet leading experts in their fields and express their scientific views, thereby improving the qualifications of the teaching staff.

4.3.4 Facilities

To improve existing facilities, universities may consider the following:

- a. Strengthening international cooperation, promoting training links, thereby investing in facilities for teaching.
- b. Increasing non-governmental budget investment is the solution to overcome the current lack of facilities in universities. This source of investment is mainly based on NGOs and ODA loans, taking advantage of non-refundable advantages of NGOs and businesses.
- c. Savings when building universities in urban areas: building pilot universities in urban areas by having universities cooperate with independent training sites but using common facilities. Other facilities such as libraries, laboratories, seminars, convention and conference centres, sports centers, document depots, and services.

5. Conclusions

The job satisfaction of lecturers plays a very important role in improving quality in the higher education system. Studies also show that teachers with high job satisfaction are more likely to contribute, be more creative in the teaching process, create more products, and perform better in the organization. opposite. The results of this article show that most of the lecturers appreciate their job satisfaction, but the evaluation factors are different and uneven. Research results also show that different factors have different impacts on job satisfaction of lecturers of public universities in Hanoi city. In which the biggest impact factor is incomes, followed by development opportunities, job requirements and finally facilities. Of all the dimensions of job satisfaction, the job itself has accounted for 63 percent contribution in job satisfaction of academicians. Opportunities for further study, growth and training intrinsically contribute to the job satisfaction. Societal and professional recognition positively affects job satisfaction.

To better understand the factors which influence job satisfaction is very crucial for all organizations. Through the understanding of the factors, organizations can be aware of the symptoms beforehand and take precaution to support and increase the job satisfaction level of employees. In order for an organization to sustain and grow its business, job satisfaction is the long-term solution for talent retention and increased performance and productivity. Managers need to pay more attention to policies on salary and bonus, creating conditions for lecturers to succeed in their work. In addition, managers need to develop factors that have a positive influence and overcome negative effects on job satisfaction when managing universities.

Job satisfaction will motivate lecturers to improve the effectiveness of teaching and scientific research activities. The study on factors affecting lecturer job satisfaction helps college to develop appropriate policies to retain and develop employees, making them more satisfied. In addition, managers need to pay attention to developing factors that have a positive influence and overcome negative effects on teacher satisfaction in the process of university management. This study was conducted at public universities in Hanoi city. In the next step, the author wishes to expand the research scale to public and private universities in Vietnam, from which there is a comparison of job satisfaction of the two types of universities.

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The Effect of Neuro-Linguistic Programming on Personal Effectiveness of Young People

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Abstract: In modern life, where digital technologies predominate in the daily activities, some people experience stress in coping up with the accelerated technological progress and adapting to it. In particular, young people endure multiple stressful situations as they do not sufficient knowledge in life or from what they have learned in the university. In addition, they also lack the soft skills required to survive and succeed. Neuro-linguistic programming (NLP) is a field of knowledge that addresses the state of mind and how to effectively manage it. It is postulated that when a person is successful in managing their state of mind, they can achieve personal effectiveness. The objective of this paper is to describe the role of NLP in the overall personal effectiveness of young people. To achieve this objective, quantitative research was carried out to establish of how people who were aware of NLP had applied it in their lives. A sample data of 207 persons was used to test the research framework before filtering unsuitable or missing data. The results indicated that NLP has a significant relationship with personal effectiveness. This study implies that young people can refer to NLP and apply this concept to improve their personal effectiveness, and to succeed. This study also contributes to academic knowledge on NLP. Further studies are needed to expand this valuable knowledge and contribute details of the role of NLP in other aspects of human life.

Keywords: NLP, soft skills, motivation, personal effectiveness

1. Introduction

The Covid-19 pandemic has affected everyone in one way or another. For young people, many of them lost their jobs due to downsizing or closure of businesses. This negative situation has created stress and mental health problems among the youths (Fundlife International, 2021). Thus, there is now a need for the youths to strengthen their mindset to move on successfully in life.

They do not only need to upgrade their professional skills but also adopt a positive mindset to improve their overall personal effectiveness (PE) and adapt to the current changes. Neuro-linguistic programming (NLP) is a concept that can support change in people's lives (Nongard, 2021). Exploring it is necessary to support the success of young people. Neuro-linguistic programming is an effective way to quickly understand the motivations and dynamics of each human action. Therefore, NLP is increasingly being applied in various industries and environments.

Through understanding NLP, people learn how to control their emotional state, develop skills in persuasive communication, overcome obstacles in work and life, help those around them succeed, and achieve other interesting life goals. NLP is unlike any method that people may previously have encountered: it is aimed at radically changing behaviour by changing ways of thinking that lead to behaviour. Life, abilities, and qualifications are all consequences of the way we think. Radical change is, therefore, a must if one wants to improve a skill or change already rooted habits.

NLP works directly with the conscious and unconscious minds; thus, the learning through NLP is more permanent (Regens, 2020). Based on the above synthesis, the main objectives of this study are to determine whether NLP can affect personal effectiveness and to identify the roles of knowledge of NLP, belief in NLP, and the implementation of NLP in personal effectiveness.

2. Literature Review

2.1 The Concept of Neuro-linguistic Programming

Kotera et al. (2018) state that ‘neuro-linguistic programming (NLP) is an approach to communication and personal development focusing on how individuals organise their thinking, feelings, and language. While a growing number of academic articles highlight the application of NLP in organisational settings, a systematic review synthesising and evaluating the quality of this evidence has not been conducted to date’.

According to the Institute of Applied Psychology (2018), NLP is a unique approach to mastering communication skills and using them to aid personal or professional development. Neuro-linguistic programming focuses on the combined effects of natural neurological processes, language, and programmed patterns of behaviour that are instilled in early childhood. The underlying theory of NLP is that these three things can be changed to help an individual achieve specific goals. Neuro-linguistic programming is widely recognised for the benefits it can provide to professionals within the workplace. Below are several professional benefits that can be experienced through NLP techniques.

Neurolinguistic programming encompasses three of the most influential factors that shape individual experiences: neurology, linguistics, and pre-programmed patterns. According to the Institute of Applied Psychology (2018), some of the benefits of NLP for professionals are increased influence and persuasion, personal effectiveness (PE), improved communication with superiors and staff, confidence, and presence. Ahmadzadeh, Badami, and Aghaei (2019) describe NLP as a systematic way to promote clearer comprehension to facilitate a positive change in behaviour patterns. This was originated and developed by Richard Bandler, an American author and trainer in the field of self-improvement, in conjunction with John Grinder, an American linguist, author, management consultant, trainer, and speaker in the 1970s. It is the study of the structure of our subjective experiences and includes the art of positive communication and personal excellence. The study is focused on how individuals structure their feelings, thoughts, and language to achieve their goals with an outstanding, positive result. Therefore, NLP is a beneficial concept, enabling people to attain PE and success.

2.2 Knowledge of Neuro-linguistic Programming

When people want to apply NLP in their lives, knowledge of NLP plays a vital role. Knowledge of NLP implies that people understand the concept of NLP deeply and can apply it in their lives and support others to implement it. According to Khalandi and Zoghi (2017), ‘Pedagogical studies have shown that the perception of information according to the manner and pace of understanding, and learning conditions differs from person to person’. Therefore, knowledge plays a vital role in awareness and understanding. When people have a sufficient knowledge of a topic, they can find it easy to develop and succeed. Lashkarian and Sayadian (2015) state that ‘anchoring is one of the NLP techniques that make association between what we see, hear and feel and our emotional states. Fortunately, anchors can in fact be formed with any sensory experience. Evidence for this claim is widely available in the personal history of every individual’.

According to Medical News Today (2017), ‘NLP is used as a method of personal development through promoting skills, such as self-reflection, confidence, and communication’. Therefore, knowledge of NLP is useful for personal development and success. People communicate with the outside world through the five senses: sight, hearing, touch, smell, and taste. They receive stimuli from outside and rebuild them inside their brains. This creates within our brains a miniature and subjective world. According to Alrouadhan (2018), ‘NLP is an interpersonal communications model based on the belief that language is strongly inter-connected with neurological processes and behavioural patterns adopted through experience, and the power of this connection can be harnessed to acquire skills in exceptional people’. Therefore, if people have knowledge of NLP, understanding it clearly and applying it, this can help them to obtain the benefits of NLP and succeed. NLP is an interpersonal communication model based on the belief that language is strongly inter-connected with neurological processes and behavioural patterns adopted through experience and the power of this connection can be harnessed to

acquire the skills in exceptional people. Anchoring is one of the NLP techniques that make association between what the people see, hear and feel and their emotional states. Fortunately, anchors can in fact be formed with any sensory experience. Evidence for this claim is widely available in the personal history of every individual. From the above synthesis, the following hypothesis may be formulated: There is a significant relationship between knowledge of NLP and PE.

2.3 *Belief in Neuro-linguistic Programming*

If people believe in NLP, they will apply it in their lives: NLP is a beneficial concept for those who believe in and practice it (Regens, 2020). If their belief is positive, people do many things that other people consider unthinkable. However, their energy is lost if their belief is negative. In people's instincts, there is an operating system preinstalled, deep in the subconscious. This operating system is installed by the attitudes, lifestyles, traditions, cultures, religions, visions, and so on, of previous generations which have affected people, along with personal education, learning, and experiences. Therefore, the application of NLP may support them to develop a positive attitude. While it is beneficial for people to be aware of NLP, belief in it is equally important. When they believe the NLP concept in their life, they will practice it daily, and it will improve their positive thinking and affect their mindset. Therefore, if people can effectively use the principles and techniques in NLP, they can gain effective communication skills and a happier, richer, and more fulfilling life. This has been proven by success stories in many areas.

According to Medical News Today (2017), 'NLP uses perceptual, behavioural, and communication techniques to make it easier for people to change their thoughts and actions'. The synthesis of everything taken into the brain creates patterns of behaviour and responses in different life circumstances, also known as 'programming'. These patterns (or habits) repeat again and again if there are no obstructions or changes, like a tape recorder replaying the same content if it is never overwritten with new content. From the above synthesis, the following hypothesis may be formulated: There is a significant relationship between belief in NLP and PE.

2.4 *Implementation of Neuro-linguistic Programming*

The human brain is very much like a computer, and we can install input in our brains. If we install a positive attitude, we can gain beneficial results and success in life. The reverse is also true. Good planning in life is necessary, and NLP is a good concept to support people to overcome negative thinking and gain a positive mindset to apply in daily life. Metaprograms are software installed for the computer: what software leads to the machine's behaviour? As the human body is a synchronous biological machine, and the human brain is a biological computer, if we want to learn and fully apply the NLP method, we also need to instinctively install and re-install the operating system.

According to Lashkarian and Sayadian (2015), 'NLP is the study of how the interaction of our brain (NEURO), our language (LINGUISTIC) and body produces patterns of behaviour (PROGRAMMING). Furthermore, NLP techniques such as reframing, anchoring, creating rapport can be applied by learners and educators to facilitate learning'. People do not react directly to the world around them. First, they use what they have gained from the outside world during their own life and growth to 'program' their brains. Then they act and react (almost automatically) according to the pre-installed programs.

According to Medical News Today (2017), 'Practitioners have applied NLP commercially to achieve work-orientated goals, such as improved productivity or job progression'. Although the understanding of the NLP is important, the stage of implementation also plays a vital role for practitioners. Therefore, they need to practice and implement NLP: this plays a crucial role in supporting them to attain PE. From the above synthesis, the following hypothesis may be formulated: There is a significant relationship between implementing NLP and PE.

2.5 The Role of Neuro-linguistic Programming in Personal Effectiveness

Personal development is a way for people to evaluate their skills and qualities, consider life goals, and set goals so that they can see what they are capable of and optimise their lives. This is a long process which should never stop. To date, various studies have dealt with the effectiveness of psychological interventions in promoting mental skills and improving performance (Ahmadzadeh et al., 2019). Neuro-linguistic programming is a collection of techniques, starting points, and thoughts commonly used for self-development. Based on NLP, people can learn to think positively and install beneficial goals and objectives to develop themselves.

Additionally, NLP is greatly used in PE. It is a helpful concept to support improving a person's mindset to gain success. It focuses on what people want, who they want to be, and how to find the inner motivation to help they change. Instead of following traditional psychology, which often tends to focus on the problem and its cause, NLP focuses on the solution. Personal effectiveness is a very broad and scattered field. The concept of PE is that people can achieve their plans and aims or achieve positive outcomes. Additionally, everything people do to be healthy, happy, nurture friendships and love, enjoy themselves, succeed in their studies and careers, become rich, and have peace of mind are all considered personal development. According to the Institute of Applied Psychology (2018), we all have innate negative behaviours that work against our attempts to attain positive achievements and only by gradually recognising this can we ever replace them (through NLP).

In general, the effective use of NLP helps people to have more effective communication and a happier and more fulfilled life. Therefore, NLP assists people to overcome obstacles and gain positive outcomes for their mindset or aspects of their life such as their job, money, relationships, or loved ones. Neuro-linguistic programming can assist people to attain overall benefits and effectiveness in their lives. Undeniably, NLP is the best approach to achieving the art of communication, personal development, and certain successes. Through NLP, people learn how to control their emotional state, maintain emotional stability, avoid becoming emotional easily, and avoid causing words and actions to convey incorrect information. It is a necessary technique for people to survive and develop in life. Moreover, the ability to persuade in communication is also significantly enhanced; practitioners of NLP do not need to spend too much time convincing others, and the results are beyond expectations. Neuro-linguistic programming helps people to improve communication skills by themselves and to interact well in their relationships, promoting success in life. Therefore, according to this analysis, there is a significant relationship between NLP and personal effectiveness.

3. Methodology

The participants in this study were young people in Ho Chi Minh City who had knowledge of NLP and believed in and applied NLP techniques in their lives. The ages of the young people ranged from 18 to under 30 years old. The data samples were collected using a random approach within Ho Chi Minh City. The data sample distribution within Ho Chi Minh City totalled 265 data samples. The data samples returned were 215 data samples and the valid data samples were 207, which were filtered to remove invalid or missing data before inputting for the study. The valid data was 207 samples, and this was utilised for the study. The input was analysed using Cronbach's alpha (using SPSS), exploratory factor analysis (EFA), Kaiser-Meyer-Olkin (KMO), Bartlett's test, and a multiple linear regression test.

3.1 The Conceptual Research Framework and Hypothesis of the Study

$$Y = \beta_0 + \beta_1 * X_1 + \beta_2 * X_2 + \beta_3 * X_3 + \sigma$$

Where,

- Y = personal effectiveness (PE),
- X1 = knowledge of NLP (KNL),
- X2 = belief in NLP (BNL),
- X3 = implementation of NLP (INL),
- σ = error term,

β_0 = intercept: β_1 , β_2 , and β_3 = the coefficients of regression of the dimensions of KNL, BNL, and INL.

In this study, the main objective of the research is to identify whether the role of NLP affects the PE of young people in Ho Chi Minh City. The hypotheses are as follows:

H1: There is a significant relationship between knowledge of NLP and PE.

H2: There is a significant relationship between belief in NLP and PE.

H3: There is a significant relationship between the implementation of NLP and PE.

Data was analysed by testing Cronbach's alpha, EFA, and multiple regression testing.

4. Data Analysis

Table 1. Results of Analysing Cronbach's Alpha

Factors	Cronbach's alpha
Knowledge of NLP (KNL)	0.886
Belief in NLP (BNL)	0.864
Implementation of NLP (INL)	0.825
Personal effectiveness (PE)	0.911

Table 1 shows all coefficients of Cronbach's alpha for the factors KNL, BNL, INL, and PE. All the factors have coefficients of Cronbach's alpha greater than 0.8. This indicates that the scales of measurement show good reliability and the research data met the analysis standards. Therefore, the researchers continued to process the EFA, as the results below show.

Table 2. The Results of the Kaiser-Meyer-Olkin and Bartlett's tests

KMO and Bartlett's Test		
KMO Measure of Sampling Adequacy		.859
Bartlett's Test of Sphericity	Approx. Chi-square	1583.071
	df	105
	Sig.	.000

From the evidence in Table 2, the coefficient of the KMO was 0.859 (>0.5), and Bartlett's test of sphericity indicated a statistical significance of 0.000, which meets the statistics standards.

Table 3. The Results of the Rotated Component Matrix

Rotated Component Matrix ^a	Component		
	1	2	3
KNL2: I continue to maintain my knowledge of NLP	.895		
KNL4: I share my knowledge of NLP with others	.851		
KNL5: I teach NLP to others	.821		
KNL1: I have good knowledge of NLP	.789		
KNL3: I have forgotten most of what I knew about NLP	.722		
BNL2: I believe NLP can help me manage my relationship with others		.874	
BNL5: I believe NLP is just a gimmick		.820	
BNL1: I believe NLP has helped me in my life		.780	

BNL3: I believe people should learn NLP	.721
BNL4: I believe people who use NLP lead a happier life	.715
INL4: I use NLP to influence others	.808
INL5: I use NLP in all aspects of my life	.770
INL3: I use NLP to help others	.763
INL1: I use NLP to manage myself	.697
INL2: I use NLP to manage my relationships with others	.687

*Extraction Method: Principal Component Analysis; Rotation Method: Varimax with Kaiser Normalisation;
a. Rotation converged in five iterations.*

The results of the rotated component matrix indicate that all variables were separated into individual groups and loading factors were above >0.6, which represents a meaningful contribution by each factor.

Table 4. *The Results of the Kaiser-Meyer-Olkin and Bartlett's Tests for Personal Effectiveness*

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.920
Bartlett's Test of Sphericity	Approx. Chi-Square	991.249
	df	36
	Sig.	.000

The coefficient of the KMO was 0.920 (>0.5) and Bartlett's test of sphericity had a statistical significance of 0.000. The average variance extracted was 58.429%, which meets statistics standards.

Table 5. *Component Matrix of the Personal Effectiveness Factor*

Component Matrix^a	
	Component 1
PE8: I am satisfied with what I have achieved so far in my career	.816
PE5: I can teach others about building rapport	.813
PE6: I have good relationships with others	.773
PE9: I am confident I will keep doing better in my career	.772
PE3: I can teach others about emotion	.761
PE7: I have achieved well in my career	.753
PE4: I understand the principles of building rapport (relationship)	.747
PE1: I understand what causes emotions	.740
PE2: I know how emotions can be controlled	.699

*Extraction Method: Principal Component Analysis.
a. 1 component extracted.*

The results of the rotated component matrix indicated in Table 5 show that PE with each of the loading factors was above >0.6, which represents a meaningful contribution by each factor. The meaning of PE was contributed by the observed variables (from PE1–PE9).

Table 7. *Descriptive Statistics*

Descriptive Statistics			
	Mean	Standard Deviation	N
PE	3.6393	.66317	207
KNL	3.4850	.71984	207
BNL	3.5894	.75201	207

INL	3.6386	.63464	207
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Table 8. *The Results of Correlations*

		Correlations			
		PE	KNL	BLN	INL
Pearson's Correlation	PE	1.000	.413	.402	.462
	KNL	.413	1.000	.277	.289
	BNL	.402	.277	1.000	.371
	INL	.462	.289	.371	1.000
Sig. (1-tailed)	PE	.	.000	.000	.000
	KNL	.000	.	.000	.000
	BNL	.000	.000	.	.000
	INL	.000	.000	.000	.
N	PE	207	207	207	207
	KNL	207	207	207	207
	BNL	207	207	207	207
	INL	207	207	207	207

From Table 7, the results of the descriptive statistics showed that there were 207 analysed data samples, and coefficients of means ranged from 3.4850 to 3.6393.

Table 9. *The Results of the Analysis of Variance (ANOVA) Test*

		ANOVA ^a				
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	30.510	3	10.170	34.357	.000 ^b
	Residual	60.088	203	.296		
	Total	90.598	206			

a. Dependent Variable: PE

b. Predictors: (Constant), INL, KNL, BNL

Table 10. *The Model Summary*

		Model Summary ^b			
Model	R	R Squared	Adjusted Squared	R Std. Error of the Estimate	Durbin-Watson Test
1	.580 ^a	.337	.327	.54406	1.966

a. Predictors: (Constant), INL, KNL, BNL

b. Dependent Variable: PE

Table 9 shows the significance was 0.000 (<0.005), and Table 10 shows that the adjusted r squared (R²) was 32.7%. As a result, it can be seen that NLP positively affected the effectiveness of young people; it also indicates that when they applied NLP, it positively supported a change in their PE.

Table 11. *The Coefficients*

		Coefficients				Collinearity Statistics		
Model		Unstandardised Coefficients		Standardised Coefficients	t	Sig.	Collinearity Statistics	
		B	Standard Error	Beta			Tolerance	VIF
1	(Constant)	.947	.268		3.532	.001		
	KNL	.244	.056	.265	4.353	.000	.883	1.133

BNL	.190	.055	.216	3.439	.001	.831	1.203
INL	.319	.066	.305	4.846	.000	.825	1.212

a. Dependent Variable: PE

From the results of the data in Table 11, the values of significance (P-values) of all variables of KNL, BNL, and INL were less than 0.005; therefore, all the hypotheses of this study are accepted, and the model of the study is significant. Due to the research outcomes, it is evident that knowledge of NLP, belief in NLP, and the implementation of NLP positively affect the PE of young people in Ho Chi Minh City. The data in Table 11 indicates that the VIF of all variables is less than two: No collinearity occurred. The final research framework of the study is as follows:

$$PE = 0.947 + 0.265 * KNL + 0.216 * BNL + 0.305 * INL$$

where PE = personal effectiveness, KNL = knowledge of NLP, BNL = belief in NLP, and INL = implementation of NLP.

5. Conclusions and Recommendations

The study shows that to effectively attain goals and objectives in their lives, young people should be encouraged to study, believe in, and implement NLP, which can improve their mindset and promote success in their lives.

Neuro-linguistic programming is a beneficial technique which young people can embrace to enhance their behaviour, thus providing them with a more effective life. Based on the findings of this study, NLP is a useful concept that can assist young people who believe in, apply, and implement it in their lives. Neuro-linguistic programming techniques and principles assist them to build solid relationships and positive connections with people and achieve smooth communication, providing greater understanding to others and adapting to the rapidly changing environment. Young people can use their language skills to ask pertinent questions and obtain appropriate answers that will enhance their expectations in life. Offering discussions with easy-to-understand illustrations, NLP can assist young people to attain a better understanding of the meaning and the benefits of NLP in their life, how it works, and how to apply it to relationships. It can lead to the easy attainment of success. Therefore, young people need to study and apply the principles of NLP to gain support to change their mindsets and attain greater success in their futures.

5.1 Limitations and Further Studies

First, this study only collected a limited data sample; therefore, the results of this study may not reflect the overall picture. Second, due to limitations of time and finance, the researchers were unable to compare different regions, so they were not able to compare results from different locations to offer solutions. In the future, researchers can expand this study by adding more variables to compare and by collecting a larger number of data samples to attain better results and make a specific contribution regarding this concept for practitioners and academics.

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Mental Health Issues and Online Counseling Services among University Students in China

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Abstract: University is a fundamental and critical turning point for an individual's development in the whole life, but students are also experiencing pressure along the way, which may lead to mental health problems. Untreated problems or illnesses may impact physical health conditions, academic performance, acculturation process, and later even cognitive and social development. Professional mental health services like counseling are helpful to solve these problems. Counseling service plays an important role in supporting students' physical as well as mental health status; and related services have a positive influence on their problem solving and school behavior, such as decreasing negative feelings, solving personal-social problems, improving academic achievement, promoting career planning and decision-making, and enhancing personal development. With the fast development of Information and Communication Technology, the way how psychological counseling services are delivered is changing. Online counseling has become a popular and feasible means to provide psychological support for university students and enjoyed its popularity for accessibility, availability, convenience, and anonymity. However, individuals who suffer from mental health problems and benefit from online counseling services at the same time are reluctant to use the services. On the other hand, online counseling also faces several challenges. Abundant studies can be found in help-seeking literature, but little attention has been given to university students in China, especially topic of undergraduates' online counseling intention for mental health issues and its influencing factors. By a systematical literature review in the help-seeking field, the current research aims to present undergraduates' mental health issues in context of China and illustrates the influencing factors of online counseling intention. A conceptual framework is proposed and expected research outcomes and implications for future research are introduced.

Keywords: university students, mental health issues, online counseling, intention

1. Introduction

China, presently the second largest economy in the world, is expected to reach the top chart as the world's largest economy as well as the next superpower in the next decade or so. Its phenomenal growth in economy and military, however, does not seem to match the growth in mental health services and resources (Lim & Lim, 2015). As part of this profound economic and social change, the Chinese people are experiencing significant multiple stressors. University students are at a critical transition period for the development of health-related behavior and mental health problems are quite common among them.

These mental health problems, if not treated properly, would cause negative influence. Counseling services play an important role in supporting students' physical as well as mental health and have positive effect on students' problem solving and school behavior (Whiston et al., 2011). With the rapid development of Information Communication Technology, online counseling has become a more feasible modality to receive psychological support. Previous studies have evidenced the effectiveness of online counseling in providing treatment to clients with mental health issues. However, despite that students benefit a lot from professional counseling, it is a sad and undeniable fact that individuals underutilize the services when they encounter mental health issues (Lam et al., 2015; Lee & Shi, 2020).

2. Mental Health Issues and Professional Mental Health Services

2.1 Prevalence of Mental Health Problems

Mental health problems are common and prevalent among young adults and have been a major concern all around the world. It is reported that university students appear to have greater risk in mental health problems than general population although problems affect all populations (Martin, 2010; Wynaden et al., 2013). Individuals between 18 to 24 years of age are at particularly high risk for mental disorders such as major depressive disorder, anxiety, and psychiatric comorbidities (Alonso et al., 2004; Saunders et al., 2020).

International research concerning on mental health issues among young adults and university students are growing. The prevalence and severity of mental health issues among university students have been discussed around the world. In the USA, a nationwide survey conducted by the American College Health Association National College Health Assessment reported that 88% of college students felt overwhelmed within the last 12 months, and 66% of college students experienced overwhelming anxiety within the last 12 months (American College Health Association, 2019). In Australia, it has been identified in research that university students have greater levels of psychological distress than their peers, with nearly 84% of students demonstrating distress levels (Cvetkovski et al., 2012; Leahy et al., 2010; Stallman, 2010). In Belgium, Bruffaerts et al.'s (2018) World Mental Health Surveys International College Student project found that approximately one in three freshman reports mental health problems in the past year.

A high prevalence of mental disorders has been reported among Chinese university students and pressures bring as well mental health problems (Shi et al., 2020). Results have revealed that university students have higher level of mental health problems than the national average (Gao et al., 2020). Moreover, Chinese domestic university students are reported to be more anxious than their counterparts in America and Europe; and they experience greater level of stress than students from the other two Asian countries in Japan and Korea (Chan, 1996; Lin et al., 2001; Xie & Leong, 2008). Untreated mental health problems may impact students' physical health conditions, academic performance, acculturation process, and later even social and cognitive development (Adams et al., 2008; Li et al., 2017). These problems may persist into adulthood if remaining undetected or untreated appropriately, which will lead to negative consequences (Yuen et al., 2019).

2.2 Benefits and Underutilization of Professional Mental Health Services

Counseling, as a form of psychological help and mental health services, applies the principles in mental health psychological and human development through various psychotherapies to support an individual's growth toward their well-being and life improvement (Hackney & Cormier, 2013). Benefits of counseling have been proved in numerous studies. Brown (2011) cited the results of Lambert and Bergin, revealing that psychotherapies have therapeutic effects to enhance client's growth and to enable them to cope with their problems. In Lynass et al.'s (2012) research, they found that clients experienced positive changes through counseling, such as feeling happier and counseling services increased confidence as well as improving relationships with family and friends. In addition, Rickinson (as cited in Cebi, 2009) added that students who seek counseling are likely to have lower drop-out and higher graduation rate. Moreover, benefits of counseling are not limited to those having the problems, but also can be a preventive measure for individuals to cope with potential problems in the future. Counseling also serves as a platform for development of individuals' potentials in life (Hackney & Cormier, 2013).

Despite the benefits brought by counseling, the underutilization of the mental health services is a worldwide phenomenon. Research has revealed this undesirable fact and indicated that people are often reluctant to seek help (Lam et al., 2015; Vogel et al., 2007). About one-fifth of all college students worldwide experience a psychological disorder within a given year, however, only 16% of these individuals receive treatment for their mental health issue (Auerbach et al., 2016). The result of the Hong Kong Mental Morbidity Survey among 5,719 Chinese adults identified the prevalence of common mental disorders (depression, anxiety, and stress) as 13.3% while only 26% of them consulted mental

health services in the past year (Lam et al., 2015). Another report by the Center for Collegiate Mental Health (2019) shows that across 152 counseling centers in colleges and universities, 179,964 college students sought help for mental health problems and 1,384,712 appointments were scheduled during the 2017-2018 academic year. However, there were only 3,723 clinicians available to provide services for these students to be treated.

Even if they decide to seek help, university students tend to solve the problems on their own or seek help from a non-professional approach, such as family members, romantic partner, roommates or friends, rather than a professional (Eisenberg et al., 2009; Rickwood et al., 2007). According to Deane et al. (2001), individuals believed that they should be able to address their concerns without professional assistance.

2.3 Online Counseling Services

With the rapid development of Information Communication Technology, online counseling has become a more feasible modality to receive psychological support. Online counseling, also referred to as e-therapy or cybertherapy, is the delivery of therapeutic interventions in cyberspace where the communication between a trained professional counselor and client(s) is facilitated using computer-mediated communication (CMC) technologies (Richards & Viganò, 2012). There have been numerous terms used to describe online counseling but there has not been a clear set of terms associated with the modes of service delivery. Online, Internet, CMC, counseling, treatment, and therapy are seen as key words concerning research fields in online counseling (Mallen et al., 2005).

Previous studies have evidenced the effectiveness of online counseling in providing treatment to clients with mental health issues. As a common distance-communication technology, telephone has become a standard tool for practitioners in tasks such as scheduling, consultation, payment, crisis management, and even psychotherapy (Mallen et al., 2005). During the 2019 coronavirus disease (Covid-19) pandemic when people were quarantined at home, online counseling proved to be effective all around the world (Dores et al., 2020; Khatib et al., 2022). For example, in China online mental health services including psychological assistance hotlines, WeChat-based online survey programme, online mental health education with communication programs (such as WeChat, Weibo, and TikTok), and online psychological counseling services facilitate the development of Chinese public emergency interventions, and eventually could improve the quality and effectiveness of emergency interventions.

Generally speaking, online counseling enjoyed its popularity for its accessibility, availability, convenience, and anonymity to clients (Harris & Birnbaum, 2015; Richards & Viganò, 2013; Teo et al., 2020; Tirel et al., 2020). However, online counseling also faces several challenges. Fear of miscommunication due to unfamiliar online language, lack of professional development and technical skill training, and limited technical resources were key deterrents for counselors to offer online counselling (Foon et al., 2020). A review of the available literature has shown online counseling to be beneficial for some clients, but the body of knowledge has not yet established itself as a truly effective mode of service delivery (Mallen et al., 2005).

Lai et al. (2018) evaluated 24 Chinese online psychological counseling websites by referring to the 16 items in the ethical intent checklist by Shaw and Shaw (2006). Intervention skills of online counseling were another major concern (Wang & Jia, 2012). Research on help-seeking intention and behavior among individuals in China has been explored in Hong Kong (Mak & Davis, 2014; Mo & Mak, 2009), Macau (Leung et al., 2019) and Taiwan (Cheung, 2010; Wu et al., 2014). However, these findings may not generalize to Mainland Chinese students due to cultural and political differences. In Mainland China, only a few studies investigated attitude toward online counseling services and its influencing factors, nonetheless, mixed findings were reported.

3. Factors Affecting Counseling Intention

3.1 Demographic Factors

Previous empirical studies investigated the impact of several demographic factors including age, gender, education, and socioeconomic status on individuals' help-seeking intention (Aldalaykeh et al., 2019; Liu & Gao, 2021). Gender is one of the significant factors in help-seeking process and gender difference is the heatedly discussed topic. There exist gender differences between men and women or boys and girls in terms of help seeking. In general, research has demonstrated that men are less likely to use professional mental health services for emotional and mental issues compared to women (Galdas et al., 2005). Researchers have found that females have more positive attitudes toward seeking help regarding mental health concerns than males (Nam et al., 2010). However, research findings were not always consistent. Roldan-Bäu's (2013) study found no evidence for the correlation between gender and help-seeking intentions. In China, similar results in terms of gender difference were found in help-seeking literature. In several studies which revealed that females were more likely to seek help for mental health issues.

Speaking about the role of gender in predicting online counseling intention, there is limited studies compared to traditional face-to-face counseling. Moreover, the findings were not always consistent. A study by Dinçyürek and Uygarer (2012) through independent sample T-test revealed that there was no significant relationship between gender and views about online counseling services. Using the Theory of Planned Behavior, the study by Wang et al. (2020) examined college students' intentions to seek both face-to-face and online counseling by conducting an online survey with 440 college students. Results showed that gender was significant for face-to-face, phone, and videoconferencing modes. Joyce (2012) investigated the relationship of personality, gender role conflict, and self-stigma on the attitudes of college students toward internet counseling and their intentions to use such services. Results indicated that no aspects of gender role conflict were related to intentions to seek online help for interpersonal or academic concerns.

3.2 The Theory of Planned Behavior

The Theory of Planned Behavior (TPB), an extension of the Theory of Reasoned Action (Fishbein & Ajzen, 1975), was developed by Ajzen in 1991, and is one of the most effective theories to predict the intention to execute a behavior. According to Ajzen (1991), the TPB model includes five components, namely, behavior, intention (INT), attitude (ATT), subjective norm (SN), and perceived behavioral control (PBC). The theory further posits that ATT, SN, and PBC, which are in turn a product of behavioral, normative, and control beliefs, are the best predictors of intention. Based on the general rule of the TPB, more positive attitude, favorable SN, and greater PBC regarding a behavior are associated with a stronger intention to perform a behavior. The TPB assumes that ATT, SN, and PBC directly affect a person's intention to perform a behavior and, ultimately, affects the actual behavior (Fishbein & Ajzen, 2011). The TPB model has been applied in a number of research in traditional face-to-face counseling and TPB variables are evidenced to elucidate the relationship with persons' help-seeking intention for mental health issues.

Attitude is defined as the degree of favorable or unfavorable evaluation of a certain behavior. It refers to individuals' positive or negative evaluations of accessing mental health services. More favorable attitudes lead to greater willingness to seek professional psychological help (Ajzen, 1991; Ajzen & Fishbein, 2000; Chen et al., 2014; Mak & Davis, 2014). Previous studies on predictors of help-seeking intentions found that attitude is the strongest predictor (Schomerus et al., 2009). Negative attitudes toward seeking mental health services were associated with decreased help-seeking behavior in Australia (Roness et al., 2005). In the context of online psychological counseling, literature is much more limited than traditional face-to-face counseling and a growing number of research has started to demonstrate interest in the comparison of attitudes toward online counseling and traditional face-to-face counseling. Leibert and Archer (2006) reported that clients were showing satisfaction with online counseling but less satisfied than in face-to-face counseling. In another survey by Murphy et al. in 2009, the researchers reported that satisfaction scores of face-to-face and online clients showed no statistically

significant difference. However, Lewis et al. (2015) found attitudes toward online counseling to be less favorable when compared to the traditional face-to-face method.

Subjective norms refer to the perceived social pressure to perform or not to perform the behavior (Ajzen, 1991). It is the perceived pressure from or approval by significant others for performing a certain behavior. Significant others are people to whom an individual considers important in his or her life (e.g., partner, friends, and family) and when a particular behavior is disapproved by significant others, a person is less likely to perform that behavior (Lee & Shin, 2020). It was found by researchers that subjective norm play an important role in help-seeking, but findings were not the same. In a study among college students in the U.S., TPB variables were examined. Attitudes and behavioral control predicted depressed students' intentions to seek mental health services, but subjective norms did not. In another study with Korean university students as participants, it was found that subjective norms are expected to predict Korean college students' help-seeking intentions (Kim, 2018).

Perceived behavioral control is defined as the perceived ease or difficulty of performing a behavior and it is assumed to reflect experience as well as anticipated impediments and obstacles (Ajzen, 1991). Investigations have shown that people's behavior is strongly influenced by their confidence in their ability to perform it (i.e., perceived behavioral control). Moreover, according to the TPB, perceived behavioral control, together with behavioral intention, can be used directly to predict behavioral achievement (Ajzen, 1991). In Mesidor and Sly's research (2014), among international students and African American college students in the USA, perceived behavioral control was proved to be the strongest predictor in the prediction of intentions to seek mental health services. Another study by Zorrilla and her colleagues (2019) showed moderate positive correlations between PBC and help-seeking intention.

3.3 *Mental Health Literacy*

Mental health literacy (MHL), which is referred to as knowledge and beliefs about multiple aspects of mental illness and treatment, is supposed to facilitate recognition of mental illness and promotion of mental health care (Jorm, 2000; Jorm et al., 1997). These knowledge and beliefs have been identified as critical factors associated with mental health help-seeking behavior. For example, people who believe that mental health treatment is beneficial and effective are likely to have favorable attitudes toward help-seeking or lead to the actual use of mental health services (Smith & Shochet, 2011). More details were revealed in Smith and Shochet's study (2011) regarding the relation between each component of MHL and help-seeking intention. Recognition of a mental disorder is generally the first step in the help-seeking process (Gulliver et al., 2010; Rickwood et al., 2005). Early recognition of depression in young adults may lead to appropriate help-seeking for themselves (Kelly et al., 2007). Knowing where to seek professional mental health services can also be an important factor influencing help-seeking intentions. The lack of knowledge about available professional services is one of the main reasons for the underutilization of services (Leong & Kalibatseva, 2011).

It is worthwhile noticing that Spiker and Hammer (2019) has suggested that the MHL be conceptualized as a theory, rather than a construct. Such framing would allow researchers to attend to important concepts (e.g. attitudes, stigma, positive mental health, and help-seeking efficacy). The mediating role of mental health literacy in help-seeking field was also explored by some researchers. Using a cross-sectional survey with a quota sampling strategy and taking responses from 596 community-dwelling individuals ages 65 years and older, the effect of mental health literacy as a mediator was estimated (Kim et al., 2017). It was found that mental health literacy mediated the relationships between socio-demographic factors (education, general literacy, and health status) and mental health service use.

3.4 *Research Gaps*

First, previous studies mainly concentrated on traditional face-to-face counseling in terms of effectiveness, barriers, facilitators, predictors, but literature concerning online counseling is much more limited. Secondly, most previous studies were conducted in English-speaking countries or among

populations in high income or developed countries such as the United States, the United Kingdom, Australia, Canada, and Japan. Limited studies focused on Asian developing countries or China in particular. Thirdly, numerous studies explored variables affecting help-seeking intention with inconsistent results and the impact of mental health literacy on help-seeking intention is less taken into consideration, which calls for an integration of demographic variables, TPB variables, and mental health literacy. Fourthly, to the author’s knowledge, there is no research concerning on undergraduates’ online counseling intention in Xi’an city, Shaanxi Province, China, which would be comprehensively investigated in the author’s research.

3.4 Proposed Conceptual Framework

Reviewing related literature in help-seeking field, a conceptual framework is formulated and proposed for exploration as depicted in Figure 1. It is hypothesized that gender, TPB variables (attitudes, subjective norms, perceived behavioral control), and mental health literacy are associated with online counseling intention. It is also hypothesized that mental health literacy has a mediating effect between gender, TPB variables, and online counseling intention.

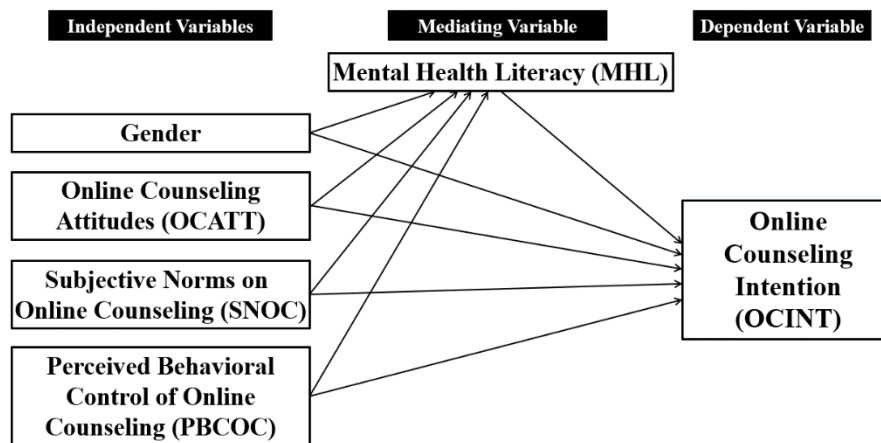


Figure 1: Proposed Conceptual Framework

4. Conclusion

Chinese university students, who are under great pressure and have mental health problems, would experience negative effects in their growth and development. While digital mental health services have been widely implemented in China, it is important to explore the feasibility of conducting online counseling to address university students’ mental health issues. It is found by scholars that help-seeking intention is correlated with various factors. Therefore, demographic factor and the TPB variables are taken into consideration to draw a comprehensive picture of online counseling and their relationships. A conceptual framework is proposed with hypotheses to test the relationship between independent variables (gender, attitudes, subjective norms, and perceived behavioral control) and the mediating role of mental health literacy. It is expected that these four independent variables all have significantly positive relationships with the dependent variable and the mental health literacy plays a mediating role. The current research is hoped to contribute to three areas in enhancing related theory, counseling practicing, and policy making. Knowledge about the influencing factors of online counseling intention in a university sample could support the application of the Theory of Planned Behavior. For counselors, and other faculty members in universities, findings may aid them to tailor programs, which will bring positive effects on students. Appropriate methods are likely to successfully encourage the students to recognize the importance and usefulness of online counseling services thus increasing their intention and actual use of the services to promote their development. Moreover, governments and related organizations could gain some implications and inspiration as to how to make policies to regulate counseling practices.

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Entrepreneurship Education, Challenges, and Impact of Gamification: Critical Review

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Abstract: After the outbreak of COVID-19, the digital transformation of entrepreneurship education has received considerable critical attention. Entrepreneurship education has positively impacted on the creation of new ventures, and it has been widely recognized. Moreover, many universities have taken initiative to offer entrepreneurship education to their students. Students are encouraged to take part in the many entrepreneurship activities at their universities such as trainings, seminars, short courses, conferences, and entrepreneurship events. Entrepreneurship education is one of the most important and necessary aspects of entrepreneurship promotion programs in the society, its education in the traditional way alone is not effective and more innovative and flexible methods are needed. Therefore, the present review was conducted by combining previous research with the aim of providing a comprehensive picture about the role of gamification on entrepreneurship education. The issues and challenges are also discussed and recommending ways to improve the situation. The results of the effort can lead to less unemployed graduates and an increase in business opportunities, which will have a direct impact on achieving the developed nation status as envisioned by Malaysians.

Keywords: entrepreneurship education, gamification

1. Introduction

The goal of entrepreneurship education (EE) is to develop an entrepreneurial mindset, that is, a set of attitudes, skills, and behaviours to discover entrepreneurship opportunities, access resources, and create value amidst uncertainty (Davis et al., 2016; McGrath & MacMillan, 2000). Entrepreneurship is also generally regarded as one of the key competences for lifelong learning which further promotes critical thinking, systems thinking, and cultural agility which is necessary to help make learners adaptable under the context of fast technological growth (Aoun, 2017).

Entrepreneurship is a key element of local and globalised market economies (D'íaz-García et al., 2015), and consequently both education and training programmes specifically designed for entrepreneurs facilitate economic growth and advance the knowledge, skills and abilities of entrepreneurs (Harrington & Maysami, 2015; Lindh & Thorgren, 2016) who can generate businesses now and into the future.

Global economic predicament has also increasingly demanded audacious action from organizations. If these organizations fail to respond properly, there is high risk of business closure. To overcome the situation, entrepreneurs need to develop new meaningful solutions to this complex and dynamic needs of the market. Guidance of many of these future entrepreneurial leaders falls on the shoulders of those in higher education.

Entrepreneurial attitudes and skills can best be advocated through learning by doing and experiencing entrepreneurship in practice, by means of practical projects and activities. Entrepreneurship education programs can help students decide early on whether entrepreneurship is a feasible choice of career (Slavtchev et al., 2012) and can add value to all students, not only for future entrepreneurs (Kuckertz, 2013).

Traditional entrepreneurship lectures usually cover business basics such as market analysis, financial statements, cost analysis, and entrepreneurship basics such as the entrepreneurial process, opportunity recognition, financing, and entrepreneurial orientation. Business planning is the primary learning

method used in most entrepreneurship programs (Honig, 2004; Matlay, 2008). Through business planning, students learn to research, interpret, and integrate data to “describe the current state and the supposed future of an organization” (Honig, 2004, p. 259).

Lately entrepreneurship education has moved towards teaching business models (Osterwalder & Pigneur, 2010). Such as case studies which allow students to review a real or hypothetical situation, analyze information, formulate assumptions, and devise with alternatives and recommendations. Case studies also can help to develop strong analytical skills (Ganesh & Sun, 2015). Meanwhile, with the technological advancements and its disruptive effects have brought about huge changes in nearly all aspects of our society. This new wave of digital transformation empowered by smart plus technologies, such as the Internet of Things, augmented reality, and artificial intelligence, has opened fresh opportunities for innovators and enterprisers.

This new technology has been integrated into tasks to engage, motivate, reward, and allow users to learn new skills or change behaviors (Deterding, 2012). This new technology also introduces gamification. Hamari et al. (2014) conceptualized gamification as motivational affordance leading to psychological outcomes and resulting in behavioural outcomes. Derived from self-determination theory (Ryan, Rigby, & Przybylski, 2006), motivational affordance refers to the fact that “human beings seek out (and continue to engage in) activities if this promise (and succeed) to satisfy motivational needs, such as competence, autonomy, or relatedness” (Deterding, 2011, p. 2). Among motivational affordances, points, leader boards, and badges are the most used gamification elements (Hamari et al., 2014).

Overall, findings from pragmatic studies shows that gamification improves user experience and engagement, motivational affordances, and behavioural outcomes (Deterding et al., 2011; Dicheva et al., 2015; Hamari, 2017; Hanus & Fox, 2015; Seaborn & Fels, 2015). It has been found that the students’ activities with gamifications are good learning stimuli in entrepreneurial classrooms as a first step; then, they found it effective to learn and expand their understanding of theories and models as a second step, which is a reverse approach from a traditional business education approach. Gamification allows students to think critically on game scenarios via participation in gamifications, which can be strengthened and embedded in their mind by theoretical learning which follows the gaming activities (Isabelle, 2020).

Given that EE are important strategic and policy initiatives in providing employment for graduate, it is essential to understand their design, characteristics, outcomes, and effectiveness. Thus, this review aims to clarify some basic tenets of entrepreneurship in education, focusing on what it is and why it is relevant to society. The review also explored the challenges and potential of online gamification to develop actionable recommendations for entrepreneurship pedagogy in the phase of ‘new normal’.

2. Literature Review

2.1 Entrepreneurship Education

Studies shows that there is no definition of entrepreneurship that is considered as a universally accepted definition (Henry et al., 2003). There are several schools of thoughts, each with its own definition. According to Low and McMillan (1988), entrepreneurship is the creation of new enterprises. To Bruyat and Julien (2001), entrepreneurship is seen as a change process, that results in the creation of new values and entrepreneur as business founder.

Traditionally, entrepreneurship education is defined as education that teaches skills required to set up a new business. The best mode of delivery has been much debated. To Hytti and O’Gorman (2004), depending on the objectives, there are many ways how entrepreneurship education can be offered. If the objective of the entrepreneurship education is to increase the knowledge of entrepreneurship, a good approach is to provide the information through public channels such as lectures, seminars, or media. These approaches are known for its effectiveness in spreading information to a larger group of target

audiences within a short period of time. If the objective is equipping individuals with entrepreneurial skills, then, the best approach is industrial training.

However, if the objective of entrepreneurship education is creation of entrepreneurs, then the effective method is using controlled environment to facilitate experiments, such as role play or business simulation. Irrespective of the method chosen, educational institutions do play a role in providing entrepreneurship education (Hytti & O’Gorman, 2004).

Li and Wu (2019) suggested that entrepreneurial education should be linked with team collaboration and interactions based on real business contexts within an organisation. Moreover, the core consideration when designing the entrepreneurial unit should be the promotion of self-efficacy and confidence (Nowinski et al., 2019).

Entrepreneurship education supports students in understanding the idea of business, structure and how the business connects society and the economy. It teaches skills that can be conveyed through the educational system, means facilitate individuals to develop new and innovative plans (Klapper, 2006). It is inevitable for the pedagogists to consider the challenges of the 4th Industrial Age, brought to entrepreneurship education as it has generated a structural change to entrepreneurial development (Zhang 2018). The development of technology has significant impacts on various aspects of business behaviour, which implies that, even with or without COVID-19 influence, entrepreneurial education needs to support the speedy transition of business scenarios to deliver effective learning modules. They also need to support in developing entrepreneurial students with entrepreneurial mindset (e.g. Maaravi et al. 2020; Zhang, 2018).

Thus, the various studies that associated entrepreneurship education to development of entrepreneurship and entrepreneurs indicated towards the need for entrepreneurship education. Entrepreneurship is considered vital to economic development and prosperity (Landström & Harirchi, 2018). Furthermore, the pressure to produce entrepreneurial has pushed universities to consider entrepreneurship education a strategic step to foster economic and societal impact.

2.2 *Interactive Learning based on a Virtual Setting*

Current focus on ‘Edtech’ (educational technology) has highlighted the potential of interactive online games to enhance learners’ financial capabilities. Deb and Bhatt (2020) emphasised the benefits of integrated digital learning to developing skill-oriented entrepreneurial education. They further noted that, employing business gamification in business units could potentially contribute to student learning. A virtual setting allows learners to experience a variety of different settings that cannot be achieved in real physical cases. Blended learning, which combines both online and offline learning perspectives, is one of the best approaches in this context (Stefanic et al., 2020).

Niebuhr and Tegtmeier (2019) recommended the use of specific assistive technologies, such as virtual reality (VR), as digital learning tools to support entrepreneurship learning process. Similarly, Goldstein and Gafni (2019) and Srivastava et al. (2019) also advocated the teaching of entrepreneurship through virtual learning settings based on multicultural teamwork. This enhances collaborative and independent learning of students’ motivation in understanding the business context in a more critical manner.

2.3 *Gamification and Entrepreneurship Education*

Gamification is generally defined as the use of gameplay mechanics for nongame applications, that is, “the use of video game elements to improve user experience and user engagement in nongame services and applications” (Deterding et al., 2011). Gamification includes a number of game components such as points, badges, levels, leader boards, status, trophies, rewards, and progress bars (Deterding et al., 2011; Seaborn & Fels, 2015). The gamification of education has primarily been assessed on how game mechanics affect student experience, motivation, and engagement (Hamari et al., 2014; Hanus & Fox 2015; Henrie et al., 2015).

The positive impact of gamification, especially in the context of entrepreneurial education, has been debated in pedagogical studies (Antonaci et al., 2015). This methodology has been a topic of discussion for several years, with practitioners offering some testimonials to recommend that gamification had a positive impact on students' business behaviour and practices (Sarmila et al., 2019). Torres-Toukourmidis et al. (2019) noted the significance of preparing a learning platform with gamification for entrepreneurial competences.

Isabelle (2020) further examined the effect of gamification from an entrepreneurial education standpoint. This examination reveals that it would be good practice to launch an online gamification learning measure, as it will have a technological impact on entrepreneurial education and enable the development of actionable action for pedagogical stakeholders and researchers. Moreover, Zhang and Price (2020) also proposed that pedagogical alignment is key to entrepreneurship education. Gamification has been acknowledged for its potential in enhancing learners' performance and nurture the entrepreneurial competence with other teaching modules (Aries et al., 2020; Isabelle, 2020; Kariv et al., 2019).

The findings of Takemoto and Oe (2021) study also suggests that the use of gamification in entrepreneurship education can be very useful on all three types of educational goals, namely the creation of learning and desirable changes in learners' behaviour in several aspects of cognitive, emotional, and skills.

2.4 The Importance of Entrepreneurship Education

Numerous studies have shown that entrepreneurship education is important in cultivating the spirit of entrepreneurship among graduates (Sexton & Upton, 1984; Ronstadt, 1987; Robinson & Hayes, 1991; Solomon et al., 2002; Katz, 2003). Studies by Kolvereid and Moen (1997) also found that students who had majored in entrepreneurship, or had taken an entrepreneurship course or subject, had shown greater tendency to become entrepreneurs. They also displayed more entrepreneurial behaviour compared to other students who are not exposed to entrepreneurship studies. This finding is also in line with the study of Ibrahim and Soufani (2002) that showed that the formation of entrepreneurial traits is strongly influenced by the education system and the schools.

Thus, the various studies that linked entrepreneurship education to development of entrepreneurship and entrepreneurs' points towards the need for entrepreneurship education for today's society. These findings also underline the needs for entrepreneurship education to be a subject for higher learning institutions in developing countries. As a developing country, Malaysia needs to hasten entrepreneurship education in its education system. Earlier introduction to entrepreneurship education can be a useful agenda to foster entrepreneurial culture among the student population.

2.5 Entrepreneurship Education in Higher Learning Institutions

Hamidon (2015) who presented a paper at the 4th UNESCO-APEID Meeting on Entrepreneurship Education, says that the current state of entrepreneurship education in Malaysia can be analysed upon four main elements namely entrepreneurship centre (EC) maturity, education programmes offered, development of entrepreneurs and competency of educators.

In terms of EC maturity, EC has effectively been formed in the Higher Learning Institutions (HLIs) in Malaysia, with 5% of the public universities are able to generate income of more than 30% of spending. However, the support from parents towards them is absent even though the Ministry of Higher Education clearly supports public universities' program (Hamidon, 2015).

For education programmes, HLIs in Malaysia are moving towards the right direction by emphasizing entrepreneurship education. 53% of HLIs in Malaysia instil entrepreneurship components in their courses and 57% of HLIs incorporate more than 15% of practical components in teaching entrepreneurship. 52-75% of students are encouraged to do industry attachments and 70% of HLIs can adapt curriculum changes.

The effort to develop entrepreneurs in HLIs is considerably high in Malaysia. 90% of HLI students in Malaysia have the aspiration to start a business and almost all HLIs in Malaysia encourage students to start a business while studying. This effort is further enhanced by having entrepreneurship incubator programmes in 70% of HLIs in Malaysia (Hamidon, 2015).

It is essential to have high competency educators to ensure entrepreneurship education effectiveness. However, the competency of educators in Malaysia is still lacking in terms of entrepreneurship competency. 50% of lecturers in HLIs are experience in entrepreneurship education but only 20% of lecturers have attended entrepreneurship training programmes and less than 20% of lecturers have attended entrepreneurial mind-set pedagogy training. The numbers are quite alarming as this situation may be interpreted as most of the lecturers that taught entrepreneurship education have not gone proper training (Hamidon, 2015).

3. Challenges of Entrepreneurship Education

Malaysia Higher Learning Institution (HLI) has offered various supports for entrepreneurship education. However, a substantial number of HILs still facing difficulties in implementing entrepreneurship education effectively.

One of the major concerns is financing. Though many agencies support the causes of entrepreneurship education, the process of obtaining loan is considerably tedious. Some HLIs took the initiative to offer seed capital in the form of soft loans, but the size of the funds is small and as it is being managed in the way of revolving funds, the funds have constantly experienced a shortage since repayment is slow and erratic (Yusoff et al., 2014). One may argue that the availability of microfinancing is sufficient, and it is easier to secure, however another problem arises as 89% of students in HLI are not aware of the availability of microfinancing (Hamidon, 2015). It seems that the promotions and awareness effort of microfinancing targeted to HLI students have considerably failed.

Secondly is the commitment towards entrepreneurship education. Both educators and students find it is difficult to commit towards this cause. The student's priority is to focus on academic grades and the ability to juggle between study and venturing into business is a challenge (Hamidon, 2015). On the educator's part, they too argued that they are burdened by academic tasks and for them to commit to entrepreneurship education, they need more time as well as recognition (Hamidon, 2015).

Furthermore, educators were also not given appropriate entrepreneurship training before being given the task of teaching entrepreneurship subjects. To make things worse, it was found that some of the educators have no qualifications to conduct entrepreneurship programs (Yusoff et al., 2014). This is a fundamental and crucial issue for the success of the university's entrepreneurship programs. Moreover, some HLIs management also do not see entrepreneurship education as a significant program. Need to understand that entrepreneurship education is not only about learning business theories, but also it demands extensive exposure to personal practical experience, an effective pedagogical method, and an experienced and competent educator.

There is also an issue where the HILs have a misunderstanding of the objectives of entrepreneurship education. The majority of HILs believe that that entrepreneurship education is to inculcate entrepreneurial characteristics to students so that when they graduate, they have certain value-added skills that will increase their chances in employment (Yusoff et al., 2014). However, contrasting to the former believes, some HLIs understanding of entrepreneurship education is to produce graduate entrepreneurs (Rahim & Chik, 2014). These contrasting understanding has created an issue as different objectives require different pedagogy for the programs to be successful. Misunderstandings of the objective affect the uniformity in the implementation of the programs.

4. Discussion and Recommendation

It is vital to address the issue of students and educators' dedication towards entrepreneurship education. Students need to be given time and recognition for their extra effort out of the normal academic responsibility. Some private HLIs provide two graduation certificates: one for academic and another for extra co-curricular activities, including entrepreneurship. While for other educators, such as University Teknologi MARA, has adopted the practice that entrepreneurship activities engaged by the educators is needed for their graduation, therefore giving recognition for entrepreneurship engagement (Rahim & Chik, 2014).

Therefore, other HLIs should also start and adopt the initiatives to promote and increase the interest among students and educators. Educators are the forefront of entrepreneurship education, and they should be well-trained and have relevant academic background to teach entrepreneurship. HLIs should focus on arming the educators with relevant training and they should be employed based on relevant academic background. Moreover, they should incorporate gamification in their delivery methods.

Lastly, Ministry of Higher Education should step up and clearly define the measurement of success for entrepreneurship education and strengthen the policy on entrepreneurship education. Entrepreneurship education in Malaysia can only be improved if steps are taken holistically and with cooperation of several parties. This effort will surely take time, but it is essential to ensure the objective of entrepreneurship education is met.

Moreover, to ensure success, curriculum should incorporate following concept as suggested by Emma-Jane Packe (2018) director of The Supper Club, a membership club exclusively for fast-growth entrepreneurs:

- a. Focus – avoid distraction, stay alert, don't get distracted by shiny new objects and exciting projects. The most successful people we see remain focused and have clarity in their vision.
- b. Communicate – clarify, simplify, and communicate the vision. It will attract better staff, attract better suppliers, attract better customers, and ultimately lead to better results.
- c. Calibrate – measure, analyse, change, repeat. Learn from successes and mistakes and improve constantly.
- d. Delegate – Invest in your team and yourself, to give the skills that needed.
- e. De-risk – make time to see what's coming down the track. History shows us that all businesses fail at some point. Make sure we don't get wiped out by something that we could have foreseen.

While the effectiveness of interactive multimedia-based learning approach has been discussed and evaluated in the higher education context, precisely which kind of teaching menu/package is required to enhance the positive outcomes of game-based learning has not thus far been researched.

A classroom is not just a place but is instead a hub of interaction and a nurturing learning atmosphere based on collaborative communication among students and tutors (Alles et al., 2019). Establishing a positive learning atmosphere and conversation culture during in-class activities is one of the critical factors to supporting students' learning outcomes.

Law Minister while debating on anti-hoping Bill said “We need to remember an important thing, we are moving towards an entrepreneur nation by 2030, if there are too many bankrupts, our youth will avoid being entrepreneurs, and will stymie government efforts to turn Malaysia into a business country,” (NST, 25 July 2022). Thus, we need to ensure that there is proper planning and support system that is available to our future entrepreneurs.

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A Literature Review of Key Determinants of the Rental Rate of A-grade Office Space

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Abstract: Many organizations were planning smaller office spaces as they moved into internet operations due to the COVID-19 epidemic. Due to the same epidemic, several other organizations were aiming to expand their workspace in order to preserve social distances. However, the resultant impact has reduced both the occupancy and rental rate of the purpose-built office building. According to recent industry surveys, the office space rent is starting to rise again, approaching pre-pandemic levels. The determinants of rental rates for office buildings include a wide range of variables such as supply and demand-side factors (micro and macro-economic factors), green practice-related factors, property-specific factors (locational and physical characteristics), marketing-related factors (branding and positioning), and transaction-related factors (lease characteristics). Numerous academics in the body of literature agree that variations in office space rental rates are primarily caused by shifts in office building supply and demand. Therefore, this review study exclusively investigates the demand and supply-side variables that influence office space rental rates by referring to the literature from 1990 to 2020 all over the world. Further, the researcher summarizes and justifies the role of those variables in influencing the rental rate of office space, which is in addition to the review of theories connected to macro and microeconomic factors from the existing body of literature. The review confirms that variables such as GDP, inflation, interest rate, office employment rate, vacancy rate, and office floor stock are prominent in deciding the rental rate of office space.

Keywords: A-grade, office space demand, rental rate, key determinants

1. Introduction

The majority of developed and developing countries have gone through the passive renting, active buying, and active renting processes. Hence, companies in any country make an economic decision when deciding whether to buy or rent office space to meet their needs. Thus, understanding the determinants of rental rates of the office space market is crucial for both landlords and tenants. On one hand, real estate investments compete with other types of capital market assets such as stocks, bonds, and money market instruments. When interest rates and yields on bonds and stocks are low, investors prefer to invest in real estate. In any economy, the new development will be very profitable if the office rent is higher than the “level of replacement cost rent” (Geltner, Miller, Clayton & Eichholtz, 2001). The “level of replacement cost rent” tends to be the long-run equilibrium rent in the market and is defined as the level of rent that is just sufficient to stimulate profitable new development. As stated by Boon and Higgins (2007), real estate developers require a better understanding of the determinants of the office market as rental values are the key property benchmark, where rental becomes a major cost for tenants, while it’s a source of income for the landlord. At the same time, stakeholders should understand that real estate properties, especially the units of office space, are heterogeneous (Jowsey, 2011). This means that each unit in the property is unique in terms of financing, building, condition, and location. Therefore, assessing and pricing is also relatively difficult. In addition to the aforementioned obstacles, building owners also face several difficulties in practice, as outlined below.

First, the occupancy rate of the same office building varies significantly over time. Second, the market's supply of office space is not accurately reflecting demand. Third, a nearby office building exhibits variations in occupancy and rental rates. Fourth, the time it takes to recoup the initial investment in energy-efficient buildings is longer than that of ordinary office buildings. Finally, neighboring office buildings with comparable added services have experienced fluctuations in rental income throughout the same time frame.

Therefore, this systematic review attempts to investigate and identify the different categories of factors that have been considered in the literature, as the key determinants of the rental rate of A-grade office space in purpose-built office buildings. Next, investigate the direction of the impact of those factors on the rental rate. However, this critical review will be limited to supply and demand-side factors as rent and occupancy rates are products of demand and supply.

Grade A office buildings are defined as the "most prestigious buildings competing for premier office users with rents above average for the area" by the Building Owners and Managers Association (BOMA) (Office Building Classification Guide, 2016). BOMA divides the class of office buildings into different categories based on a variety of criteria in order to standardize the office building industry.

2. Research Methodology

There are two distinctive orientations available for reviewing articles: author-centric and theme-centric (Webster and Watson, 2002). In this paper, the researcher follows the theme-centric approach. The selected theme was "rental income from commercial property."

2.1 Search Strategy

The search follows a systematic review of published academic research papers, conference proceedings, books, etc. as shown in figure 1. The geophysical area of the study is not limited. The data collection period is limited to 20 years from 2000 to 2021. First, the search was performed using Google Scholar and Scopus with the theme of "key determinants of the rental rate of purpose-built office space". The keywords used in the Boolean operators of various combinations are shown below.

- a. Commercial property
- b. Office space market
- c. Rental rates
- d. Real estate
- e. Key determinants of rent

Next, the titles and abstracts of the articles were examined. It was found that many articles have at least one keyword. After reviewing the topic and authors, the duplicate publications were removed. Next, we realised that some of the publications that resulted from keyword searching were completely irrelevant to the study area. Those false-positive publications were only known once the abstract was read, and they were also rejected because the articles discussed a different topic. Next, the selection of articles was carried out by means of rejection. i.e., we selected only articles whose dependent variable is rent and all other articles were rejected. The final step was to review the content of the remaining articles.

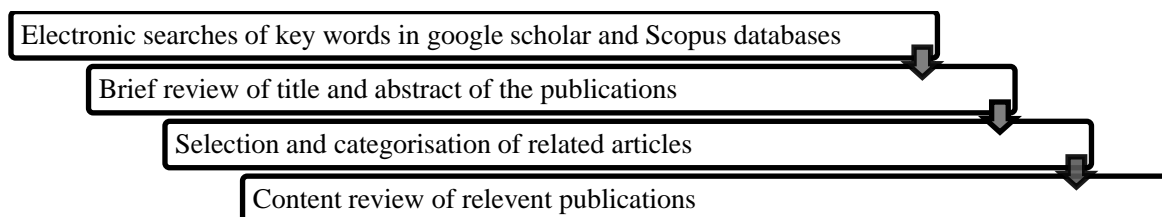


Figure 1. Search Strategy Process

3. Results

The results of the selection of articles based on the above criteria are shown below.

- a. 620 articles identified and downloaded
- b. 193 articles obtained after reading the title and abstract. Included those discussing office building
- c. 138 articles were selected as relevant and categorized based on the type of variables. Included those discussing office rent.
- d. 49 articles selected for further review which discuss demand and supply-side factors in their reduced-form models and whose dependent variable is "rent". i.e., if IVs are related to demand and supply, they were included for further review; if IVs are related to other factors, such as property-specific factors, availability of green certification, branding, and so on, they were excluded.

The literature considered several clusters of independent variables and examined their impact on the rental rate, as listed below.

- a. Supply & demand-side factors (micro and macro-economic factors)
- b. Green practice related factors
- c. Property specific factors (locational and physical characteristics)
- d. Marketing related factors
- e. Transaction related factors (lease characteristic)

The number of published articles in each cluster is illustrated in Figure 2. It is important to note that several articles considered more than one cluster of independent variables.

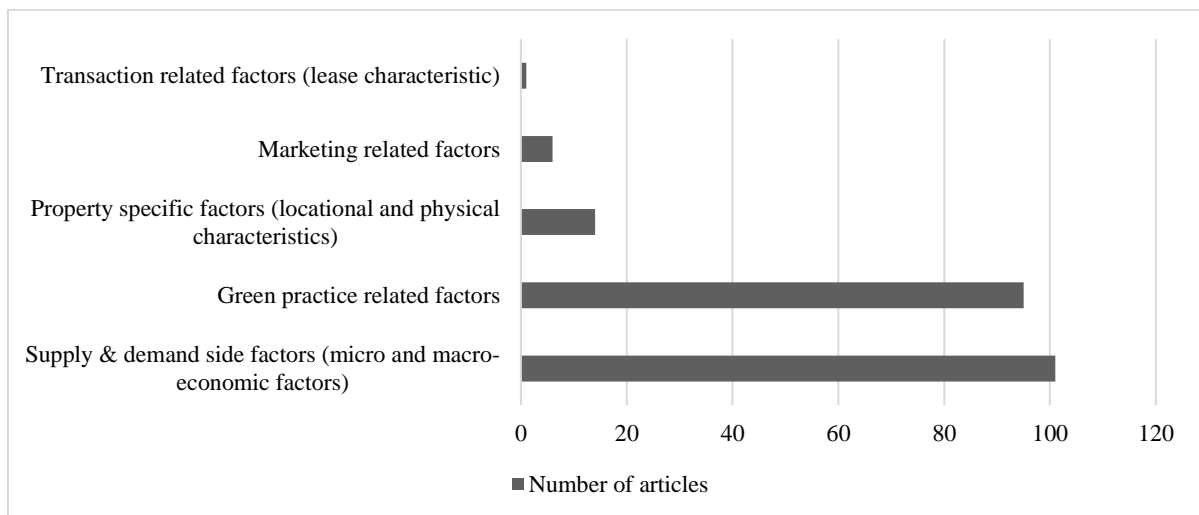


Figure 2. Clusters of Independent Variables vs Number of articles

The selected 49 articles, which mainly considered the demand and supply-side variables as independent variables, were further analysed. The list of independent variables and their dispersion is shown in figure 3.

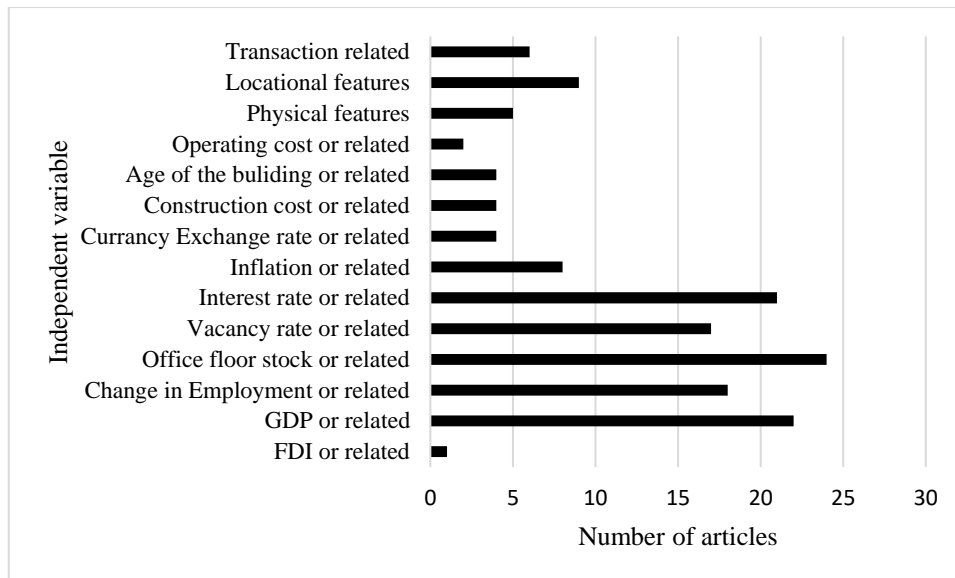


Figure 3. Independent Variable Vs Number of Articles

4. Critical Review

As per Bera & Uyar (2019), office rent determinants can be classified into three major groups; locational, physical and lease characteristics, in addition to the demand side characteristics. Oven & Peckdemir (2006a), 74 numbers of office rent determinants derived from the literature. However, these factors are highly interchangeable based on the geo-environmental locations (Dunse, Jones & White, 2010). Simon, Achسانی, Manurung, & Sembel, (2015) stated office rental rates can be modelled by using the framework of the theory of demand and supply. Simon et al clearly stated that macroeconomic factors belong to demand-side factors, whereas the microeconomic factors fit into supply-side factors. Karley (2016) stated in general both micro and macro-economic factors affect the office space rental rates. Therefore, the rental rate can be determined by the interaction between demand-side and supply-side factors as stated by Chin (2003). Jowsey (2011) stressed the importance of consideration of different attributes in rental value determination. There is plenty of demand and supply-side factors, considered in the literature. It is important to note that different researchers in different geological locations used different factors to capture the same measure. Therefore, those factors were clustered based on the nature of the measure as described in the following section.

4.1 List of Demand and Supply-side Variables (Macro and Micro-economic Related Variables)

In this review study, the critical review is limited to demand and supply-side factors and does not examine other factors such as green certifications, property-specific (locational and physical characteristics), marketing and lease characteristics.

Macroeconomic (Demand side) factors (Simon et al., 2015):

- a. Prime interest rate, the Interest rate on General commerce, the Interest rate on real estate loans, or Monetary policy rate (Akinsomi et al., 2018)
- b. FIRE employment (Finance, Insurance and Real-estate employment), Service employment or Unemployment rate (Chin, 2003)
- c. Inflation or Consumer Index (CI) (Udoekanem & Nuhu, 2014)
- d. Exchange rate (Udoekanem et al., 2015)
- e. GDP (Gross Domestic Product), GDP growth rate, Real GNP growth (Δ GNP) or Service Sector Output (Boon Foo & Higgins, 2007)

Microeconomic factors (Supply-side) factors (Simon et al., 2015)

- a. Vacancy rate, Occupancy rate or Absorption rate (Ke & White, 2009)
- b. New supply, Office space inventory, Office floor stock or Changes in floor space (FS) (McCartney, 2012)
- c. Availability (Orr & Jones, 2003)

4.2 Review of Macroeconomic (Demand-side) Factors

4.2.1 Gross Domestic Product (GDP)

According to Udoekanem and Nuhu (2014), GDP is significantly related to rental rates in Minna, Nigeria. The study done in Shanghai by Ke and White (2009) found a substantial positive association in the long run but insignificant in the short run. These outcomes are understandable given that the market requires time to respond to or adjust to economic changes. McCartney (2010) discovered a positive association between real GNP growth (GNP) and the annual change in real office rents (RR) in the Dublin office market. McCartney (2012) again found consistent outcomes in a study of the Dublin office market. In the long run, 12 major European marketplaces yielded similar outcomes (Mouzakis & Richards, 2007). Alike et al. (2018) in South Africa, Giussani, Hsia & Tsolacos (1993) in Europe, Udoekanem et al. (2015) in WUSE, Abuja, Nigeria and Udoekanem et al. (2015) in Minna, Nigeria revealed a positive correlation.

In contrast, Boon Foo and Higgins (2007) discovered that GDP is not statistically significant in explaining variation in rent in Singapore. Similarly, Simon et al. (2015) discovered a negative connection in their Jakarta investigation. However, the property's selling price has a favourable link with economic growth. This indicates that rental rates are not affected by economic fluctuations. This scenario should be explainable by looking at the composition of the Indonesian GDP over this time period. One may argue that, while GDP has changed, the contribution of the service sectors to GDP has not. A study conducted in the Southeast Asian cities: Singapore, Hong Kong, Taipei, Kuala Lumpur, and Bangkok also experienced no correlation between net office rents and GDP (Chin, 2003). This scenario can also be depicted as above, taking into consideration the contribution of the service sector to the country's GDP.

As described above, existing literature supports the positive, significant correlation between GDP and rental rates. Hence, the GDP of the country or more precisely GDP of the service sector should be considered as a prominent determinant of the rental rate of office space.

4.2.2 Foreign Direct Investment (FDI)

According to Ke and White (2009), FDI is significant in the long run but insignificant in the short run. This can occur in any market where the reaction lags. Similarly, Wang and Hartzell (2021) demonstrated that changes in FDI influence housing and retail returns, while GDP becomes the primary determinant of Hong Kong's real estate returns. GDP and FDI are inextricably linked in economic terms. Furthermore, there is no convincing evidence in the literature to support considering FDI as an explanatory variable independent of GDP.

4.2.3 Inflation (Price level)

Inflation erodes the wealth of everyone over time. The prime objective of an investment is to protect against the negative effects of inflation. Investors expect real estate investments to be inflation hedges as rental rates can be adjusted over time in response to the fluctuation of inflation. Taderera & Akinsomi (2020) show that direct real estate investments are generally an inescapable hedge against inflation in the short run in the study held in South Africa. However, the income return of office space hedges against inflation in both the long run and the short run. However, rental escalation does not allow rental returns to outgrow inflation in the short and long run (Taderera & Akinsomi, 2020). Similar results were found in the study conducted in New Zealand in the area of real estate and financial assets by Gunasekarage et al. (2008).

According to Boon Foo and Higgins (2007), inflation has a positive link with Singapore construction costs. Furthermore, Simon et al. (2015), Akinsomi et al. (2018), and Udoekanem et al. (2015) found a favourable link between the inflation and rental rates in the marketplaces of Jakarta, South Africa, and Abuja in Nigeria. In contrast to the above findings, Chin (2003) finds that inflation is insignificant in Southeast Asian cities such as Singapore, Hong Kong, Taipei, Kuala Lumpur, and Bangkok. Chin employed the consumer index (CI) as an inflation proxy. In a study conducted in Minna et al. (2014) and Udoekanem et al. (2015) found inflation to be insignificant. The experts contended that the GDP growth rate was unstable during this time period since inflation peaked at 23.8% in 2003, then fell to 6.6% in 2007 and fluctuated thereafter. As a result, we might argue that this is an uncommon scenario in which rental levels cannot respond to such a change in inflation. In summary, inflation can be considered a significant factor that affects the behaviour of rental rates of office space.

4.2.4 Bank Lending Rate (Nominal Interest Rate)

Boon Foo and Higgins (2007), Chin (2003), Simon et al. (2015) reported the prime interest rate is significant and has a positive relation to rental rates in office space markets in Singapore, Hong Kong & Kuala Lumpur, and Jakarta respectively. However, South Africa reported mixed results (Akinsomi et al., 2018).

Udoekanem and Nuhu (2014) investigated the relationship between interest rates on general commerce and interest rates on real estate loans in Minna, Nigeria, and discovered that there is no relationship to office rent. In a study done in Abuja et al. (2015) discovered no association between interest rate fluctuations and rental rates. In Shanghai, Ke and White (2009) found insignificant results in both the long and short run. This result is consistent with the findings of other scholars, as Ke and White considered real interest rates, which are inflation-adjusted, whereas others considered nominal interest rates. Further, it is important to note that, inflation (price level), nominal interest rate, and real interest rate are interrelated as per concepts in finance and economics. This relationship can be illustrated by the Fisher equation (Gregory Mankiw, 2007). Nevertheless, the body of literature proved as described above, that the rental rates of office spaces are highly influenced by nominal lending rates.

4.2.5 Currency Exchange Rate

There are economies such as Moscow and Colombo that have A-grade commercial properties owned by foreigners, and they may fix rental rates in USD. Investors in those properties expect a triple return on investment from real estate; rental yields, expected property appreciation and expected exchange rate appreciation. Yang and Zhiqiang (2012) claimed that, when expecting the appreciation of the local currency and the increase of the foreign investor's overall return, foreign capital will be flown into the local real estate market, and thereby real estate rental yields and property values will appreciate. On the other hand, what if the local currency devalues in comparison to the USD in an economy? In addition to the reduction in foreign inflow, the cost of imports will also go up. If the industry depends on imports of MEP (Mechanical, electrical and plumbing) equipment, the cost of construction will go up as 30% to 40% of construction cost comprises MEP services. Hence, in an economy such as Colombo, expected return should be hinged with parity in rationale and expected rental rates should also be connected to the parity rates.

However, there hasn't been much research on the exchange rate as an independent variable in determining office space rental rates. Furthermore, among the studies conducted, most research determined that the exchange rate has no meaningful link with the rental rate of office space. Udoekanem and Nuhu (2014), Udoekanem et al. (2015), Udoekanem et al. (2016). However, Simon et al. (2015) found a substantial positive relationship in the Jakarta office market.

4.2.6 Office Employment / Unemployment Rate

In Jakarta, Simon et al. (2015) found a significant positive relationship between rental rates and service employment. Similar results were reported by Bruneau and Cherfouh (2015) in Greater Paris but with employment and rental rates. Alike Akinsomi et al. (2018), disclosed a negative relationship between unemployment and real estate return in South Africa. Similar results were shown by Giussani et al. (1993) in a study conducted in Europe. However, Udoekanem and Nuhu, (2014), disclosed employment level and rental rates have positive relation but are not significant in Minna, Nigeria.

According to Boon Foo and Higgins (2007), unemployment and rental rates in Singapore have no relationship. Chin (2003), on the other hand, reported a positive relationship between Taipei's rental rate and unemployment, which is theoretically incorrect. The scholar argued that this unrealistic result could be because the prime office market in Taipei is located in the CBD and unemployment is taken for the whole country. It is problematic to use the unemployment rate to forecast the requirement for office space because some employees don't actually need an office to function. People who work in production, agriculture, self-employment are some examples of those who cannot be classified as unemployed but do not need traditional office space. Similarly, digital nomads whose primary employment takes place on the internet (Thompson, 2018), gig employments (gigs are one-time jobs and people can be acquired from a particular website or phone base application) are location independent and do not need a permanent office. As a result, choosing the unemployment rate as an explanatory variable for the rental price of offices may not be wise. Therefore, it makes sense to take employment rates into account when estimating office space rental costs. However, as it covers all employments that are not office jobs, it shouldn't represent the overall employment rate. So, it is possible to choose the office employment rate more wisely.

Therefore, this review concludes that the office employment rate is a significant determinant of office rental rates because numerous scholars have demonstrated that employment level or service employment has a considerable impact on rental rates for office space. Additionally, this review recommends using an alternative variable such as "office space/service employees," which will help to resolve the problems with the service employee rate mentioned above.

4.3 *Microeconomic Factors (Supply-side)*

4.3.1 *Vacancy Rate*

Almost all scholars reported a significant negative correlation between the rental rate and the vacancy rate in various studies conducted in different parts of the world. Boon Foo and Higgins, (2007) in Singapore, Udoekanem & Nuhu, (2014) in Nigeria, Ke & White, (2009) in Shanghai, McCartney, (2010) in the Dublin office market, McCartney, (2012), again in the Dublin office market, Udoekanem, Ighalo, Sanusi & Nuhu, (2015) in Abuja in Nigeria, Udoekanem, Ighalo & Nuhu, (2015) in Minna in Nigeria, Wheaton & Torto, (1988), Frew & Jud, (1988) in Greensboro, North Carolina, Glascock, Jahanian & Sirmans, (1990) are some of the studies recorded in the body of the office market literature. Furthermore, some investigations reported the size of the influence of vacancy rate changes on rental market performance. According to one study conducted by Wheaton & Torto (1988), real office rentals drop by about 2% per year for every percentage point of "excess vacancy" in the market. In addition to the foregoing, McCartney examined rental growth sensitivity to demand when vacancy is low. In other words, McCartney argues that when supply declines, rental growth will become more susceptible to fluctuations in demand.

Regardless of the above truth, one can claim that the vacancy rate is a product of supply and demand as the vacancy is defined as the gap between office floor stock and occupancy. However, the current period's vacancy rate will undoubtedly influence the rental rate of office space for the following period.

4.3.2 *Office Space Inventory or Office Floor Stock Available to Occupy*

Adams and Füss (2012) found that a 1% increase in the supply of office space reduces real rents in the long run by 2.25% in a study done in German towns to establish the rental adjustment process. Similarly, Ke and White (2009) and Mouzakis and Richards (2007) found a significant and negative link between office floor stock and rental rates in both the short and long run for the Shanghai and European office markets. Chin (2003) observed similar findings for changes in office floor stock and net office rentals in Southeast Asian economies.

On the supply side, most researchers used office floor stock relative to total demand as an independent variable. However, the appropriateness of this variable is challenging as some of the office spaces may not be ready for lease all the time. Therefore, available office space or the availability rate can be considered more appropriate. Boon Foo and Higgins (2007) used new supply as the supply-side independent variable for the Singapore market and reported an insignificant correlation but with the expected negative sign. Hence, we conclude that office floor stock that is available to occupy is a prominent variable that should be considered in examining the rental rate of the office market.

5. Propositions or Theories

In the field of the rental market for office space, the following hypotheses or theories have been identified.

- a. Demand and Supply
- b. Natural vacancy theory
- c. Pattern of Vacancy rate and rental rate

5.1 Demand and Supply

The Law of Supply and Demand appeared several discoverers; John Locke in 1691, Sir James Steuart in 1767, Adam Smith in 1776, and Alfred Marshall in 1890 (Dwivedi, 2009). As per the theory, the rental value is the market price of occupying office space. Hence, the market price (rental value) has to be determined by the supply and demand of office space. Office space is required by professional sectors such as banks, finance, insurance, etc. One can argue that office space is a factor of the production of other economic activities (Karley, 2016). Therefore, when the economy is dominated by the service sector and is growing, the rental rate has to go up, as illustrated in figure 4 below. It is important to note that the supply cannot be changed immediately in response to a change in price due to the nature of construction.

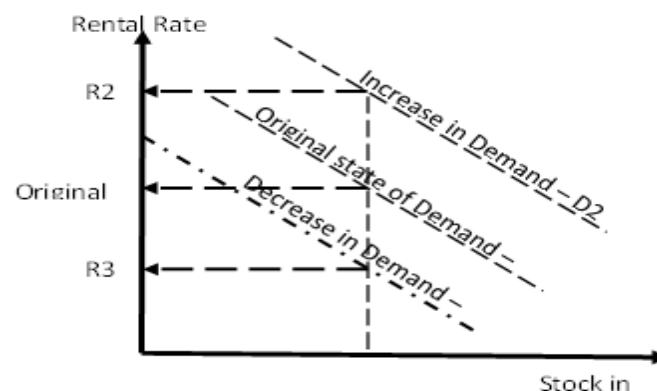


Figure 4. Graphical Representation of Demand and Supply

However, the application of demand and supply theory has limitations as the behaviour of individuals or firms cannot be controlled similar to set up in a laboratory. Therefore, the results will be different in the changing economic conditions from time to time and market to market (Jowsey, 2011).

5.2 Natural Vacancy Theory

In a frictionless economy, supply equals demand, which implies that the vacancy rate is zero. In reality, real estate markets are characterized by frictions that tend to impede the process of market clearing. And in this market, it can be difficult to tie up a particular office space with the most suitable tenant. Therefore, landlords wish to lease to tenants who are most willing to pay for their particular space and will set rents so that not all tenants will find the lease attractive. Further, at any given time, some buildings will be temporarily vacant, either because they are between lettings or because they are newly built and awaiting their first occupancy. Thus, even in equilibrium, we should expect to observe some empty space. This is identified as the natural vacancy rate. Hence, the natural vacancy rate can be defined as the frictional vacancy rate created by landlords waiting for better offers (McCartney, 2010).

However, the application of the natural vacancy theory to the rented property market was first proposed by Blank and Winnick in 1953. The percentage change in real effective rent is related to the difference between natural and observed vacancy rate as per the traditional equation (Black & Winnick, 1953 as stated by Rodríguez & Sosvilla-Rivero (2017), Rosen & Smith, 1983, Wheaton & Torto, 1988). Sanderson, Farrelly & Thoday (2006) stated that developed markets have lower natural vacancy rates than developing markets by analyzing data from North America, Europe and Asia Pacific markets. Amy, Ming & Yuan (2000) showed that the natural vacancy rate for the office space market in Singapore over the sample period of 1979–1997 was found to be between 10% and 12%, depending on the price adjustment model used. Similar studies were conducted by Anari & Hunt (2002), Yang, Chau & Chen (2021).

5.3 Pattern of Vacancy Rate and Rental Rate

According to the natural vacancy theory, a simple characteristic of market equilibrium is demand equals supply minus natural vacancies. Outside of the equilibrium, rent gradually returns to equilibrium, and vacancies return to the natural vacancy rate. In such a case, the vacancy rate variation from the natural rate would simply be a mirror image of the rent divergence from its equilibrium levels (Englund et al., 2008).

6. Conclusion

This paper undertakes a systematic review of studies of key determinants of rental values of office space. There are plenty of factors considered in the literature. As shown by Adnan & Daud (2010), the rental rate is the most important factor in deciding occupation. The rent is largely determined by the interaction of demand-side and supply-side factors. It demonstrates that on the demand side, GDP, inflation, interest rate, and office employment rate dominate, whereas on the supply side, vacancy rate and office floor stock dominate.

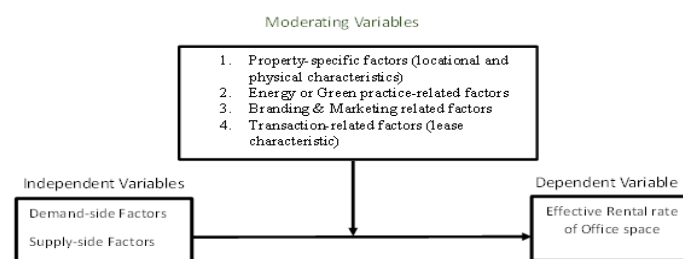


Figure 5. Conceptual Framework for Econometric Model

The rent of offices does not remain constant across the entire market (Dunse and Jones, 2002). i.e., once the demand and supply-side factors become common across the market, the other factors play a role in influencing the rental rate. Other factors have an indirect impact because they influence the demand and supply of office space and help to moderate the outcome of demand and supply. Therefore, future studies shall be conducted in the areas of Property specific factors, Marketing related factors, and green

certification as those are vital in a competitive office space market. At the same time, a reasonable econometric model can be conceptualized as shown in figure 5.

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A Review of the Impact of Green Building Certification on the Rent of Commercial Properties

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Abstract: The cost of energy and global warming are two serious issues that confront the world today. As a result, the world is promoting sustainable or green building development to mitigate the impact of the building sector, particularly on global warming and other environmental pollution. As green development costs more to developers, it is important to investigate the return of such investments from developers' perspectives in addition to the benefits enjoyed by the tenants. This study explores available certifications and institutes for green or sustainable building certifications all over the world. Then, the researcher examines the development of green building studies over time and in various markets of office buildings. Further, the researcher investigates the green incentives in various property markets such as the USA, Europe, and other parts of the world. This study reviews and summarises the impact of various green building certifications on rental rates by reviewing the existing body of literature from 2003 to 2021. The review finding signifies that green certification improves the rent of commercial properties in comparison to similar non-certified buildings, as 77% of the studies confirmed a significant positive correlation between green certification and rental rate. However, the researcher eventually proposed conducting studies on relative rent as the profitability of the development depends on both the occupancy rate and rental value

Keywords: commercial property, green certification, rental rate, review

1. Introduction

Today, the world is focusing on low-energy buildings, also known as eco-buildings, sustainable, or green buildings, which are designed to reduce the strain on environmental resources while also limiting the negative impacts on human health by utilising natural resources efficiently. However, the words sustainable and green were used interchangeably in the literature, though the words sustainable and green have different meanings as highlighted by many scholars. For example, Cole (2006) described Green as “building design strategies that are less environmentally and ecologically damaging than typical practice”. Berardi (2013) described sustainable development as “a development which meets the needs of the present without compromising the ability of future generations to meet their own needs”.

Global warming, lack of resources, and other factors necessitate the need for energy-efficient structures in general. Aside from the need to increase human productivity, the transmission of the COVID-19 virus emphasises the need for healthy buildings, as interior air quality is prone to preventing virus spread. As a result, the world has recognised the significance of converting conventional structures to green buildings. It is an addition to the green building drivers mentioned by Yudelson (2010) for green buildings in the United States.

There are plenty of independent green building certification institutions available all over the world. As such, developers need to be aware of those institutions and their rating systems. As per Doan et al. (2017), there are approximately 600 green rating systems available globally, each with similarities and differences. As per Doan et al. (2017), the most flexible or available rating system all over the world is LEED, and it is distributed to 160 countries, whereas BREEM is spread to 77 countries. However, the highest number of certified buildings recorded by BREEM is 561,600 as of 2017 (Doan et al., 2017).

1.1 Evolution of Green Building Studies

Green building research covers a wide range of topics, including the effect of indoor air quality on cognitive performance (Boubekri, 2020), satisfaction benchmark (Bae, Martin, & Asojo, 2021), and occupant health (Cedeo-Laurent et al., 2018). There are several review articles available in the area of green building developments. According to a bibliographic analysis undertaken by Li et al. (2021) from 1998 to 2018, the United States was the most producing country, accounting for 14.98% of all publications. China (including Hong Kong and Taiwan) and the UK followed next. The analysis also revealed the highest growth rate in green building-related publications between 2004 and 2007. According to Li et al., the development of green buildings has gained momentum since the establishment of the United States Green Building Council (USGBC) in 1993 and the UK Green Building Council (UKGBC) in 2007. Additionally, the introduction of the Energy Policy Act 2005 in the USA was a turning point in the development of green buildings and served as the inspiration for numerous publications on the subject.

2. Motivation for the Literature Review

One of the primary goals of the 26th United Nations Climate Change Conference being hosted in Glasgow is emission reduction and achieving net zero by 2050. The UN secretary-general urged developed countries and emerging economies to accelerate the decarbonization of the economy as well as the phase-out of coal in producing energy (UN climate change conference, 2021). However, energy is an essential need for all countries. The total primary and final energy consumption for industry, which includes agriculture, power generation, buildings, and transportation, was predicted to be 17,487 Mtoe and 11,775 Mtoe, respectively, in 2040 (Ahmad & Zhang, 2020). Mtoe is a unit for measuring energy which is equivalent to the amount of energy released after burning a metric tonne of oil. At the same time, researchers discovered that rapid urbanization has resulted in a massive consumer of energy in buildings, accounting for 39% of global energy expenditure and 68% of total electricity consumption by buildings in the United States (Yuan et al., 2013). Another study reported that the building sector is a major energy-consuming sector and is estimated to account for more than a third of the world's energy consumption (Kim et al., 2019).

This demonstrates the necessity for conventional structures to be replaced by green buildings around the globe. However, the development of green buildings requires more funding than the construction of standard buildings and is 0.7% to 6.5% more in the Massachusetts market (Kats, 2003). Morris & Langdon (2007) noted quite clearly that a number of variables, such as the type of building, project location, local climate, site circumstances, and the familiarity of the design team, will have a significant impact on the cost of adopting sustainable design aspects. Therefore, it is necessary to carry out a cost-benefit analysis to ascertain the worthiness of investing in green buildings.

However, these benefits are either subject to conjecture or perception or difficult to quantify, as stated by Jones (2013) cited by Oyedokun et al. (2015). A systematic review study conducted by Olubunmi, et al. (2016) categorized green building incentives mainly into external and internal incentives. External incentives are forced choices, where developers need to fulfil some requirements to get benefits, whereas internal incentives allow beneficiaries to be incentivized out of volition. External incentives can be financial or non-financial but are ultimately linked to the financial category. Expedite building permit approvals, a higher buildable area in comparison to land area, and a higher rentable area in comparison to gross floor area are some of the non-financial incentives commonly found in the developed market.

As stated above, there are several ways a company as a tenant may (financially) benefit from being located in a green building. However, the number of green developments is still small compared to total developments. Therefore, it is certainly worth investigating whether the developers who invested in the green buildings received the expected incentive from governments as well as from the market. i.e., an incentive specially from tenants. Hence, this study critically reviews and investigates the existing body

of literature that investigates the expected incentive for green building development by means of a premium rental rate and higher occupancy rate.

3. Research Methodology

The aim of this review study is to examine the expected incentive for green building development by means of the premium rental rate. Hence, the study reviews and analyses published research papers that compare rental rates of green-certified buildings with non-green buildings. This review study is not constrained to geographical areas but is limited to data from the years 2003 to 2021 of published literature.

This paper follows a systematic review process as shown in figure 01. First, an electronic search was performed using Google Scholar and Scopus with the theme of "impact of certification of green buildings on rental rate office space". The keywords used in the Boolean operator of various combinations are shown below.

- a. Green certification, green label
- b. Office space, office buildings, or commercial property
- c. Rental rates

Next, the title and abstract of the articles were examined. It was found that many articles have at least one keyword. After reviewing the topic and abstract, the duplicate and false-positive publications were removed. Next, the selection of articles was carried out by means of rejection. The final step was reviewing the content of the remaining articles.

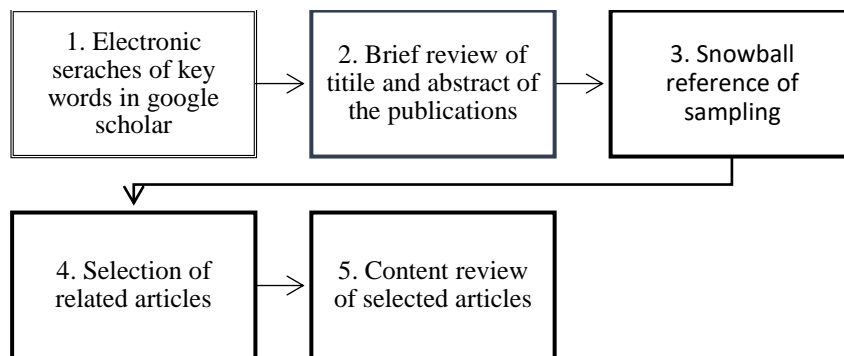


Figure 1. Search Strategy Process

Initially, 256 articles were obtained in the electronic search. Then the number of articles was reduced to 83 by reading the abstract. Finally, screened to 47 articles that exactly examined the impact of green building certification on rental values of office buildings all over the world. The selected articles were limited to 2003 to 2021 based on the published year

4. Results

From 2003 to 2021, numerous research articles on green or sustainable office buildings were published. We noticed that 83 articles published over the time period investigated the financial advantages of green certification. There are also 49 research publications that examine the association between green certification and rental rate from 2003 to 2021. The dependent variable of those studies is purely rent per square area. As graphically presented in figure 02, the highest number of research articles were published in the year 2018.

In addition to the above, the researcher categorizes a number of studies carried out based on their geographical locations. The results are shown in figure 3. The highest number of studies was recorded in the US market which is in line with the findings of Li, Rong, Ahmad, Wang, Zuo, & Mao, (2021),

who conducted a comprehensive bibliometric review study on green office buildings by reviewing articles from 1998 to 2018.

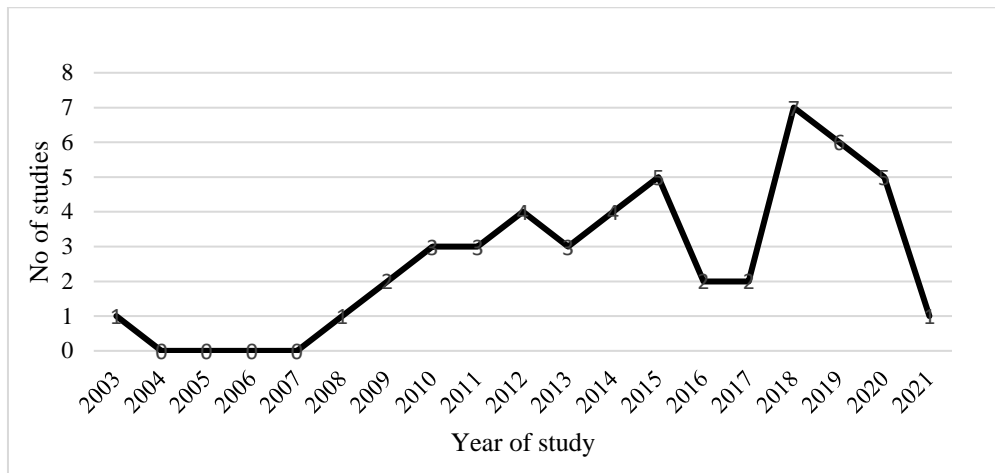


Figure 2. Number of Studies Conducted over the Time

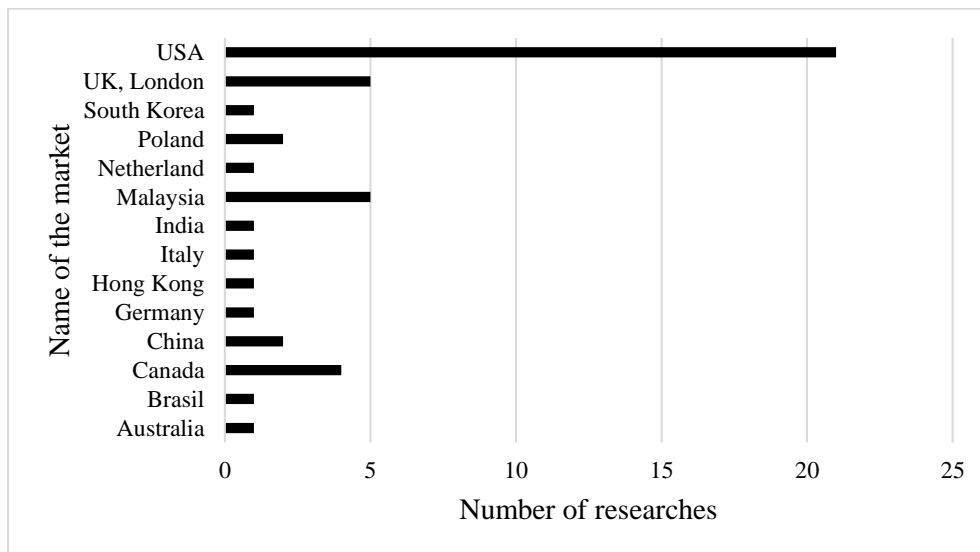


Figure 3. Number of Research Conducted in Different Markets

The findings show mixed results. However, 36 studies out of 47 (77%) reported that any form of green certification has a positive impact on the rental rate of office buildings. Only 11 of the 47 (23%) studies reported no or negligible association. A brief summary of findings for different geographical locations is tabulated in table 1.

Table 1. Association of Green Certification and Rental

The geographical location of the publication	Findings	
	Association of rent & green certification	Main certification type
USA	85% show a significant positive correlation	LEED and Energy Star
Europe	81% show a significant positive correlation	BREEAM and DGNB

Other parts of the world	75% show a significant positive correlation	LEED & country-specific certifications
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5. Discussions

This review study was conducted to find out the impact of green certification on rental rates of office buildings. The results of the sample studies are critically reviewed in the following section.

5.1 Studies Conducted in USA

One of the remarkable studies conducted by Eichholtz et al. (2010) reported a rent premium of 5.2% for LEED-rated buildings and 3.3% for energy star-rated buildings in the USA for the period 2004 to 2007. Another study conducted by Fuerst and McAllister (2011), collecting data from 1999 to 2009 in the USA, stated that LEED and Energy Star buildings obtain rental premia of approximately 3% to 5%, which is in line with the previous study conducted by Eichholtz et al. This study further concluded that any office building having dual certification (both LEED and Energy Star) produces rental premia of 9%. Similarly, Reichardt et al. (2012) presented that energy-star and LEED-certified buildings earn a rental premium in a study conducted in the USA, collecting data from 2000 to 2010. Scholars further exhibited that the premium increased steadily from 2006 to 2008 and then declined. This decline in rent can probably be due to the economic recession that started in the latter part of 2008. Very similar results were stated by Eichholtz et al. (2013). In order to represent real facts, Eichholtz et al. ran the same model for effective rent (rent multiplied by the occupancy rate) and discovered that the effective rent had fallen 7.5% from 2007 to 2009. However, the relative rent or effective rent between green and non-green remains unchanged. This proves the reduction in rental rates is purely due to the economic recession and it affected both green-certified and non-certified buildings.

Green buildings provide additional economic benefits in addition to rental premiums. Wiley, Benefield, and Johnson (2010) discovered that both LEED and energy star buildings have a positive significant link with rent, occupancy, and selling price, demonstrating the improved performance of energy star and LEED-certified buildings. In addition to many economic benefits, green premiums tend to stabilize rental rates across various real estate market conditions, even by offsetting some of the negative effects of down-markets (Das et al., 2011). In another study, Das and Wiley (2014) tested the performance of LEED and Energy Star and revealed that the premium for Energy Star is diminishing with the age of the building, whereas the premium of LEED-certified buildings is independent of age. This proves the power of LEED certification, which has the ability to offset the negative effects of the market as stated by Das et al. (2011). Also, this implies that LEED is much more popular than Energy Star in the USA.

However, it is crucial to note that not all of the green features provided by the certification authority are valued by the public. Robinson et al. (2016) investigated tenants' preferences and willingness to pay (WTP) for green building characteristics. The findings showed that enhanced indoor air quality and access to natural light are the qualities of green buildings that are seen as being most important, with an overall reported WTP for green features of a premium of 9.3%. As a result of the foregoing, extra research was undertaken to determine which green characteristic increases the rental premium. According to one study, high daylight floors command a 5% premium over low daylight areas, and extremely high daylight floors command a 6.1% premium over low daylight spaces. The scholar calculated the daylight floor by taking into account the lux level, coverage, and duration (Turan et al., 2020). Another study conducted to determine the preferred green features discovered that when advertising the green certification, the market largely expects that green features are present and people respond accordingly (Robinson et al., 2017).

Despite the fact that the majority of studies conducted in the United States show a positive correlation between green certification and rental rate, Robinson and McAllister (2015) discovered that only smaller buildings earn a green premium from 2001 to 2011, with larger buildings showing limited evidence for the green premium. In support of the aforementioned, Harrison and Seiler (2011) caution against generalizing results from different markets within the same country by analyzing the impact of

political economics on green office buildings (A-grade offices). Based on the 2008 election results, the study discovered that rental rates for both green-certified and non-green-certified buildings are higher in blue counties (Democratic) than in red counties (Republican).

Despite a few unfavorable outcomes, we can infer that green certification has a positive impact on rent in the US market and that the premium is approximately 10% more than for non-certified properties. However, the premium can vary from market-to-market dependent on political economics, and it can also vary within the same market by responding to overall market performance.

5.2 Studies Conducted in Europe

A noticeable study conducted by Chegut et al. (2011) showed that green-labelled (BREEM) buildings earn 21% higher rental rates and 26% higher sales transactions in comparison with non-green-certified buildings in the London office market. This study revealed another amazing result. In other words, the obtained rental rate per square meter rises by 1.6% as the number of observed green-certified buildings grows. The scholar argued that this could be due to an "emanating effect" as a result of gentrification. However, Chegut et al. also reported that clustering of the green buildings leads to a lower achieved rental rate of 1.4% for every additional green building. In other words, the premium may begin to decrease as neighborhoods become saturated with environmentally certified green buildings. Kok and Jennen (2012) reported similar findings in the Netherlands office market from 2005 to 2010, however, rental premiums were limited to 6.5% for designated energy-efficient buildings. Furthermore, the research revealed the following. A one-point increase in the energy index resulted in a 5% decrease in the rental rate, and the rental rates of green-rated buildings were cut during the 2008-2009 economic collapse. However, as the economy improved, energy-efficient building rental rates began to rise consistently, while those of energy-inefficient structures continued to decline. Likewise, a study conducted in Krakow, Poland presented a positive correlation between green building certification and the willingness to incur a premium in rental rates and reported 12.4% for any certificate (Zieba et al., 2013). Meanwhile, Chegut et al. (2014) documented a positive impact on average rent and prices in BREEM-certified buildings in London during the years 2000 and 2009 and reported a premium of 19.7%. The investigation in Porta Nuova and the Central Business District (CBD) of Milan, Italy, yielded similar results. The study also revealed an interesting finding: the market absorption rate for pre-let properties was four times higher than that of non-certified properties.

As there are many green certifications available in Europe, it is worth hypothesizing which green certification gives the most benefits to the developer and its level of rating. To cover that scope, Fuerst and Van de Wetering (2015) examined the impact of the BREEM rating using control samples throughout the UK for the period 2006 to 2010. The study documented that rent premiums exhibit different values between different markets as well as over time, but premiums increase with higher versions of BREEM-certified buildings. This result gives meaning to building owners' investments in higher certification ratings, as the investment grows larger as the rating increases. However, by looking at the literature, building owners should not draw the conclusion that green certification will always enhance the rental rate. The building grade is one of the other important factors which is independent of green certification. Therefore, it is worth investigating the performance of green buildings by isolating the grade of the building. Ott and Hahn (2018) addressed this issue in a study that examined green payoff in commercial investments using data from 160 European office properties. According to the study, premium rent and market value dropped by 13% and 29%, respectively, for super trophy buildings with excellent green certification. As a result, developers must carefully calculate the investment and its return. As previously discussed, while the empirical results show a relationship between green certification and a rental premium, the true reason for the higher rental rate could be due to other factors. Hence, more properly designed market research is essential to address this issue. One such study was carried out by Dixon et al. (2009). In that study, Dixon et al. hypothesis the extent to which occupiers are actually factoring sustainability into the office space selection process. The study was conducted in the UK office market from 2006 to 2008. Results revealed that only one respondent stated the requirement for sustainability (BREEM-rated building). The reasons for moving were primarily due to growth (36% cases), the desire for new locations (30%), and the need for consolidation

of offices (24%). The results further showed that the running cost (energy cost and utility bills) is the final choice of a building. The scholar argued for the strong implication of sustainability in selecting a new office location. The findings of the research seem to contradict most other research in Europe. Hence, it is imperative to investigate the mismatch of the results related to sustainability. One can argue that energy costs account for 1% to 6% of the business's operating costs and therefore create a reduced incentive to change, based on sustainability, from the perspective of the tenants.

The findings of mainstream European research reveal a positive relationship between rent and green certification. Furthermore, the average premium is slightly larger than many US benchmarks. However, after carefully analyzing the facts, we can deduce the following: unquestionably, tenants prioritize green-certified buildings when picking office buildings while other characteristics remain constant among the optional buildings.

5.3 Studies Conducted in Other Parts of the World

Many studies were conducted around the world, and a few of them are explored further below.

According to Halim (2012), green buildings receive better rental prices and greater rental growth rates of about RM 0.50 to RM 2.25 and RM 0.50 to RM 1.00 per square foot when compared to conventional buildings. In addition to the foregoing, Halim noted that the value of green buildings in the Malaysian market is 5% more than that of conventional buildings. Similarly to the preceding, the Shanghai office market revealed a 12.8% premium rent above conventional office buildings, and the cost of upgrading to LEED can be recovered in one year (Hui et al., 2015). Cheah et al. (2015) in Kuala Lumpur's CBD and Wadu Mesthrige and Chan (2019) in Hong Kong both validated the premium rental value of green-certified office buildings over non-certified office buildings. Another study in Sao Paulo, Latin America's largest urban area, found that green-labeled (LEED certified) office buildings command greater rents than their equivalents in industrialized countries (Costa et al., 2018). Correspondingly, a recent study conducted by Li et al. (2021) analysed an overall sample of 50 LEED-certified and 50 non-LEED offices in each sample in China, Shanghai, and Beijing and suggested that the rental premium for LEED-certified in the China sample is 19.5%, while that in the Shanghai and Beijing samples is 25.5% and 20.8%, respectively.

As previously stated, green-certified buildings predominate in the majority of marketplaces. This performance is applicable not only to new construction, but also to conventional structures that have been retrofitted to become green buildings. Kok et al. (2012) investigated the economics of green building retrofits and discovered that rents and occupancy rates grew in line with the control sample following retrofitting. Carlson and Pressnail (2018) observed a similar outcome in Toronto, Canada.

While some studies examine the relationship between green certification and the rental rate, others look at tenants' willingness to rent. Such a study conducted in South Korea by Jang et al. (2018) proved that green building certification increased the potential of tenants' willingness to rent. However, results showed that an increase in the grade of green certification did not necessarily lead to a higher willingness to rent (Jang et al., 2018). At the same time, Abraham and Gundimeda (2020) documented that after explaining the green features to tenants, the majority of tenants stated that they are willing to pay higher rent in the future for green buildings in the Indian office market. However, Holtermans and Kok (2019) reported that Energy Star or LEED-certified buildings command a rent premium of only 2.2%, whereas class-A buildings command a 14.6% rental premium against grade C buildings. This is in line with the study conducted by Ott and Hahn (2018) in Europe.

While the bulk of studies found a positive relationship between green certification and rent, few investigations hypothesised that there is no relationship. An expert survey done in Malaysia to determine the value of office space features in tenants' viewpoints revealed that green buildings ranked lowest in terms of importance (Adnan et al., 2013). The scholar rightly claimed that the results are attributable to little pressure on Malaysian authorities to make green features mandatory, and that implementation of the green building index (GBI) in Malaysia is in its early stages. This could be considered as the primary reason for having lower importance for green-related factors in the office

market. The findings are consistent with those of Abraham and Gundimeda (2020). The above was confirmed by another study conducted by Gabe and Rehm (2014), which revealed that there was no significant presence for energy efficiency premium in the CBD in Sydney. Further, the study confirmed that there is no strong evidence of discounts for energy-inefficient buildings. Gabe and Rehm examined 3 motivations from tenants' viewpoints to pay for a green premium; reduced factor cost, social responsibility, and legal obligations; and scholars argued that these motivators are not robust enough to elicit rent premium in Sydney. Another cause for unimpressive findings could be the use of gross rent, which conceals energy efficiency (net rent + operational expenses = gross rent). Similarly, studies conducted by Roy et al. (2016) and Rahman et al. (2017) found no conclusive evidence of a green premium in commercial property in Toronto.

As discussed above, some of the findings support the green premium, whereas some research disproves the green premium. If the green premium is an illusion, why do developers invest in green buildings? To find out the reason for investment, Onuoha et al. (2018) carried out a survey study in Malaysia and reported that the monetary green tax incentives and life cycle cost savings exhibited a significant and positive reciprocal correlation among the core green building development factors. The results implied that developers believed in monetary green tax incentives (external financial incentive) rather than life cycle motivation (internal incentive). This also implied the need for more research in confirming developers' premium rent on green office investments.

6. Conclusion

This study reviewed relevant literature to assess the impact of green certification on the rent of office spaces. The significant finding of this study is that those green-certified buildings earn a rent premium over non-certified buildings. The majority of researchers agreed that green certification has an impact on rental rates. Furthermore, some studies confirmed that the impact of green certification will be amplified when the building is labelled, published, and marketed as a green-certified building (Robinson et al., 2017). Despite this, as Harrison and Seiler (2011) point out, the green premium might vary from market to market over the same time period. At the same time, the green premium might fluctuate with the market's economic stability throughout time. Furthermore, Fuerst and Van de Wetering (2015) proved that higher classes of green-certified buildings command higher rental prices than lower grades of green buildings.

However, the results of many research are questionable as they compared only the availability of any green certification and rental rate but did not consider the level of occupancy. The rent has to be relative (relative rent = rent x occupancy rate) as suggested by Eichholtz et al. (2013). Hence, we suggest conducting future studies using relative rent as the dependent variable.

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The Success Factors Determining Good Governance Practices and Firm Performance in Malaysian Government Linked Companies

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Abstract: Of late, there are many emerging cases relating to corporate frauds especially with Government Linked Companies in Malaysia. This not only highlights the poor management composition but also draws attention to the public opinion about the weaknesses of Malaysian Government Linked Companies (GLC) having major governance issues. This study will outline the good governance practices and company performance with reference to GLC firms in Malaysia that can enhance the effectiveness and efficiency of Government Linked Companies. These criteria can then use as guidelines to evaluate the competency of GLC and Government Link Investment Companies (GLIC) in future. There is a general lack of literature relating to governance practices in Malaysian GLCs despite the fact that these organizations play a key role in driving the Malaysian economy. Elsewhere, corporate governance research has grown rapidly in recent times with the vast majority of this research concerned with the traditional agency conflict. This is exclusively related to emerging markets within the developing countries. However, the relationship between corporate/good governance and firm performance in emerging markets is not well researched. Moreover, prior academic literature has failed to provide consensus evidence with regards to this relationship in general. Concurrently, recent advances provided by corporate governance literature have focused on how the national governance quality differences may affect and shape firm-level governance mechanisms, and consequently, firm performance. These arguments give support to the concepts presented in this paper that, a good governance framework must be established at GLCs and their investment holding companies - the GLICs. In terms of countries that have the highest GLC presence among their largest firms, Malaysia ranks fifth highest in the world. This article emphasizes variables on audit, fraud control, risk management, strategic planning and quality performance. Despite many financial disasters reported in the Malaysian media, GLCs are still standing strong for the sustainability of the Malaysian economy. These prove that the effectiveness and efficiency of the entire Malaysian GLCs are still present but may not be at the optimum level.

Keywords: good governance, firm performance, fraud, government-linked, financial disasters

1. Introduction

There are six main Government linked investment companies (GLIC) namely Khazanah Nasional, Permodalan Nasional Berhad, Kumpulan Wang Simpanan Pekerja, Kumpulan Wang Persaraan, Lembaga Tabung Angkatan Tentera, and Lembaga Tabung Haji. All six are owned by the federal government via The Ministry of Finance Incorporated. These GLICs are not only owned but also work in line with the Ministry of Finance Incorporated. Taken together this makes the list to seven financing institutions supporting all the GLCs (Government Linked Companies) in the country (Musalib et al., 2016).

In Malaysia, we are more familiar with the term GLC than state-owned enterprises (SOEs). Unlike other countries which use the term SOE, we use GLCs to refer to enterprises with commercial objectives and have the government as the majority shareholder, either directly or indirectly via government-linked investment companies (GLICs) such as Khazanah Nasional Bhd and the Employees Provident Fund (EPF). The term SOE is broader and in Malaysia's case includes GLCs, GLICs, statutory bodies and government agencies. GLCs are distinct from other State Own Enterprises (SOEs) as they are

incorporated as companies under the Companies Act 1965 and considered as “commercial” because they engage in markets where competition occurs or could occur (The Edge Markets, 2020).

Government Linked Companies are the backbone of the country’s economy. They play major roles in implementing the national social agenda (MOF, 2021) and the Government relies on them for new investment and job creation. Government-linked companies and GLICs have played a significant role in shaping the economic structure of Malaysia and they have a significant presence in the corporate sector. GLCs are also committed to corporate social responsibility. Corporate social responsibility (CSR) is the latest buzzword concerning companies and over the last couple of years, more and more companies have started to include this initiative into their business operations.

In the financial sector, the GLCs account for approximately RM260 billion of the stock market capitalisation of the national Stock Exchange or Bursa Malaysia (PCG, 2006). GLCs are expected to function in a fully commercial manner, raise finances on their own and set their own prices for non-essential services (Ghani, 2020). At the same time, they are also expected to play a key role in enhancing the economic wealth of the Bumiputeras by creating a strong and vibrant Bumiputera business community (Jomo et al., 2021; PCG, 2006).

2. Literature Review

This section outlines the good governance practices and company performance with reference to GLC firms in Malaysia. The good governance emphasizes variables on audit, fraud control, risk management, strategic planning, and quality performance/ best business practices. In this investigative research, each one of these parameters will be evaluated in light of current best practices in government owned entities in Malaysia.

2.1 Audit

Audit committees have the accountability to independently oversee the organization as well as provide checks and balances (ACFE & AICPA, 2002). The external auditors assess the risk of the company in the various segments of the entity’s operations Internal auditors help design control systems to detect and deter fraud by examining and evaluating the adequacy and the effectiveness of internal controls (Omar & Bakar, 2012). The fraud specialist investigates the allegations of wrongdoings. All these groups work together in an anti-fraud effort but preventing fraud, requires the dedication of every employee in the organization. Audit of each department in GLC is measured via the appointment of an internal auditor, satisfaction with the diligence of the audit/finance committee, audit reports are timely and clear, and spending of sufficient time in meetings in which actions to audit findings are considered (Khalid et al., 2016). A social audit is a significant social performance assessment to determine the needs for social audits to ensure commitment to good governance and sustainable development (Ghonkrokta & Lather, 2007).

2.2 Fraud Control

Fraud Control of each department in GLC is measured via maintenance of independence and challenges of senior management, presence of internal control to minimize the risk of fraud, reference checks during employee recruitment, internal and external audit processes covering fraud prevention and a thorough process in investigating and handling fraud (Khalid et al., 2016). Organizations must have an independent audit committee that functions independently from the management, has good financial experience, meets frequently, and evaluates the integrity of financial reports (The International Federation of Accountants [IFAC], 2012). Institutional fraud is the deliberate use of deception to obtain an illegitimate or unlawful advantage. Managements have been able to commit such frauds in the past as a result of a less efficient internal control environment (Martinov–Bennie, 2007). New regulations and recommendations for good governance codes have been introduced with the intention of mitigating fraud cases and future lawsuit cases in the future. Well-governed organizations are less accountable for

fraud and lawsuit cases (Donker & Zahir, 2008). Control environments involving governance and management roles are accountable for the prevention and detection of fraud and error (Martinov–Bennie, 2007).

2.3 Risk Management

The risk management model involves risk appetite, risk identification, materiality filtering, risk assessment, risk monitoring, risk mitigation and reporting (Aggarwal et al., 2016). Risk management of each department in GLC is measured via consideration of strategic and specific issue risk, monitors government priorities for any possible risk, importance to drivers of organizational success, up-to-date international developments or technology and conduction of succession planning (Khalid et al., 2016). Audit committees focus on the challenge of a comprehensive risk profile and context. The internal audit focuses on the implementation of appropriate risk management as well as maintaining objectivity and continuity in its growth (Demidenko & McNutt, 2010).

As a result, the efficacy of risk management is closely linked to senior management's honesty and ethical principles. Understanding the organization's values and incorporating a structured risk management approach into strategic decision-making is critical. Risk management can be a competitive advantage for a company in terms of enhancing strategic thinking, and ethical practices, enabling good governance to expand beyond the realm of conventional corporate philanthropy (Demidenko & McNutt, 2010). Good governance ensures that ethical principles, rules, duties, and obligations are carried out within a consistent risk management system with clearly specified accountabilities. Furthermore, an efficient risk management strategy aids companies in achieving their corporate goals while also enhancing financial reporting and preserving their image (Subramaniam et al., 2009).

2.4 Strategic Planning

A strategic planning model is actually a collective term for a number of elements that contribute to the strategic planning process. The core components of a strategic planning model typically include a templated structure for creating goals, frameworks to decide the work and a loose structure of governance to track strategy (Wright, 2019). Strategic planning of each department in GLC is measured via an adaption of global trends in planning and decision making, balancing between sectoral administration and business issues, and having a clear and agreed distinction between strategy and operation (Khalid et al., 2016).

In both public and private organizations, strategic planning is essential because it defines practice guidelines with the intention of achieving business objectives. Furthermore, strategic planning is a complex, universal, participatory, and collaborative mechanism for determining an institution's priorities, objectives, and practices (Silva & Neto, 2014). The phase begins with the identification of institutional obstacles. Following that, guidelines for best practices are developed for all units to follow in order to achieve operational objectives. The strategic planning process takes an interdisciplinary approach and is linked to the sustainable development debate, which clarifies the negative and positive impact of such policies and activities on other stages of development (Sumpor & Dokic, 2013).

2.5 Quality Performance/Best Business Practices

Quality Performance of each department in GLC is measured via the sound system of monitoring program/service quality, the commitment of all internal people to exhibit quality performance, managers are exposed to good practices outside the sector, training and education for top management and staff and implications of relevant government legislation (Khalid et al., 2016). Good governance policies promote the maintenance of economic development by increasing the performance of companies and enhancing access to external capital from investors and financial institutions.

Good governance policies also mitigate exposure to financial crises in countries, promote property rights, reduce transaction costs and costs of capital, and lead to the development of a capital market. Also, the formation and use of the governance devices act are important in determining the trade-off

between financial and non-financial performance of organizations and of mixed public-private ownership (Peda et al., 2013). Governance is important in determining the performance of microfinance institutions (MFI) and the independence of the board and the difference in the position of the CEO and the board chairperson has a positive relationship with performance measures (Coleman & Osei, 2008).

2.6 Theories of Good Governance

Governance can be understood as the process of decision-making and the process by which decisions are either being implemented or not. Governance can be used in various contexts, such as corporate, international, national, and local governance. State-owned enterprise acts as one of the actors who play a major role in governance through the appointment of GLIC. Good governance has a number of factors that affect quality elements in the GLC (The Malaysian Digest, 2014). The National Integrity Plan (NIP) aimed to mitigate corruption, misconduct, and misuse of power, and improve the efficiency and effectiveness of the public delivery system by 2008 (Rusnah et al., 2011). These initiatives are in line with established theories of good governance regarding participation, rule of law, transparency, responsiveness, broad consensus, equity and inclusiveness, effectiveness and efficiency, accountability, and strategic vision, as tabulated below in Table 2.1.

Table 1. *Established Theories of Good Governance*

Audit	Audit committee have the accountability to independently oversee the organization as well as provide check and balances. The external auditors assess the risk of the company in the various segments of the entity’s operations Internal auditors helps design control system to detect and deter fraud by examining and evaluating the adequacy and the effectiveness of internal controls. The fraud specialist investigates the allegations of wrongdoings. All these group work together in an anti-fraud effort but to prevent fraud, it requires the dedication of every employee in the organization.	ACFE & AICPA, 2002
	Internal auditing departments and internal auditors are critical in detecting and preventing fraud.	Omar & Bakar, 2012
	Internal auditors who understand the various types of fraud and their relative rates of occurrence, will be more likely to recognize any red flags and be better prepared to fight the high organizational cost of fraud.	Carpenter & Mahoney, 2001
	Auditors are an integral part of a company's monitoring structure and one of the most important aspects of good governance. As a result, auditors must collaborate with other good governance actors to ensure the production of high-quality financial reports to stakeholders while safeguarding the interests of current and prospective shareholders and investors.	Arnold, 2002
	Organizations with good internal control, auditors, and strong audit committee can cope comprehensively with fraud at any practice.	Alleyne & Howard, 2004
	If external auditors have strong positions in an organization while internal audit committee plays important role positioning good governance. Moreover, results also identified a relationship between audit committee practices and the integrity of financial statements. This relationship strengthens the quality of good governance and avoids failure.	Okpala, 2012
	Social audit is a significant social performance assessment to determine the needs of the society.	Ghonkrokta & Lather, 2007
	Social audit is a method of determining the degree to which an institution lives up to its beliefs and objectives.	Boyd, 2005
	Different organizations and governments have shown interest in implementing social audit to ensure commitment to good governance and sustainable development	Ghonkrokta & Lather, 2007
	Audit of each department in GLC is measured via appoints of an internal auditor, satisfactory with the diligence of the audit/finance committee, audit reports are timely and clear, and spending of sufficient time in meetings in which actions to audit findings are considered.	Khalid et al., 2016
Fraud Control	Institutional fraud is the deliberate use of deception to obtain an illegitimate or unlawful advantage. Managements have been able to commit such frauds in the past as a result of a less efficient internal control environment.	Martinov–Bennie, 2007
	Recent scandals are mostly plagued by fraud. New regulations and recommendations for good governance codes have been introduced with the intention of mitigating fraud cases and future lawsuit cases in the future. Well-governed organizations are less accountable to fraud and lawsuit cases.	Donker & Zahir, 2008
	Organizations must have an independent audit committee that functions independently from the management, has good financial experience, meets frequently, and evaluates the integrity of financial reports.	IFAC, 2012
	Control environments involving governance and management roles are accountable for prevention and detection of fraud and error.	Martinov–Bennie, 2007

	Fraud Control of each department in GLC is measured via maintenance of independence and challenges of senior management, presence of internal control to minimize the risk of fraud, reference checks during employee recruitment, internal and external audit processes cover fraud prevention and a thorough process in investigating and handling fraud.	Khalid et al, 2016
Risk Management	Since the governance system involves strategic and organisational decision making, risk management is critical for good governance. The latter is heavily reliant on business awareness and understanding, as well as access to mandatory information via electronic or other means.	Barret, 2007
	Good governance ensures that ethical principles, rules, duties, and obligations are carried out within a consistent risk management system with clearly specified accountabilities. Furthermore, an efficient risk management strategy aids companies in achieving their corporate goals while also enhancing financial reporting and preserving their image.	Subramaniam et al., 2009
	Audit committees focus on the challenge of a comprehensive risk profile and context. Internal audit focuses on the implementation of appropriate risk management as well as maintaining objectivity and continuity in its growth. As a result, the efficacy of risk management is closely linked to senior management's honesty and ethical principles. Understanding the organization's values and incorporating a structured risk management approach into strategic decision-making are critical. Risk management can be a competitive advantage for a company in terms of enhancing strategic thinking and ethical practises, enabling good governance to expand beyond the realm of conventional corporate philanthropy.	Demidenko & McNutt, 2010
	The risk management model involves risk appetite, risk identification, materiality filtering, risk assessment, risk monitoring, risk mitigation and reporting.	Aggarwal et al., 2016
	Risk management of each department in GLC is measured via consideration of strategic and specific issue risk, monitors government priorities for any possible risk, importance to drivers of organizational success, up-to-date of international developments or technology and conduction of succession planning.	Khalid et al., 2016
Strategic Planning	Strategic planning involves approaches, devices, beliefs, and mindsets for scientific inquiry, consultancy, and policy practice. Strategic planning is used as a good entrepreneurial reminder focused on satisfying clients.	Placet & Branch, 2002
	Strategic planning is the primary focus of public services.	Sumpor & Dokic, 2012
	Lack of efficiency in the strategic plan results in the inconsistencies of Royal Malaysian Custom (RMC) practice compared to international practices.	Muzainah & Mahamad, 2012
	In both public and private organisations, strategic planning is essential because it defines practise guidelines with the intention of achieving business objectives. Furthermore, strategic planning is a complex, universal, participatory, and collaborative mechanism for determining an institution's priorities, objectives, and practises. The phase begins with the identification of institutional obstacles. Following that, guidelines for best practises are developed for all units to follow in order to achieve operational objectives.	Silva & Neto, 2014
	The strategic planning process takes an interdisciplinary approach, and is linked to the sustainable development debate, which clarifies the negative and positive impact of such policies and activities on other stages of development.	Sumpor & Dokic, 2013
	A strategic planning model is actually a collective term for a number of elements that contribute to the strategic planning process. The core components of a strategic planning model typically include a templated structure for creating goals, frameworks to decide the work and a loose structure of governance to track strategy.	Wright, 2019
	Strategic planning of each department in GLC is measured via adaption of global trends in planning and decision making, balancing between sectoral administration and business issues and having a clear and agreed distinction between strategy and operation.	Khalid et al., 2016

Quality Performance / Good Business Practices	Good governance policies promote the maintenance of economic development by increasing the performance of companies and enhancing access to external capital from investors and financial institutions.	Hifzainam, 2014
	In China and India, good governance supports a number of objectives for developing public policies. Good governance policies also mitigate exposure to financial crises in countries, promotes property rights, reduces transaction cost and cost of capital, and leads to the development of a capital market. Also, formation and use of the governance devices act are important in determining the trade-off between financial and nonfinancial performance of organizations and of mixed public-private ownership.	Peda et al., 2013
	Governance is important in determining the performance of <i>micro finance institutions</i> (MFI) and that the independence of the board and the difference in the position of the CEO and the board chairperson has a positive relationship with performance measures	Coleman & Osei, 2008
	Governance mechanisms are positively associated with organizational performance.	Louizi, 2006
	Quality Performance of each department in GLC is measured via sound system of monitoring program/service quality, commitment of all internal people to exhibit quality performance, managers are exposed to good practices outside the sector, training and education for top management and staff and implications of relevant government legislation.	Khalid et al., 2016

2.7 Conceptual Framework

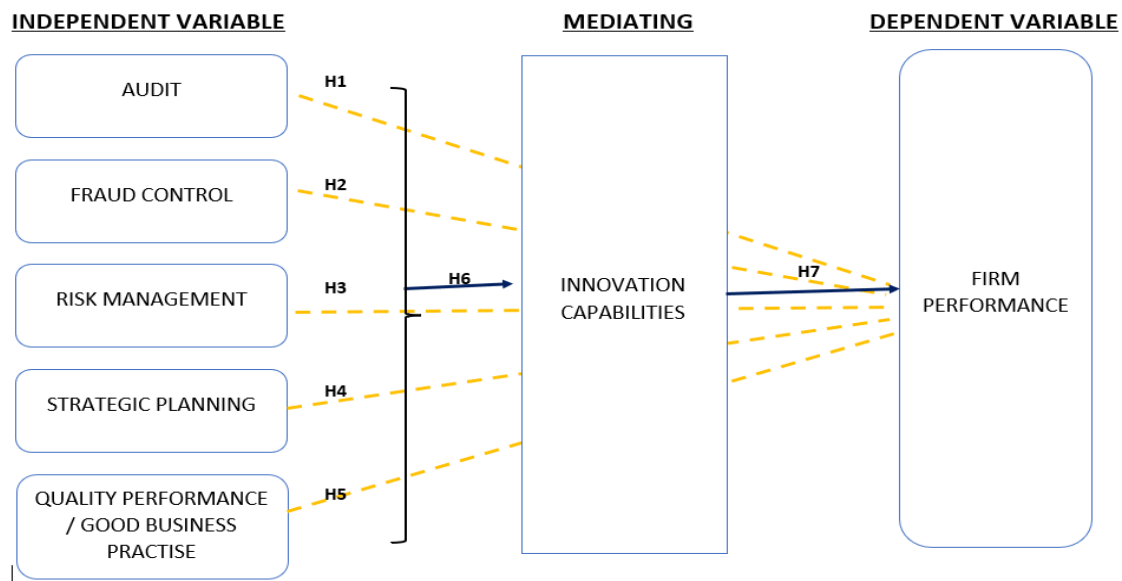


Figure 1. Conceptual framework: The Success Factor Determining Good Governance Practice and Firm Performance in Malaysia GLC

3. Methodology

This research is focusing on the conceptual method incline to form theory by offering propositions regarding previously untested relationships. However, the research design is a quantitative exploratory study involving a one-time sampling of management personnel at government-linked firms to investigate the requirements of good governance and firm efficiency using a deductive method. Positivism is an approach to the creation of knowledge through research which emphasizes the model of natural science: the scientist adopts the position of objective researcher, who collects facts about the social world and then builds up an explanation of social life by arranging such facts in a chain of causality (Khairul, 2008). The research focusing respondents from the management group staff selected from Government Linked Companies around Malaysia as they have a wider understanding of the operational flow of their companies. The research will apply Krejcie and Morgan's sample size calculation which is same as the Krejcie and Morgan's sample size determination table. The questionnaires were distributed to any voluntary response from any employee following the inclusion and exclusion criteria at any Government Linked Company in Malaysia. The data analysis will be performed using the statistical platform SPSS.

4. Results and Discussions

Government Linked Companies are the backbone of the country's economy. They play major roles in implementing the national social agenda (MOF, 2021) and the Government relies on them for new investment and job creation. They are therefore crucial for a long-term growth of the economy (AsiaMoney, 2007). GLCs are expected to function in a fully commercial manner, raise finances on their own and set their own prices for non-essential services (Ghani, 2020). At the same time, they are also expected to play a key role in enhancing the economic wealth of the Bumiputeras by creating a strong and vibrant Bumiputera business community (Jomo et al., 2021; PCG, 2006). GLCs face the challenge of effectively playing both roles. Several GLCs are underperforming and have become a financial burden to the Government. This study will outline the good governance practices and company performance with reference to GLC firms in Malaysia. These practices can then be implemented as guidelines to evaluate the competency of GLC and GLIC in future. There is a general lack of literature

relating to governance practices in Malaysian GLCs despite the fact that these organizations play a key role in driving the Malaysian economy. Elsewhere, corporate governance research has grown rapidly in recent times with the vast majority of this research concerned with the traditional agency conflict. This is exclusively related to emerging markets within developing countries.

A good governance system should help create an environment conducive to efficient and sustainable growth in the Malaysian corporate sector. Since the Southeast Asian financial crisis in 1997 – 1998 ('financial crisis'), a systematic governance system has become a key policy issue confronting many Southeast Asian countries, including Malaysia. However, GLCs in Malaysia have received much criticism in recent years since the failure of numerous companies during and after the financial crisis. The financial crisis generated a substantial amount of analysis and debate largely focused on macro-economic issues, systemic stability, as well as issues pertaining to the regulation of international investors, the role and function of regulators and the need to improve disclosure and governance system. This crisis highlighted weaknesses which led to efforts to rectify and overhaul the entire good governance approach of GLCs in Malaysia. Corporate failure has been debated as it has an adverse effect on many people such as shareholders, employees, and suppliers and also has a diverse impact on the local as well as international communities. Therefore, GLCs have become a hot topic because of the scandals linked to them.

As a result of the discussion, they give support to those presented in this research, that, good governance research must be executed at both privatized public sector (GLIC) - and firm-level (GLC) issues. The role that government-linked companies (GLCs) play in the Malaysian economy is widespread and pervasive. In terms of countries that have the highest GLC presence among their largest firms, Malaysia ranks fifth highest in the world. Therefore, this study will outline the factors that can enhance the effectiveness and efficiency of successful Government Linked Companies. These criteria can then be made as guidelines to evaluate the competency of GLC and GLIC in future.

5. Conclusion

Government Linked Companies are the backbone of the country's economy. They play major roles in implementing the national social agenda and the Government relies on them for new investment and job creation. They are therefore crucial for a long-term growth of the economy. The Malaysian government has implemented initiatives in terms of programs and budgets to ensure the efficient management of public money. Measures have also been implemented to monitor the performance of good governance practices in the public sector. Therefore, this study attempts to explore the current level of good governance practices in the government link companies of Malaysia. The findings of this study will also help policy makers especially GLICs in ensuring good governance practices in the GLCs.

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Capital Regulation Policy and Risk- Taking in Vietnamese Commercial Banks

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Abstract: Capital Regulation in Decree of Government of Vietnam No.141/2006/NĐ-CP on 22 November 2006 required commercial banks to reach at least VND 3,000 billion for authorized capital in the period 2008-2010. This paper uses survey data of 31 commercial banks in the period 2007-2018 to test the empirical evidence that the authorized-capital regulation decreases risk-taking; furthermore, it contributes to the debate of capital regulation and encourages government operator to consider the efficiency of banks' sizes.

Keywords: capital regulation, FE, RE, risk-taking

1. Introduction

It is wondered if the increase in commercial bank sizes due to capital regulation by the government can lead to a decrease in their risk-taking, since there is controversy among previous research.

Previous research on the effect of commercial banks' equity accumulation (Z-car) on their risk-taking (Z-score) is inconsistent. Some research papers find that the increase in commercial bank size for capital regulation by the government leads to a decrease in their risk-taking. Thus, they are up to Z-car to lower moral-hazard because this absorbs a large part of the loss from commercial banks' operating from economic shocks (Fonseca & González, 2010). The commercial bank's sizes consolidate a steady state when a global financial crisis (Cohen & Scatigna, 2016) has a critical role in ensuring their securities to recover from economic shocks as well as to decrease moral-hazard compared to the commercial banks' capital for operating. Banks' capitals could support the problems of debt amounts to lower the pressure of credit-market competitiveness (Chen & Lin, 2016). Because losses could enlarge in the future, commercial banks usually hold more equity than the total debt due to the problems of losses (Valencia, 2016). Commercial banks that have the ratio of equity and total assets (EA) higher than before could be out of financial crises and expand more loans (Cohen & Scatigna, 2016).

As other aspects, previous research on the effect of commercial banks' equity accumulation (Z-car) on their risk-taking (Z-score) found some inconsistent negative results. Barth, Caprio, and Levine (2004) give empirical evidence that capital regulation is negatively related to risk-taking. Barth, Caprio, and Levine (2008) also show that the capital consolidation of Basel standard regulation, which countries catch up to capital regulation and commercial banks supervision, do not support a steady state and have more efficiency.

Besides, Calem and Rob (1999) find other effects of non-linear capital regulation and risk-taking. The result of the U-figure means that the increase in capital regulation leads to the decrease in risk-taking at the beginning period, but the capital regulation and risk-taking have positive relation if it is continuously increasing capital.

In Vietnam, the government increased authorized-capital for commercial banks up to VND 3,000 billion in the period 2008-2010 according to Decree No. 141/2006/ND-CP. Moreover, VanHoose (2007) shows that the evaluation of effect between commercial banks' capital and risk-taking is a crucial program agenda for theoretical research of banking in the future. Therefore, this paper aims to evaluate of the effect of commercial banks' capital regulation on their risk-taking; moreover, the finding is that the increase authorized-capital regulation for commercial banks has a negative relationship with risk-taking.

This paper supports the controversy among academic research in the banking field. It has found empirical evidence about the effect of capital regulation on risk-taking for commercial banks in Vietnam which is a developing country. The result helps policy operators refer to this relationship. And, commercial banks' managers are encouraged to increase banks' sizes under the capital regulation.

This paper is structured as follows: the second section is the literature review and the development of the hypothesis. The third section is the methodology of research and the description of data. The fourth shows the result of research which is tested by the consistency of research model. Conclusion is the final section of this paper.

2. Theory and Research Hypothesis

On the literature reviews of capital regulation and risk-taking, some research has an approach of risk-taking minimum from commercial banks' operating due to capital regulation (Furlong & Keeley, 1989; Kim & Santomero, 1988). And, the restructure of optimal portfolios is essential for smaller-equity commercial banks than authorized-capital regulation by the government. Besides, the policy of capital regulation also creates opportunities for larger-equity commercial banks to select optimal portfolio flexibly based on their available financial resources (Shrieves & Dahl, 1992). The capital regulation accumulates bank's motivation to decrease in the pressure of competitiveness in the credit market. So, the hypothesis is proposed as H₁: the capital regulation for Vietnam commercial banks reduces their risk-taking.

3. Research Methodology and Data

3.1 Research Model

According to Berger, Hasan, and Zhou (2009); Hryckiewicz (2014); Agusman, Cullen, Gasbarro, Monroe, and Zumwalt (2014); Shao, Hernández, and Liu (2015) in the proposed research model of capital regulation and risk-taking for commercial banks

$$Risk_{i,t} = \beta_0 + \beta_1 Zcar_{i,t} + \sum_{k=2}^4 \beta_k X_{k,i,t} + \sum_{u=1}^2 \gamma_u M_{u,t} + \varepsilon_{i,t} \quad (1)$$

where $Risk_{i,t}$ is measured by risk-taking of bank i at time t ($Zcore_{i,t}$) with the model consistency by standard deviation of return on total assets ($\sigma ROA_{i,t}$) and standard deviation of return on equity ($\sigma ROE_{i,t}$), in which

$Zcore_{i,t} = \frac{EA_{i,t} + ROA_{i,t}}{\sigma ROA_{i,t}}$ is the risk-taking index of bank i at time t (Beck, Jakubik, & Piloju, 2013; Berger et al., 2009; Boyd, De Nicoló, & Jalal, 2006; Fu, Lin, & Molyneux, 2014; Schaeck & Cihák, 2014; Schaeck, Cihak, & Wolfe, 2009; Turk-Ariss, 2010), and

$Zcar_{i,t} = \frac{CAR_{i,t} + ROA_{i,t}}{\sigma ROA_{i,t}}$ is the accumulated index of authorized-capital of bank i at time t

$\sum_{k=2}^5 X_{k,i,t}$ are the control variables $\{lnTA, EA, ROA\}$ of bank i at time t ,

$\sum_{u=1}^2 M_{u,t}$ are macro-economic variables $\{inf, g\}$ at time t .

3.2 Summary Statistics

This paper's data sample is yearly balance sheet and income statement data from Bankscope including 31 Vietnamese commercial banks during the period 2007- 2018. Main characteristics of the data set are reported in Table 1.

Table 1.

Variables	Obs	Mean	Standard deviation	Min	Max
Zscore	311	9.58408	15.10755	0.02900	162.72160
σ ROA	311	0.02930	0.04775	0.00055	0.42004
σ ROE	311	0.00253	0.00348	0.00002	0.03067
Zcar	311	9.93531	15.33650	0.02900	162.72170
LnTA	311	11.31581	1.19557	8.56415	14.08790
EA	311	0.09523	0.04401	0.02576	0.29313
ROA	311	0.00812	0.00690	0.05512	0.04729
INF	311	0.08241	0.06335	0.00630	0.22970
GDPR	311	0.06141	0.00620	0.05247	0.07130

The descriptive statistics are shown as follows: mean, standard deviation, minimum and maximum values. The average *Zscore* is about 9.58408 with the maximum and minimum values of 162.72160 and 0.02900 respectively. The figure for *Zcar* averaged 9.93531; the biggest value is 162.72170 and the smallest one is 0.02900.

4. Empirical Results

This section reports the effects of capital regulation on risk-taking. Capital regulation and risk-taking are shown positively related for both univariate and multivariate analysis. The correlation matrix in Table 2 shows that they are positively correlated at 1% level of significant supporting H₁. This shows that capital regulation has a positive relationship with commercial banks' risk-taking. The testing results of H₁ through multivariate regressions will be presented in the Table 3.

Table 2

Variables	Correlation of. <i>Zscore</i> (Standard Error)	Correlation of. <i>dROA</i> (Standard Error)	Correlation of. <i>dROE</i> (Standard Error)
<i>Zcar</i>	0.99187*** (0.00724)	-0.24641*** (0.05513)	-0.19931*** (0.05575)

Note: symbol (***) denotes the statistical significance lesser than 1% (**) lesser than 5% and (*) lesser than 10%.

The testing results of H₁ for capital regulation and risk-taking (Eq. (1)) are shown in Table 3. The coefficients for capital regulation measured by *Zcar* is significant at 1% level from column (1) to column (4). H₁ is supported. The finding is similar to some prior studies (Chen & Lin, 2016; Cohen & Scatigna, 2016; Fonseca & González, 2010; Valencia, 2016) but they differ from others (Barth et al., 2004, 2008; Calem & Rob, 1999). This result is consistent with the government.

Table 3

Variables	(1) <i>Zcore</i> Coefficient (Standard error)	(2) <i>Zcore</i> Coefficient (Standard error)	(3) <i>Zcore</i> Coefficient (Standard error)	(4) <i>Zcore</i> Coefficient (Standard error)
<i>Zcar</i>	0.97547*** (0.00691)	0.97416*** (0.00705)	0.97497*** (0.00741)	0.97668*** (0.00688)
LnTA	0.45558*** (0.12077)		0.32872 (0.21766)	0.41411*** (0.11716)
EA	5.10155 (3.29551)	-3.08492 (2.60670)		3.26712 (3.08832)
ROA	-23.70653 (16.36088)	10.25435 (16.24954)	3.30553 (17.60987)	
INF	-5.13253*** (1.82160)	-6.83688*** (1.80323)	-5.89699*** (2.09188)	-5.62560*** (1.79251)
GDP	26.29487 (17.78616)	25.08575 (18.22600)	21.56922 (18.04653)	22.48909 (17.66354)
Constant	-6.74316*** (1.98148)	-0.69404 (1.21616)	-4.68763* (2.60414)	-6.03081*** (1.92615)
Observations	311	311	311	311
R ²	0.98590***	0.98520***	0.98570***	0.98580***
Estimation methods	RE	RE	FE	RE

Dependent variable *Zcore* is risk measurement variable.

Research variable is *Zcar* that is capital accumulation according to legal capital.

Control variables: LnTA is logarithm of total assets, EA is equity on total assets, ROA is return on total assets.

Two macro environment variables are INF: inflation rate and GDP: Rate of GDP.

This paper is used Hausman Test to collect estimation methods for panel data as Pool- OLS, Fixed Effects (FE), Random Effects (RE).

Note: *** significance level 1%, ** significance level 5%, * significance level 10%

5. Robustness Test

This paper also employed another measure for risk-taking such as deviation of ROA (σROA) and deviation of ROE (σROE) which are shown in Table 4 and Table 5. The coefficients for capital regulation measured by *Zcar* is symbol (-) and significant at 1% level. This shows that capital regulation is positively correlated to commercial banks' risk-taking. This test's results supported Robustness.

Table 4

Variables	(1) σROA Coefficient (Standard error)	(2) σROA Coefficient (Standard error)	(3) σROA Coefficient (Standard error)	(4) σROA Coefficient (Standard error)
<i>Zcar</i>	-0.00071*** (0.00016)	-0.00071*** (0.00016)	-0.00059*** (0.00016)	-0.00056*** (0.00017)
LnTA	-0.00117 (0.00369)		-0.01235** (0.00483)	-0.00968* (0.00535)
EA	0.12829 (0.08302)	0.14076** (0.07140)		0.03171 (0.08819)
ROA	-1.57355*** (0.39066)	-1.59045*** (0.38781)	-1.38372*** (0.39075)	
INF	0.06256 (0.04297)	0.06724* (0.04033)	0.02368 (0.04642)	0.00487 (0.04717)

GDPR	-0.37252 (0.40570)	-0.37568 (0.40550)	-0.40242 (0.40043)	-0.53611 (0.41311)
Constants	0.06736 (0.05351)	0.05302* (0.02782)	0.20886*** (0.05778)	0.17394** (0.06928)
Observations	311	311	311	311
R ²	0.12600***	0.12950***	0.06300***	0.03460***
Estimation methods	RE	RE	FE	FE

Dependent variable σROA is risk measurement variable.

Research variable is $Zcar$ that is capital accumulation according to legal capital.

Control variables: $LnTA$: logarithm of total assets, EA : equity on total assets, ROA : return on total assets.

Two macro environment variables are INF : inflation rate and $GDPR$: Rate of GDP.

This paper is used Hausman Test to collect estimation methods for panel data as Pool- OLS, Fixed Effects (FE), Random Effects (RE).

Note: *** significance level 1%, ** significance level 5%, * significance level 10%

Table 5

Variables	(1) σROE Coefficient (Standard error)	(2) σROE Coefficient (Standard error)	(3) σROE Coefficient (Standard error)	(4) σROE Coefficient (Standard error)
$Zcar$	-0.00005*** (0.00001)	-0.00005*** (0.00001)	-0.00003*** (0.00001)	-0.00004*** (0.00001)
$LnTA$	-0.00012 (0.00026)		-0.00079** (0.00035)	-0.00020 (0.00027)
EA	0.02512*** (0.00588)	0.02652*** (0.00508)		0.02057*** (0.00571)
ROA	-0.07655*** (0.02760)	-0.07802*** (0.02741)	-0.04823* (0.02832)	
INF	0.00306 (0.00304)	0.00355 (0.00284)	0.00310 (0.00336)	0.00167 (0.00303)
$GDPR$	-0.02641 (0.02862)	-0.02674 (0.02859)	-0.05119* (0.02903)	-0.03803 (0.02860)
Constants	0.00397 (0.00381)	0.00243 (0.00197)	0.01507*** (0.00419)	0.00546 (0.00382)
Observations	311	311	311	311
R ²	0.17520***	0.17550***	0.10620***	0.15210***
Estimation methods	RE	RE	FE	RE

Dependent variable σROE is risk measurement variable.

Research variable is $Zcar$ that is capital accumulation according to legal capital.

Control variables: $LnTA$: logarithm of total assets, EA : equity on total assets, ROA : return on total assets.

Two macro environment variables are INF : inflation rate and $GDPR$: Rate of GDP.

This paper is used Hausman Test to collect estimation methods for panel data as Pool- OLS, Fixed Effects (FE), Random Effects (RE).

Note: *** significance level 1%, ** significance level 5%, * significance level 10%

6. Conclusion

Previous research presents contradicting empirical evidence on the topic. Moreover, Vietnam's government implemented the policy of increasing authorized-capital regulation up to VND 3,000 billion in the period of 2008-2010, which affected Vietnamese commercial banks' risk-taking. This paper discovers research gaps of empirical evidence for the purpose of capital regulation and Vietnamese commercial banks' risk-taking by utilizing data of 31 Vietnamese commercial banks in the period of 2007-2018. The result of model showed that the increase in authorized-capital regulation up to VND

3000 billion by Vietnam's government decreased commercial banks' risk-taking to consolidate more empirical evidence of authorized-capital regulation related to commercial banks' risk-taking and the efficient valuation of capital regulation policy by Vietnam's government.

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State Budget Revenue and Expenditure in Vietnam Over the Past Decades

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Abstract: State budget revenue and expenditure is always an important and concerning issue in many countries. The state budget revenue and expenditure situation in Vietnam over the past two decades is analyzed in this article. Thereby, the status of state budget revenue and expenditure over the years is shown specifically. Objective and subjective factors affecting the balance of revenue - expenditure are also pointed out and discussed. Through the process of analyzing and discussing the collected data and the actual situation, at present, Vietnam is facing several challenges such as many key revenue sources that have been sharply reduced due to objective causes. The most typical example is the revenue from crude oil, many inefficient public expenditures leading to losses, wasting people's money, and public debt always increases over time and increases compared to GDP, putting pressure on people's money. Debt repayment capacity, paying high-interest rates, affecting economic development. Based on the challenges pointed out, a series of solutions have been proposed such as increasing efficiency in state budget revenue, controlling state budget deficit with economic, financial, and supporting solutions, and domestic and foreign loans.

Keywords: state budget, Vietnam, revenue and expenditure, GDP, loan

1. Introduction

The state budget is a key stage in the financial system. It has an important position in the Vietnamese market economy. Every year, the Ministry of Finance of Viet Nam (MOF) prepares and publishes the state budget revenue and expenditure plan for the next year and final account of the previous year's state budget revenue and expenditure data. Over time, the state budget revenue and expenditure have changed greatly, reflecting the country's economic development under the influence of domestic factors as well as the general situation of the world. Due to its important roles and related issues, the state budget has been the topic of studies. Pham Xuan Hoan (2012) pointed out four (4) points of the existence of Vietnam's state budget revenue and expenditure: The size of the budget compared to GDP is very large; Unstable revenue and expenditure growth; The growth rate of revenue and expenditure is relatively fast; The budget deficit is large and tends to increase.

In addition, the author also believes that the potential for budget revenue may be greater than the published data. That is due to many revenues and expenditures not being reflected under the provisions of the law or by the fact of the activities. revenue and expenditure. According to the results, the article recommends Vietnam reform towards gradually reducing the budget size, and at the same time recommends changes related to accounting to better reflect the size of the state budget. Meanwhile, Vu Sy Cuong (2012) points out the relationship between estimation and implementation of the state budget with inflation. Along with the economic development of the country and changes in the world, the state budget revenue and expenditure have many drastic changes. Some points change in a positive direction, but many points change in a negative trend. From the issues analyzed and evaluated above, this study analyzes the state budget revenue and expenditure data in the last 20 years to show the evolution and status of the budget revenue and expenditure process. Thereby, assessing the structure of budget revenue and expenditure, and objective and subjective factors affecting the process of budget revenue and expenditure. In addition, orientations to increase the efficiency of budget revenue and expenditure in the new situation will also be proposed.

2. Vietnamese Stage Budget System

According to Article 4 of Law No. 83/2015/QH13, the state budget means all the expenditures and revenues of foreign that are estimated and realized over a certain period (a year commonly) decided by competent authorities to perform the functions and tasks of the state. The state budget is a term that has been around for a long time and today is commonly used in socio-economic life and is expressed from many different angles. In addition, the state budget is also a very broad and comprehensive category, both related to the economic field and related to the state management perspective. Therefore, at present, there is also a definition of the state budget in three aspects: economic, legal, and annual.

The state budget is a key stage in the financial system. It has an important position in the market economy. The role of the state budget is determined based on its specific functions and tasks in each period, ensuring that the state performs its functions and tasks and maintains its power. This is the basic role of the state budget that any country must perform. In addition, the state budget is an important management tool in adjusting the country's macro-economy, especially evident in the socialist-oriented market economy.

The budget cycle, also known as the budgeting process, is the entire operation of a budget from its inception until the end of the transition to a new budget. A budget cycle consists of three successive stages, namely: Budget plan, budget execution, and budget final account. State budget expenditure means the distribution and use of state budget funds to ensure the performance of state functions according to certain principles. Budget expenditure is used as a tool of national financial policy, which has a great impact on the development of the economy. In other words, state budget expenditure is the process of redistributing financial resources that have been concentrated in the state budget and bringing them to use. The state budget expenditure includes investment and development expenditures, repayment of debt and provision of aid, current expenditure, salary reform expenditure, and transfer to financial reserve fund.

State budget revenue is the process by which the state mobilizes financial resources to form a centralized monetary fund to satisfy the spending needs of the state. State budget revenues include all amounts of money that are concentrated in the hands of the state to form a state budget fund to meet the spending needs of the state. State budget revenues include domestic revenue, oil revenue, customs revenue, net, and grants revenue.

State budget balance is the balance between state budget revenues and expenditures in a period (usually a budget year). The correlation between state budget revenue and expenditure in a fiscal year is expressed through three states: State budget overspending (deficit), state budget surplus, and state budget balance. A budget deficit in macroeconomics and public economics is a situation in which the expenditures of the state budget (government budget) are larger than the revenues, the main difference being the budget deficit. In this case, state budget revenue cannot meet expenditure needs. The reason may be that the state cannot arrange to spend needs to suit its ability; unreasonable structure of consumption and investment, causing waste; due to state budget revenue loss; but it can also be due to the cyclical recession of the economy or the impact of natural disasters or wars, the state budget revenue decreases relative to the need to spend to restore the economy. Government revenue does not include borrowing. Borrowing is the government's way of financing a budget deficit. The opposite case with the budget deficit, when revenues are greater than expenditures is called a budget surplus. The State has mobilized resources beyond necessary or has failed to develop a reasonable spending program corresponding to the revenue or the economy has prospered, which increases budget revenues beyond the estimate and the State can proactively arrange to allocate the surplus for the following years. A state budget balance is a situation in which the state mobilizes just enough revenue to cover the state budget surplus - revenue is larger than budget expenditure. The state has mobilized resources beyond necessary or has failed to develop a reasonable spending program corresponding to the revenue or the economy has prospered, which increases budget revenues beyond the estimate and the State can proactively arrange to allocate the surplus for the following years.

The state budget includes the central budget and local budget. The central budget is the budget of ministries, ministerial-level agencies, agencies attached to the Government, and other central agencies. Local budgets include budgets of administrative units at all levels with the People's Council and the People's Committee. In other words, the local budget includes the provincial level budget, the district level budget, and the commune level budget. The structure of Vietnam's current state budget system is described in Figure 1.

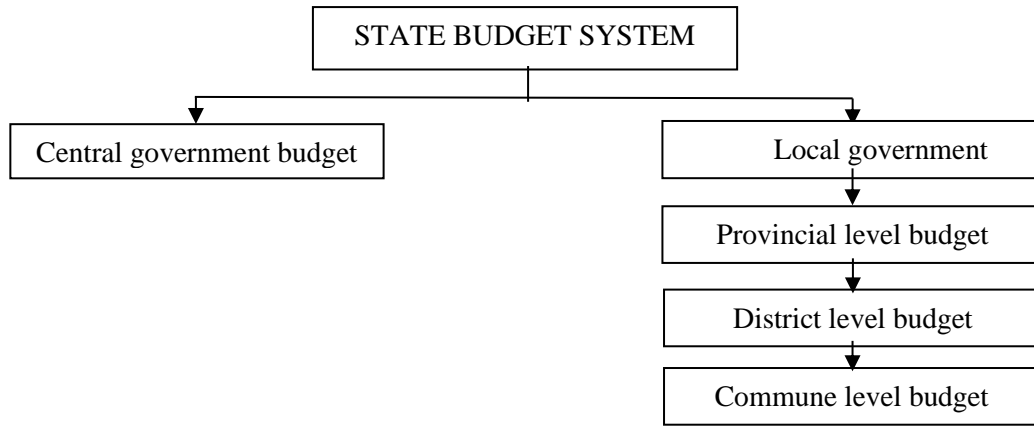


Figure 1. Vietnamese State Budget System

3. Data Collection

There are two important data sets are utilized in this study. They are the plan and final account of state budget revenues and expenditures. Both data sets in recent years (from 2003 to 2020) are collected from the websites of the Ministry of Finance of Vietnam.

4. The Actual Situation of State Budget Revenue and Expenditure in Vietnam in Recent Years

4.1 State Budget Revenue Situation

The state budget revenue final accounts for the period from 2003 to 2020 are presented in Figure 2. Accordingly, the revenue of the following years always increases compared to previous years. The annual increase in budget revenue is about 83,000 billion VND, with a relatively steady growth rate. That implies Vietnam's economy is expanding and developing. The production capacity of all industries is growing.

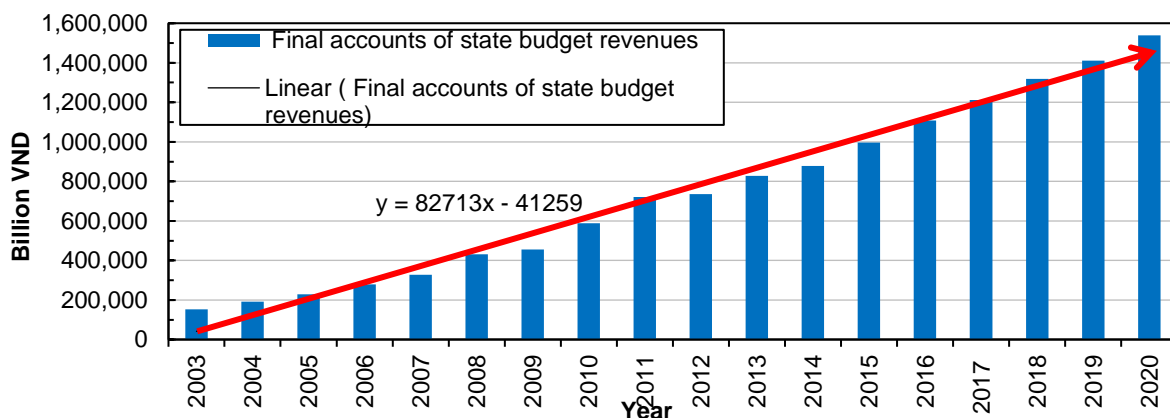


Figure 2. State Budget Revenue Final Accounts for the Period from 2003 to 2020

Figure 3 shows the value obtained from the main revenue sources according to the final account data for the years 2003 to 2020. The results show that the main source of state budget revenue is domestic revenue. This revenue is always increasing year by year. This means that domestic production and business over the years have grown and expanded rapidly. As mentioned above, the second largest contributor to the state budget is revenue from crude oil. However, this source of income is not as stable as domestic revenue. Although it has always been in the second position in contribution to the state budget in the period from 2003 to 2007, it has increased and decreased over time. With the development of exports in terms of quantity and quality, revenue from crude oil has given way to second place for export revenue from 2008 to the recent (except in 2012, when crude oil prices peaked). The years 2009 and 2010 witnessed a decline in crude oil revenues. Although it latterly recovered, it declined again from 2013 to 2020 (rising again in 2021 and 2022 due to global political instability). This instability in revenue is associated with the large increase and decrease in world oil prices (Figure 4). Crude oil price (average year) at one point increased to nearly 110 USD/barrel in 2008 (peaked at 155.78 USD/barrel in 6/2008). Crude oil prices in the years from 2011 to 2014 were also relatively high. The times of high oil prices coincide with times when the state budget revenue from this source is high, culminating in 2012. However, due to fierce competition from shale oil as well as the effort of keeping high oil prices in other countries, the oil price has dropped sharply since 2015 until recent. There was a time when the oil price dropped as low as 29.27 USD/barrel (January 2016). The low oil price has been anchored since 2015 (US\$47.97/barrel - March 2017), so it is forecasted that the state budget revenue from crude oil in the years from 2015 to 2020 and then will decline seriously. This shows a huge challenge for the Vietnamese economy in the current period. To compensate for this decrease, state budget revenues from other sources must be boosted.

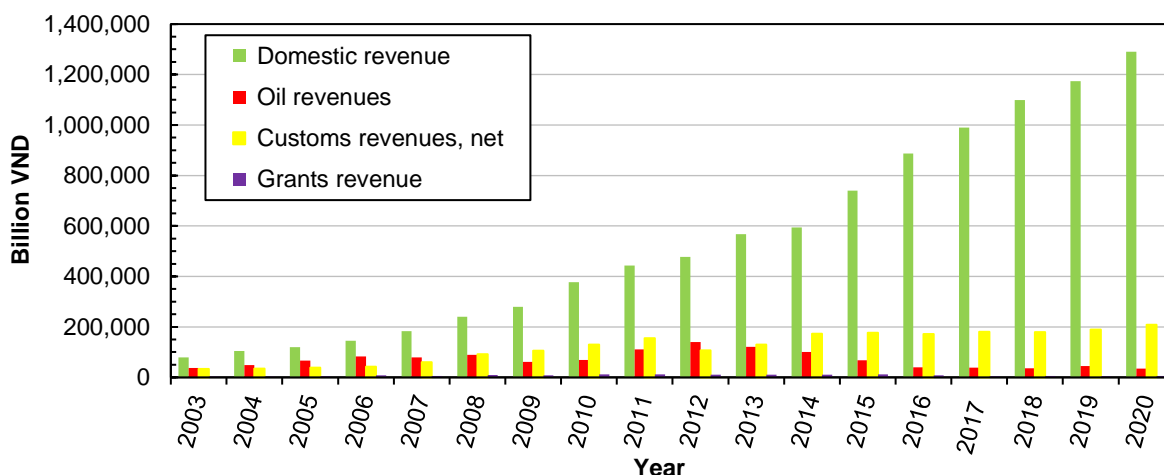


Figure 3. State Budget Revenue Final Accounts from Main Sources for the Period from 2003 to 2020

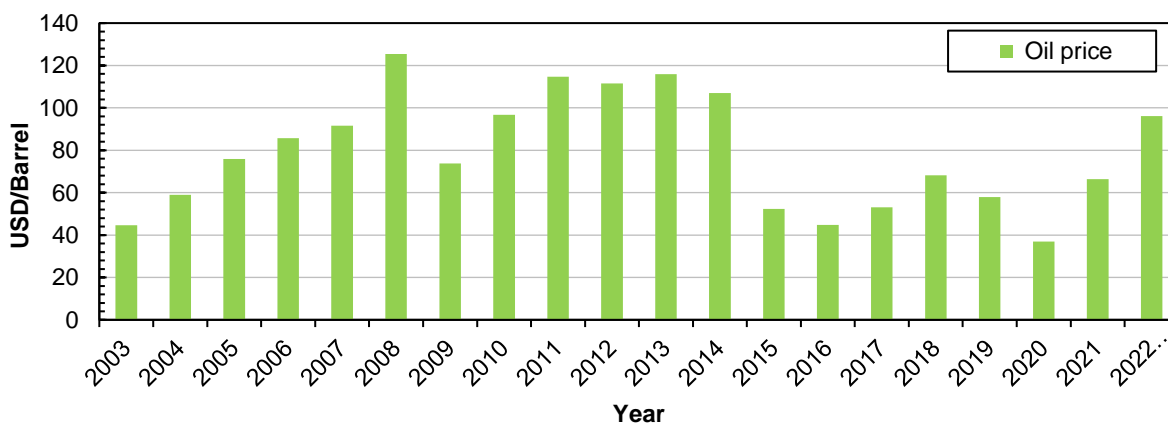


Figure 4. Crude Oil Price from 2003 to 2022 (Source: <https://inflationdata.com>)

The results in Figure 3 also show that revenue from import and export activities increased over time (except in 2012 and 2013). Up to now, this revenue has surpassed revenue from crude oil to rank second in the largest contributors to the state budget. This shows that following the trend of integration, production and export have grown steadily over time, making great contributions to the country's economy.

The source of revenue that contributes the least to the state budget is the revenue from grant aid. This revenue also increases gradually over time but accounts for a very small proportion compared to the remaining revenue sources.

Through the above data and analysis, it is shown that although there is a change in the proportion of revenue sources, the total value of budget revenue still increases over time. The growth rate of state budget revenue in the years 2011 to 2020 is the same, and higher than the revenue growth rate between 2004 and 2010.

4.2 State Budget Expenditure Situation

The expenditure according to the plan and the final account of the expenditure budget from 2003 to 2020 is presented in Figure 5. Accordingly, the actual expenditure level is always greater than the initial budgeted expenditure. The level of spending over the years has always increased gradually. The budget is always in a state of deficit. The extent of the deficit is expressed as a percentage of the deficit compared to GDP. This value is also shown in Figure 6. Accordingly, it varies from year to year. In 2008 and from 2010 to 2012, this value is low, however, in other years it is high.

Among the types of expenditure, current expenditure always accounts for the highest proportion. The results shown in Figure 6 pointed out that. Accordingly, current expenditure always increases gradually over time, and in the current period, it is more than three times higher than the second largest source of expenditure, which is spending on development investment. As mentioned in the previous section, current expenditure includes many types of activities to be spent, of which the most important ones are expenditures on non-business activities of education, training, health, society, culture, information literacy, art, physical training, and sports, science and technology, other social causes, economic and non-business activities, national defense, security, and social order and safety. As this type of expenditure increases year by year, the expenditure for these activities is promoted, especially investment in education, training, health, society, culture, information, literature and art, sports, science and technology, and other social causes. However, at present, there are still many cases of inefficient expenditures leading to loss and waste of people's money. This is the next challenge in the process of the socio-economic development of the country.

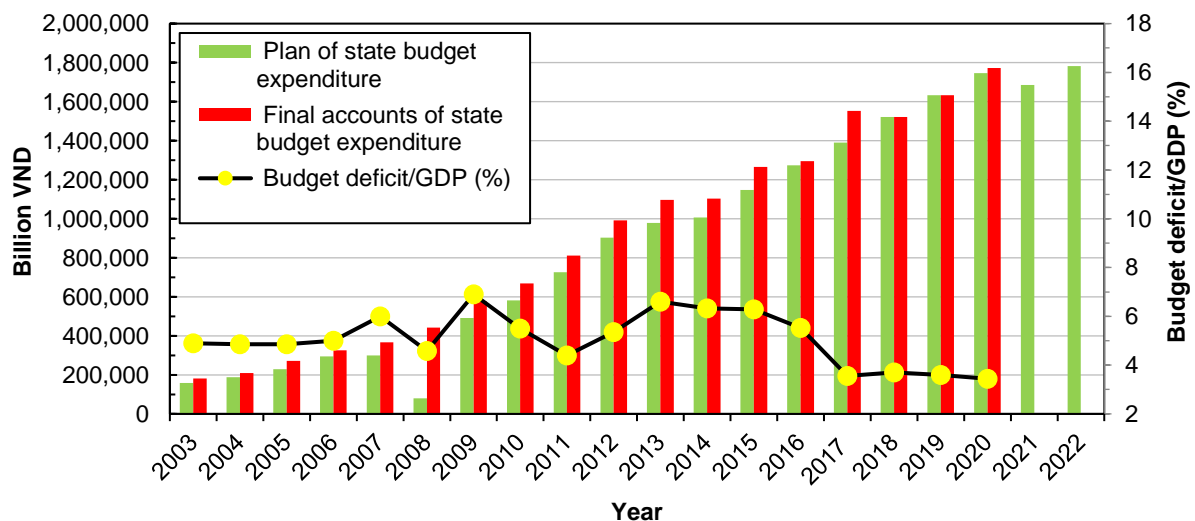


Figure 5. Plan and Final Account of State Budget Expenditure from 2003 to 2020 and the Corresponding Percentage of Budget Deficit/GDP

The actual state budget deficit over the years from 2003 to 2020 is shown in Figure 7. Accordingly, the value of the state budget deficit increased sharply over the years, especially in recent years, except for a partial decrease in 2011. This increase also partly reflects the increase and decrease of the percentage of overspending compared to GDP. The years 2008 and 2010 to 2012 had a lower percentage of state budget deficit compared to GDP compared to previous times. But the results in Figure 7 show that Vietnam is always in a state of a budget deficit, for example in 2014 and 2015, the state budget has a deficit of nearly 12 billion USD. This is a very huge amount. To ensure economic development and social stability, these state budget deficits are covered by domestic loans through the issuance of bills, state treasury bonds, investment bonds, and loans, abroad through borrowing from governments, international financial institutions, or issuing international bonds. Because it is always in a state of a budget deficit and has to borrow to compensate, the public debt situation always increases over time. That puts pressure on debt repayment and high-interest rates, affecting economic development. This is the next challenge in the state budget revenue and expenditure and economic development of the country.

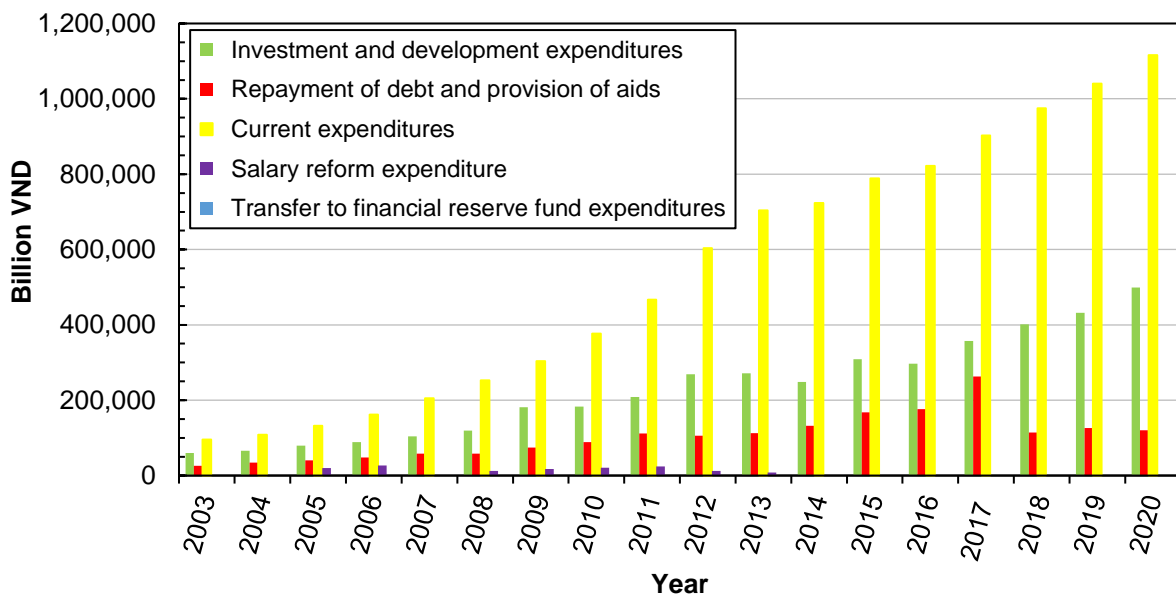


Figure 6. State Budget Expenditure Final Accounts from Main Sources for the Period from 2003 to 2020

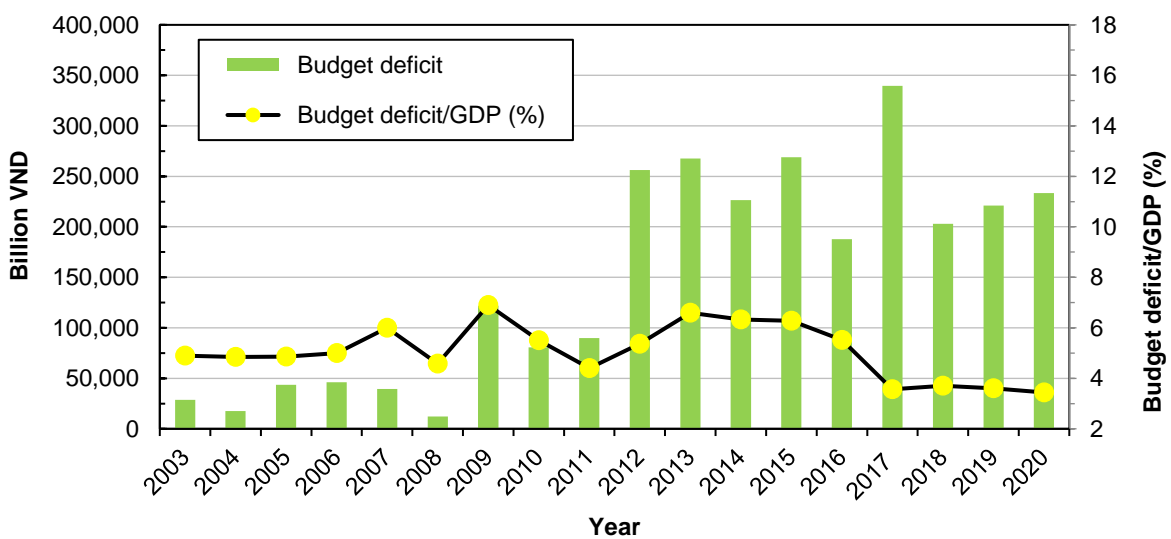


Figure 7. State Budget Deficit and Percentage of Budget Deficit/GDP from 2003 to 2020

In addition to some of the factors mentioned above such as the sharp drop in crude oil prices, the increase or decrease (mainly a decrease) in the state budget is assessed to be due to several other reasons. Accordingly, the National Assembly Standing Committee of Vietnam pointed out that the quality of growth is still slow to improve, the labor productivity is not high, the production and business of many enterprises are facing difficulties, and the number of enterprises that terminate their business and temporarily business is still large. For example, in the first 6 months of 2016, the number of enterprises stopping business with a term increased by 37.1%; The number of enterprises completing dissolution and bankruptcy procedures increased by 17% over the same period last year. Revenues from state-owned enterprises, foreign direct investment (FDI) and non-state-owned enterprises did not meet the estimate, the report stated, while factors promoting production were still limited. Many businesses are still facing difficulties, especially some corporations and corporations that make great contributions to the budget such as automobile assembly, mining, hydropower, and natural gas, some large FDI enterprises are in the period of enjoying tax exemption and reduction incentives. In addition, the slow restructuring of state-owned enterprises and credit institutions are factors that negatively affect revenue from the three important economic sectors mentioned above. Another factor that needs to be mentioned is that the country is increasingly deeply integrated into the world economy through the signing of free trade agreements. Therefore, the implementation of tax reduction according to the integration commitment has also affected the revenue from import tax.

5. Some Orientations to Improve the Operation of the State Budget

5.1 Increasing Efficiency in the State Budget Revenue

According to the above analysis, the state budget revenue is still increasing steadily over time. The current growth rate is better than in the years before 2011. Therefore, the solutions are given at least to ensure stable revenue sources determine and develop sustainably according to the current trend and following the new situation under the influence of unfavorable factors domestically and abroad. Some suggested macro solutions are as follows:

While exploiting, leasing, and selling national assets and resources to increase revenue for the state budget, the state needs to spend adequate funds for nurturing, regenerating, and developing those assets and resources, and not deplete and destroy assets and resources for immediate purposes. The review and re-evaluation of revenue sources have also been promoted to analyze the factors affecting revenue in the area, especially unstable revenue sources, to clarify the lost revenues and taxes, the potential revenue sources such as promoting revenue management measures for revenues related to land, real estate trading, and mineral resources.

Tax policies must both mobilize revenue for the state budget and encourage capital accumulation for businesses and residents. The tax sector continues to strengthen coordination with functional sectors, boosting revenues from projects and new urban residential areas. At the same time, accelerate the collection of land rent, land use levy, and non-agricultural land use tax; strengthen the management of a collection of natural resources tax and environmental protection fee for mineral exploitation, etc. To ensure correct and sufficient revenue, the tax sector will step up the inspection of several industries and fields, such as enterprises showing signs of transfer pricing (low amount of tax payable); enterprises investing in real estate projects and trading; losing enterprises still expanding production and business. The policy of borrowing people to cover the state budget deficit must be based on the income and living standards of the people.

Using the state budget to invest directly in many important enterprises in key fields, to create new financial sources. In the context of businesses facing many difficulties today, to create a source of revenue for the state budget, the tax sector determined that it must closely coordinate with branches and levels in the area to advise the local authorities promptly, solve difficulties and obstacles in production and business and fulfill tax obligations, helping production and business activities to develop stably and firmly. Create a favorable environment to attract investment, increase new production capacity, and

stabilize the market. Organize timely settlement of problems and difficulties of enterprises related to the implementation of tax obligations. Quarterly, tax departments hold dialogues with enterprises in their localities to promptly grasp and resolve or report to competent authorities to resolve difficulties and problems of enterprises in production and business. business, in the fulfillment of tax obligations.

The State needs to have a thrift policy, encourage people to save for consumption, streamline the apparatus, and reform administration to accumulate capital for investment. Expansion of tax registration and electronic tax declaration services; expanding the system of receiving tax declarations online and declaring taxes online, paying taxes through the commercial banking system, connecting information between the four branches of tax - customs - treasury - finance. Coordinating sectors and levels in the locality to strengthen inspection of the observance of price management regulations to strictly handle acts of abusing price increases to gain illicit profits, unreasonable pricing, and price speculation. Timely monitoring of price fluctuations to fully collect revenues into the state budget.

5.2 Some Orientations to Control the State Budget Deficit

The main cause of the state budget deficit is the rapid increase in expenditures, especially current expenditures. Regular spending for economic development is a must-do, but it is necessary to increase efficiency and reduce losses. These are the main problems that need to be solved. To realize that, it is necessary to set up inspection teams to review all investment works and projects from the state budget capital and government bonds that have been arranged but are still inefficient. Slow progress. Identify specific works and projects that need to be stopped, postponed, or extended. Withdrawal or transfer of amounts that have been arranged but are not urgent or not by the objectives. In addition, to control the state budget deficit, it is necessary to perform several other tasks as follows:

Economic solutions to control the state budget deficit by restructuring the economy, ensuring sustainable growth, and completing public sector reform policies. Implement financial solutions to control state budget deficit by redirecting state budget revenue towards a sustainable direction and perfecting decentralization of state budget management. Proposing policies and supporting solutions by reforming public administration and improving management capacity, developing financial management information system and public financial accounting system, renewing management mechanism funds, and financial institutions, and determining the state budget deficit in the post-crisis context.

Implement measures to offset the state budget deficit by making domestic and foreign loans. When making foreign loans, the following factors need to be paid attention to, such as: Improving the country's credit rating, choosing an underwriting partner, analyzing foreign financial market developments, and preparing financial statements related to the issue of bonds. In addition, to borrow effectively, it is necessary to increase labor productivity, increase investment to have a debt repayment surplus, and gradually reduce the deficit. In addition, it can also increase market interest rates, and destabilize exchange rates, causing Vietnam to enter a vicious circle of overspending, borrowing, debt repayment, economic instability, increasing overspending, and, in the long run, can lead to default. The main solution in the long term is to reduce the budget deficit through increasing revenues and reducing expenditures, not making up the deficit. Increasing revenue can be done through tax increases, but this solution is often not supported by the people, and in the long-term negatively affects the economic - monetary situation.

6. Conclusions

In this study, the state budget revenues and expenditures from 2003 to 2020 were collected and analyzed. The analysis of the above data shows that the state budget is currently facing some challenges such as many key revenue sources have suffered a sharp decline due to objective and force majeure causes, most notably: Revenues from crude oil, many inefficient public expenditures lead to losses, wasting people's money, public debt always increases over time and increases compared to GDP, putting pressure on debt repayment and paying high-interest rates, affecting economic development.

Based on the challenges pointed out, objective and subjective factors affecting the revenue-expenditure balance were also pointed out and discussed. On that basis, a series of solutions have been proposed, such as increasing efficiency in state budget revenue, and controlling state budget deficit with economic, financial, support, and domestic and foreign loans.

Acknowledgments

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

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Stock Return with Equilibrium Price

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Abstract: The research exploits the Miller and Modigliani (1961) valuation to combine the real cashflows of all investors to find out a formula of stock return for all periods and the alternative systematic-risk measures are essential. The methodology of the research is based on the stock price and the quantity to formulate a break-even price to reflect an equilibrium between total benefits of sellers and total costs of buyers to determine the market return and the systematic risk of market.

Keywords: expected return, stock price, stock return, systematic risk

1. Introduction

There have been two viewpoints of valuation formula: (i) the viewpoint of stock price P to stand for the real bargains of investors in stock market (Miller & Modigliani, 1961), and (ii) the viewpoint of market equity M to stand for the expected dividends in future to stand for holding stocks of shareholders to infinity (Gordon 1959, 1962, 1997) and new versions on the foundation of Gordon's valuation formula of market equity (Fama & French, 2006; 2015; Penman et al., 2007; Novy-Marx, 2013; Aharoni et al., 2013; Zhang, 2017; Asness et al., 2018). The difference has led to misunderstand the asset pricing in the academic research so far because the asset pricing existed on two different channels of equity budgeting under real cashflows of investors for capital gains or losses and dividends that Miller & Modigliani (1961) employed the stock price P for asset pricing, in the opposite that real cashflows of shareholders for holding stocks that Gordon (1959, 1962, 1997) employed dividends Div for asset pricing. The key difference of the valuation formulas has affected much students and financial analysts when the stock price P relies on the real cashflows of investors for the real bargains, different the real cashflows of shareholders for holding stocks, and it is wondered on which of viewpoints we determine the asset pricing, investors or shareholders.

In the context, we classify a key difference of real cashflows on the valuation formulas between the Miller & Modigliani (1961) and Gordon (1959, 1962, 1997) to find out research gaps of the asset pricing in these formulas, and hence we introduce a new approach of the valuation formula based on both the stock price P and the market equity M for asset pricing under their real cashflows. This contribution supports two viewpoints to connect the measure of asset pricing closer when their debates are still on the streamline periods (Brennan, 1971; Baker & Nofsinger, 2010, pp. 435-447; Aharoni et al., 2013; Guerard et al., 2021, pp. 218-223). Because of not real cashflows of all investors for the bargains, the Miler and Modigliani (1961) employed the change in stock price and cash dividends for the valuation formula of stock return for one period, and hence we exploit the real cashflows in the foundation of the Miler and Modigliani (1961) valuation for both the asset pricing and the speculation to find out the stock return for all periods, to augment the explanation of the Miller & Modigliani (196) valuation.

Moreover, the findings of the research are given 'a break-even price' embedded into the the Miler & Modigliani (1961), to determine the central theorem of stock price, to defined as a gravity rod over time, and the marginal break-even price determines long-run financial risk when its heart-beat is dead under no existence of investors' real cashflows, and explain the Fama & French (2006) empirical evidence clearly, which there are the negative relation between expected returns and expected rates of investments, on the aspect of the real bargain of all investors under the distance $P - P_e^*$ between stock price P and break-even price P_e^* .

In the context, the research uses the data of Stock Exchange VNINDEX in Vietnam to complement the valuation formula of stock return for all periods on the foundation of Miller & Modigliani (1961), and

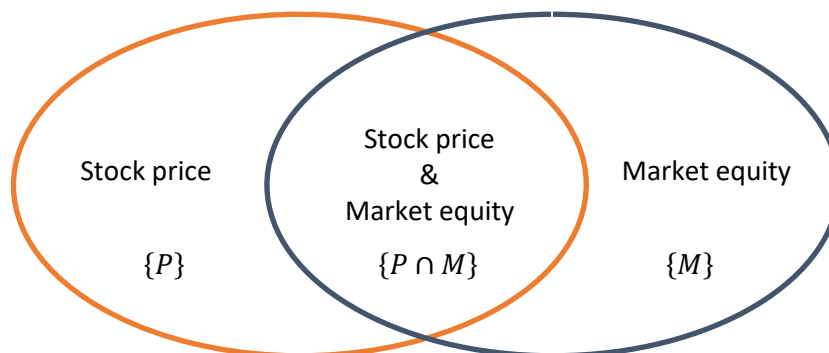
build the alternative measures of short-run long-run risks for the common stocks. The contents of the research include (i) introduction, (ii) the generalized valuation formula of stock return, (iii) the central theorem of stock price, (iv) the Miller & Modigliani (1961) valuation formula of stock return under the real cashflows of investors, (v) the methodology for asset pricing on the Miller and Modigliani (1961) valuation, and (vi) conclusion and outlooks.

2. The Generalized Valuation Formula of Stock Return

Miller & Modigliani (1961) (henceforth MM) gives the valuation formula of stock return for one period, which is based on two key elements: (i) the change in stock prices P to stand for capital gains or losses, and (ii) the dividends per share Div to stand for corporate business performance,

$$R_t = \frac{P_t - P_{t-1}}{P_{t-1}} + \frac{Div_{t-1}}{P_{t-1}}, \quad (1)$$

where P_{t-1} , $P_{i,t}$ are the prices of stock i at time $t - 1$ and time t , and Div_{t-1} is the dividend per share that all shareholders receive at time $t - 1$. And it is wondered how to refresh the MM valuation formula of stock return for all periods to reflect real cashflows of all investors trading stocks on market. The problem is laid on real cashflows of investors in stock market to formulate stock price P , which is different from real cashflows of shareholders on business performance to formulate market equity M , so that the consideration of two real cashflows between the stock price P and the market equity M is essential for both the asset pricing and the speculation that Brennan (1971) used to classify the stock price P on the MM valuation and the market equity M on the Gordon's valuation, and it is wondered in academic research and reality that the firm valuation relies on the real cashflows of investors to formulate the stock price M or the real cashflows of shareholders to formulate the market equity M .



Source: Anh & Hung (2020), Anh & Khanh (2021b)

Figure 1. Stock Price P and Market Equity M

In Figure 1, the population of asset pricing includes three groups under real cashflows on: 1) the stock price to stand for the real outflows of the investors selling stocks to hold money on the part area $\{P\} - \{P \cap M\}$; 2) the market value to stand for the real cashflows of the shareholders only holding stocks for the dividends and the part ownership of market equity on the part area $\{M\} - \{P \cap M\}$; 3) the stock price and the market equity to stand for the real inflows of the investors buying and holding stocks for opportunity of capital gains or losses and the dividends on the part area $\{P \cap M\}$. To augment the MM valuation formula of stock return, we have some literature reviews on two viewpoints of stock price P and market equity M to clarify a full picture of asset pricing.

In some reviews of market-equity viewpoint, the valuation formula is originally from the Gordon's dividend-growth model (Gordon, 1959; 1962; Brigham & Gordon, 1968; Gordon & Gordon, 1997), based on cash dividends Div all shareholders receive, discounted by the equity cost R_e to calculate for

the market equity M , and the original valuation is based on the expected dividends in future to reflect equity outflows that all shareholders would receive for holding stocks to the infinity,

$$M_t = \sum_{\tau=1}^{\infty} \frac{Div_t(1+g)^\tau}{(1+R_e)^\tau} = \frac{Div_t(1+g)^\tau}{R_e - g}, \quad (2)$$

where P_t are the price based on future flows of dividends per share Div_t with growth rate g discounted to current time t by equity cost R_e . The development of market equity M is based on the change in expected equity per share ∂E and the expected equity earnings per share Y in future for holding stocks to the infinity (Fama & French, 2006; 2015; Penman et al., 2007; Novy-Marx, 2013; Aharoni et al., 2013; Zhang, 2017; Asness et al., 2018).

$$M_t = \sum_{\tau=1}^{\infty} \frac{E(Y_{t+\tau} - \partial E_{t+\tau})}{(1+R_e)^\tau} = \frac{E(Y_t - \partial E_t)}{R_e}, \quad (3)$$

where R_e is the long-run average expected stock return (Fama & French, 2006). And it is wondered on the firm valuation that the market equity M of all shareholders holding stocks is based on the equity outflows that all shareholders would receive expected dividends in future; or based on the equity and the market value added minus the real cash dividends in whole process of business performance that corporate is running. So, there are two aspects for asset pricing: 1) if you are a shareholder, the price level you hold stocks is equal to total cash dividends in future you would receive; but 2) if you are an investor, the price level you pay is equal to the real asset value you buy. And hence, the problem of valuation should be clarified under the real cashflows of investors to formulate the stock price P on the viewpoint of MM valuation, or the future cashflows of shareholders to formulate the market equity M for asset pricing on the viewpoint of Gordon's valuation.

The difference is also shown that the MM valuation formula is based on the area $\{P \cap M\}$ to reflect trading values for opportunity of capital gains or losses and dividends from aspect of investors, but the Gordon's valuation formula is based on the area $\{M\}$ under no condition of the real bargain for buying or selling stocks on market to reflect payback period in whole process of receiving cash dividends in future from aspect of shareholders.

On another aspect of real cash dividends which is considered as the equity charges paying for shareholders in whole process of business operating, the valuation formula of stock return is based on various channels of equity budgeting for asset pricing. This approach augments the MM valuation formula of stock return. According to real cashflows of stakeholders from two channels of equity budgeting on stock market and corporate's business performance, the valuations should build a general formula of stock return on two channels of stock price P and market equity M on the area $\{M\}$ under the condition of the real bargains for buying or selling stocks on market (Anh & Khanh, 2021b)

$$R_e = \frac{Q_n}{Q_g + Q_n} \cdot R_o + \frac{Q_g}{Q_g + Q_n} \cdot (R_g + R_o) = R_o + \frac{Q_g}{Q_g + Q_n} \cdot R_g, \quad (4)$$

where R_e is the stock return on break-even price P_e^* and market equity M , R_g is the yield of capital gains or losses on the break-even price P_e^* with trading stocks Q_g , and R_o is the return on the market equity M with outstanding stocks Q_o , which equals the trading stocks Q_g and the non-trading stocks Q_n . The valuation formula (4) of stock return represents the yield of capital gains or losses R_g on the break-even price P_e^* , which is an equilibrium price between total benefits of sellers and total costs of buyers trading stocks Q_g , and the part return R_o on the market equity M to reflect the corporate business performance. Under normal conditions, the part return R_o on the market equity M gives a threshold price for initial public offerings (IPO) if that corporate is not listed on stock market, as well as follow public offerings (IPO).

The stock return of formula (4) reflects both the real cashflows of investors on the break-even price P_e^* and the real cashflows of shareholders on the market equity M . The payment of cash dividends Div for

all shareholders leads to the decrease in the stock return calculated for the outstanding stocks $Q_o = Q_n + Q_g$, the stock return R_e after the adjustment turns into the retained stock return R_e^a ,

$$R_e^a = (1 - R_{Div}) \cdot R_o + \frac{Q_g}{Q_g + Q_n} \cdot R_g, \quad (5)$$

where R_{Div} is the equity cost or the ratio of real cash dividends that all shareholders received. The asset pricing in the formula (4) is laid on the aspect of the book equity and the market value added MVA of real business performance,

$$M_t = E_t + MVA_t^* + Div_t^*, \quad (6)$$

where M_t is the market equity of the real bargains for buying and selling stocks at time t , E_t is the equity minus retained earnings at time t , MVA_t^* is the average market value added of total $MVA_t = \sum_{\tau=1}^T EVA_\tau$ which is the accruals of economic value added EVA on business performance in whole process of business operating from the first time to the current time $\tau = 1 \div T$, Div_t^* is the average cash dividends all shareholders receive in whole process of business operating from the first time to the current time $\tau = 1 \div T$.

This market equity M in formula (6) is based on the real bargains for buying and selling stocks on business performance to reflect the accruals of inflows for asset pricing and the accruals of cash dividends payable for all shareholders in whole process of equity budgeting.

2. The Central Theorem of Stock Price

The importance of asset pricing relies on stakeholders, i.e. investors or shareholders, for an optimal selection to evaluate stock return. In the context, we use the central theorem of stock price based on the accruals of trading values divided by the accruals of quantities to reflect real cashflows of all investors trading the same stock,

$$P_e^* = \lim_{T \rightarrow \infty} \frac{\sum_{\tau=1}^T P_\tau \times Q_\tau}{\sum_{\tau=1}^T Q_\tau}, \quad (7)$$

in which P_e^* is the break-even price to stand for the central theorem of stock price P , at current time t , $\sum_{\tau=1}^T P_\tau \times Q_\tau$ is the accruals of trading values, the stock price P_τ multiplied by the quantity Q_τ , and $\sum_{\tau=1}^T Q_\tau$ is the accruals of quantities. When the time τ reaches to the infinity ∞ , the consistency of break-even price is determined by an equilibrium stock price between total benefits of sellers and total costs of buyers trading the same stock, that called a gravity rod. The finding of break-even price P_e^* is useful for the MM valuation to calculate stock return for all periods from the first time to the current time when the time τ is long enough to formulate the gravity rod over time. The consideration of investors' inflows is based on the increasing trend of the gravity rod and the consideration of investors' outflows is based on the decreasing trend of the gravity rod, so that the stability of stock price P moves around the break-even price P_e^* , that is the phenomenon of homoscedasticity, and hence the Gordon's valuation is still suitable for all investors under homoscedasticity when the market equity M is equal to the break-even price P_e^* . In reality, the stock price P moves stochastically to arise the short-run financial risk for investors if the distance between stock price P and break-even price P_e^* is large, that is the phenomenon of heteroscedasticity.

In some reviews, there are two kinds of financial risk measures: the stochastic theorem to find out critical values of financial risk and the central theorem to control financial flows in financial system. On the aspect of the stochastic theorem, it is considered as the strength of financial risk measure that Markowitz (1959) used to suggest the alternative risk measures, such as stochastic dominance and expected utility (Levy, 1992; Blavatsky, 2010), 'almost' stochastic dominance (Leshno & Levy, 2002); the changes of stochastic dominance in return distribution (Dachraoui & Dionne, 2001; Chow,

2001), diversification under the stochastic dominance (Kuosmanen, 2004). Or on aspect of the central theorem, the theoretical capital asset pricing model CAPM controls financial flows based on the convergent factors, such as the tradeoff between risk return of stock market and riskless interest rate of bond market (Sharpe, 1964; Lintner, 1965; Fama, 1968), the Fama-French CAPM of three factors (Fama & French, 1996a); the Fama-French CAPM of five factors (Fama & French, 2015). However, there are two kinds of financial risks relevant to the central theorem of stock price: The distance $P - P_e^*$ is the highest for the financial risk of buying or holding stocks; and the lowest for the financial risk of selling stocks. It is a kind of the short-run financial risk based on the stochastic theorem to determine the critical values of the distance $P - P_e^*$.

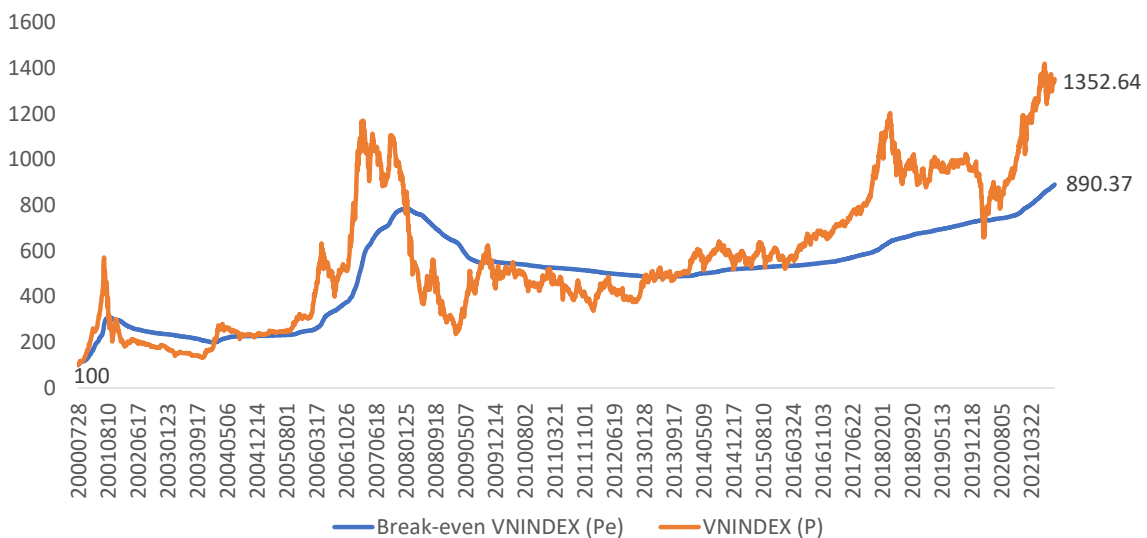


Figure 2. VNINDEX and Break-even VNINDEX of Vietnam

Source: cophieu68.vn

For instance, taking the VNINDEX Stock Exchange in Vietnam measures the short-run financial risks from the beginning date Jul 28th, 2000 to the current date Sep 17th, 2021 on a respond of the break-even price P_e^* to the stock price P . The volatility of VNINDEX inflows and outflows strongly in the period from Jun 2007 to May 2009 was due to a global crisis of economics, and the higher pricing of VNINDEX under the weak inflows of investors on the stock market to make a large distance $P - P_e^*$ in the period from Nov 2016 to Nov 2019, leading to be a sudden decrease in the period from Dec 2019 to Mar 2020, and it has had one more large distance $P - P_e^*$ continuously during the Covid-19 periods of Vietnam, shown in the Figure 2.

The break-even price P_e^* is constant for only the financial risk of holding stocks. It is a kind of the long-run financial risk based on the central theorem to determine the existence of a gravity rod P_e^* in the measurement of its heart-beat for investors using short-run financial resources or financial leverages to buy the stocks with constant break-even price P_e^* . For the consideration of risk measures on the break-even price P_e^* , the Markowitz (1952) diversification of stocks in optimal selection is useful to prevent the long-run financial risk, and the Markowitz (1959) suggestion of alternative risk measures is essential for investors in the optimal portfolio selection; the Fama & French (2006) evidence found the negative relation between expected return and expected investment that could arise the long-run risk when the corporates do less profitability on business performance, leading to the long-run payback period of investors with high buying price. In the context, we describe the basic kinds of portfolios for risk measures of common stocks under three controls of institutional investors: (i) stock dominance, (ii) cash dominance, (iii) stock-cash dominance. On the first condition of stock dominance that institutional investors control the volumes of selling stocks, the stock price P is often priced higher than the break-even price P_e^* in the inner distribution of $P > P_e^*$, to do the payback-cash function higher than the real cashflows of individual investors which are willing to bargain with stock price P for expected return or corporate's profitability.

On the second condition of cash dominance that institutional investors control the cash or equivalence on long-run financial resources, the stock price P is often priced lower than the break-even price P_e^* in the inner distribution of $P < P_e^*$ to do the payback-stocks more than the stocks of individual investors which are bound to sell stocks under their pressure of financial resources or financial leverage.

On the third condition of stock-cash dominance that institutional investors control the stocks and cash or equivalence on long-run financial resources, the stock price P is priced much higher than the break-even price P_e^* out of the distribution of $P > P_e^*$ to do the control of a group of high prices in a portfolio or market indexes for speculation of derivative stocks, derivative indexes. In spite of different portfolios, the long-run financial risk of holding stocks could happen if the signals of buying or selling stocks do not exist, and hence it is depressing investors in holding stocks for long terms because of the financial leverage and the short-run financial resources. For instance, the VNINDEX Stock Exchange in the Figure 2 happened the weak signals of buying or selling stocks on stock market in the period from Dec 2009 to Mar 2016 when the stock price P is almost equal to the break-even price P_e^* in the central distribution of $P = P_e^*$.

3. The MM Valuation Formula of Stock Return under Real Cashflows

The central theorem of stock price is found on the break-even price P_e^* , useful for the alternative valuation formula of stock return (4) to calculate for the MM valuation formula of stock return (1) in all periods of buying and selling stocks. To connect this assumption, the MM valuation formula of stock return (1) is adjusted by the break-even price P_e^* and the average cash dividends per trading-share Div^g , only to calculate for all investors on the asset pricing of stock price P , excluding market equity M . Then, the MM stock return with the break-even price P_e^* is similar to a part of the valuation formula of stock return (4), including the yield of capital gains or losses R_g and the yield of dividends R_{Div}^g ,

$$R_t = R_{gt} + R_{Div_t}^g = \frac{P_t - P_{e_t}^*}{P_{e_t}^*} + \frac{Div_t^g}{P_{e_t}^*} = \frac{\sum_{\tau=1}^T (P_t - P_\tau) \times Q_\tau}{\sum_{\tau=1}^T P_\tau \times Q_\tau} + \frac{\sum_{\tau=1}^T Div_\tau \times Q_\tau}{\sum_{\tau=1}^T P_\tau \times Q_\tau} \quad (8)$$

in which P_t is the stock price at current time t , $P_{e_t}^*$ is the break-even price at current time t , P_τ is the stock price which buyers and sellers have traded stocks in all periods $\tau = 1 \div T$, Q_τ is the volumes which buyers and sellers have traded stocks in all periods $\tau = 1 \div T$, Div_t^g is the average cash dividend per share calculated on trading stocks Q_g at current time t , and Div_τ is the real cash dividend per share calculated on trading stocks Q_g which has paid for investors holding stocks in all periods $\tau = 1 \div T$. And hence, the valuation formula of stock return (8) complemented the MM valuation formula of stock return for all periods under real cashflows of all investors trading stocks Q_g in stock market, so that it is employed to analyze the partial asset pricing on the trading stocks Q_g and the speculation on risk measures of the large distance $P - P_e^*$ for buying or selling stocks in short terms, and the long-run financial risk for holding stocks under no signals of buying or selling stocks, shown in the Section 2 of the central theorem of stock price.

Besides, the MM valuation formula of stock return (8) repairs tow constraints of discount rate by stock return, weighted average cost of capital WACC, internal rate of return IRR, etc. in short or long terms under the volatility of real cashflows (Jackowicz et al., 2017). The selection of financial ratios in models of asset pricing is consistent under the stability of real cashflows in capital market, but it turns into the inconsistency of asset-pricing measures due to the stochastic phenomenon of real cashflows into/out of capital market. So, the exchanges of stock return and stock profits are useful to find the average stock profits, rather than the average stock return. For instance, an investor buys an asset with its price $P_{B,1} = \$30$ at the first year $t = 1$, in the 2-year period of the profitability on each year $\pi_{2\div3} = \{\$10, \$5\}$ and the maturity of the third year in selling the asset with the price $P_{B,3} = \$30$. Then, the IRR of the asset is $IRR = .26$; but if the profitability is stochastic in the two years $\pi_{2\div3} = \{\$5, \$10\}$, although the total profitability is the same $\$15$, the IRR is changed into $IRR = .24$ and hence the findings of the ratio accruals or the average value are better than the marginal ratio in the asset pricing which the MM

valuation formula of stock return (8) is marginal return accruals to reflect real cashflows of investors in all periods of trading stocks Q_g continuously on stock market.

4. The Methodology for Asset Pricing on the MM valuation

The MM valuation formula of stock return (8) is employed for the asset pricing of banking industry in Vietnam with the sample data of 25 commercial banks on two Stock Exchanges of HOSE and HNX and the OTC. And the variables are employed to look for the marginal stock return for all periods, including: (i) the stock price P , (ii) the volumes of 25 trading stocks Q_g on stock markets, and (iii) total dividends $\sum_{i,\tau=1}^{T_i} Div_{i,\tau} \times Q_{i,\tau}$ calculated for 25 trading stocks Q_g with $Q = Q_g$.

4.1 The methodology of marginal stock return and marginal break-even price

The methodology of the marginal stock return m for k periods use on two approaches of break-even price $P_{e,t}^*$ in the formula (8) simpler than reverse discount rate in the formula (9) which is exchanged from the marginal stock price $(P_{i,t} - P_{i,\tau})$ with $\tau_i = 1 \div T_i$, but results are the same,

$$R_{i,t} = R_{g_{i,t}} + R_{Div_{i,t}}^g = \frac{\sum_{\tau_i=1}^{T_i} (P_{i,t} - P_{i,\tau_i}) \times Q_{i,\tau_i}}{\sum_{\tau_i=1}^{T_i} \frac{P_{i,t} \times Q_{i,\tau_i}}{\prod_{k_i=\tau_i}^{T_i} (1+m_{i,k_i})}} + \frac{\sum_{\tau_i=1}^{T_i} Div_{i,\tau_i} \times Q_{i,\tau_i}}{\sum_{\tau_i=1}^{T_i} \frac{P_{i,t} \times Q_{i,\tau_i}}{\prod_{k_i=\tau_i}^{T_i} (1+m_{i,k_i})}} \quad (9)$$

where m_{i,k_i} is the marginal return of i^{th} stock price $(P_{i,t} - P_{i,\tau_i}) \times Q_{i,\tau_i}$ divided by the accruals of total trading values $\sum_{\tau_i=1}^{T_i} P_{i,\tau_i} \times Q_{i,\tau_i}$ with τ_i on each period discounted for k_i periods with $k_i = \tau_i \div T_i$. Both the formulas of (8) and (9) give the same results on different calculation, in which the formula (8) is easier than the formula (9), in the opposite that the marginal ratio m_{i,k_i} is useful to determine the horizontal stock price for long-run financial risk of holding stocks continuously under the weak signal of buying and selling stocks when the range of the marginal ratio is very small for k periods by the statistical mean T-test of the hypothesis $H_0: \bar{m}_{i,k_i} = 0$. Based on the data of VNINDEX, the result of mean T-test for the marginal market return is equal to zero $\bar{m}_{VNINDEX} = 0$ with $sig.t(\bar{m}_{VNINDEX}) = .7632 > .05$ in the period from Dec 2009 to Mar 2016.

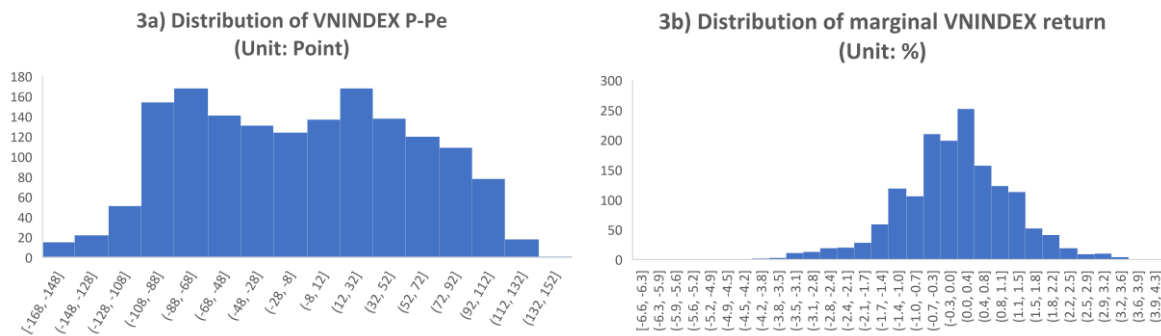


Figure 3. Distributions of $P - P_e^*$ and marginal return of VNINDEX, Dec-09 to Mar-16

The marginal stock return m could be determined under the Figure 2 to pick up the past events of stock break-even price of VNINDEX in the period from Dec 2009 to Mar 2016. This technique does not support strongly the heart-beat of break-even price, or the existence of a gravity rod because the volatility of margin stock return m is similar to the volatility of stock price P . There is another technique to find out heart-beat of break-even price, that is the marginal break-even price ∂P_e^* ,

$$\partial P_e^* = \lim_{T \rightarrow \infty} \frac{\sum_{\tau=2}^T (P_\tau - P_{\tau-1}) \times Q_\tau}{\sum_{\tau=2}^T Q_\tau} = 0. \quad (10)$$

The formula (10) reflects the heart-beat of break-even price based on the change in prices ∂P over time over time, to support the statistical mean T-test $\bar{m} = 0$ by the consideration of the smooth of marginal break-even price to stand for the long-run stock return at steady state. In the Figure 4, the stability of the heart-beat are in periods: Jun-2002 to Sep-2003, Jun-2004 to Oct-2005, Jun-2010 to Mar-2017, Nov-2018 to Oct-2019 to represent the holding stocks with different long-run expected return for the asset pricing, suitable for the evidence of the negative relation between expected return and expected investment when the lower expected return is the higher rates of investment (Fama & French, 2006). However, this asset pricing is suitable for holding stocks under the stability of marginal break-even price ∂P_e^* , not reflect the bargains for capital gains or losses under the kurtosis of marginal break-even price ∂P_e^* on the foundation of the MM valuation. This is a different point between MM and Gordon.

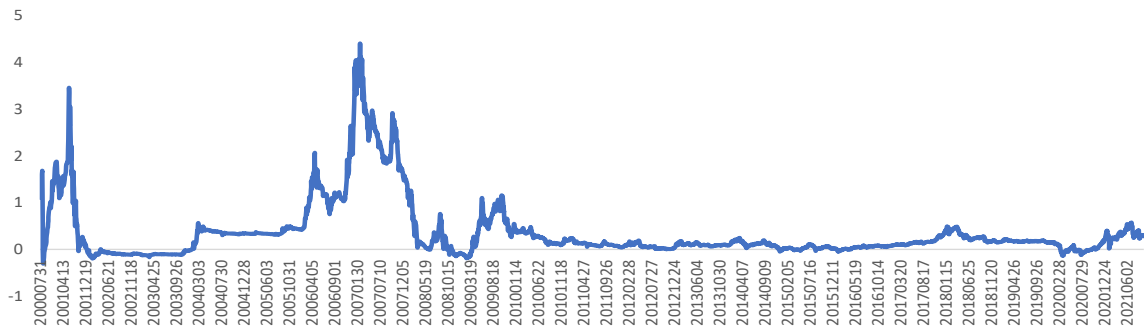


Figure 4. The Marginal Break-even Price of VNINEX

Moreover, the consideration of marginal break-even price ∂P_e^* under no existence of the heart-beat is the phenomenon of death hear-beat of gravity rod for capital gains or losses due to not having the real cashflows of investors on these stocks. Holding stocks relies on much the attractive cash-dividend policy for the payback period, so that the asset pricing would be high or low if the business performance is good or bad. The consideration of cash-dividend policy has had the absurdity of adjustment duplication on stock price P in the stock market and market equity M in balance statement.

4.2 The Economic Loss due to the Adjustment of Stock Price

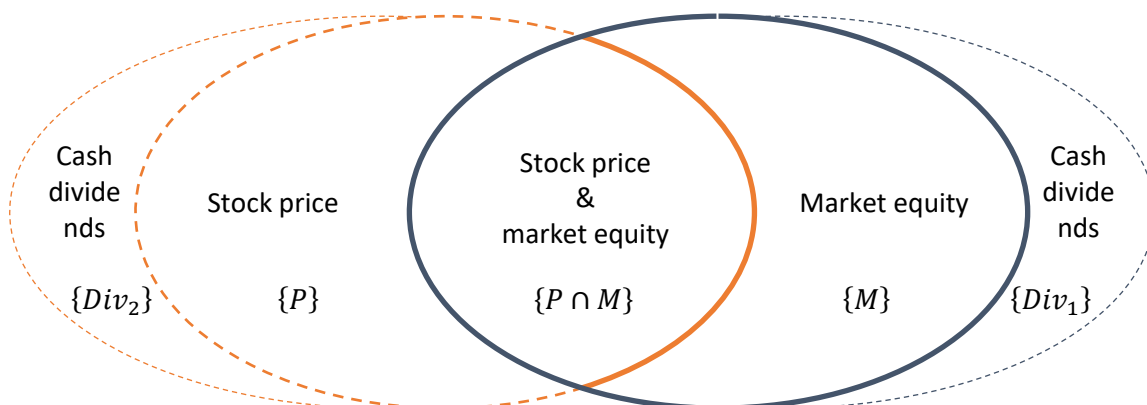


Figure 5. The Duplicated Adjustment on Stock Price and Market Equity by Cash Dividends
Source: Anh & Hung (2020), Anh & Khanh (2021b)

In the Figure 5, the consideration of duplicated adjustment on stock price P and market equity M by cash dividends on both the current mechanism of stock market and the financial system have the absurdity when the equity outflows are adjusted on the two different places on the part areas of cash dividends $\{Div_1\}$ and $\{Div_2\}$, but the shareholders only receive one place from the business performance on the part area of cash dividends $\{Div_1\}$, to make an economic loss on the part area of cash dividends $\{Div_2\}$. Due to different real cashflows of the two channels, the asset pricing should be

laid on the population of real cashflows to find out a general stock return in the formula (4), and the adjustment of equity outflows by cash dividends cuts on the part area of the market equity M in the formula (5), to make a positive signal of external financial resources converging into the stock market.

5. Conclusions and Outlooks

The research provides a new look of the asset pricing on the aspect of all investors under the stock price P and all shareholders under the market equity M to connect a key difference between the MM valuation and the Gordon valuation based on the real cashflows in the academic research. Moreover, the explanation of the bargains for capital gains or losses and cash-dividend policy on the foundation of the MM valuation supports investors and financial analysts to look for alternative risk measures that Markowitz (1959) used to suggest, as well as the absurdity of stock-price adjustment in the stock market when the duplication of stock price P and market equity M is adjusted by the equity outflows of cash dividends to make a economic loss for the convergence of external financial resources into the stock market.

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Internal Corporate Governance Mechanisms and Agency Costs: Empirical Evidence from Companies Listed on HOSE, Vietnam

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Abstract: This study aims to determine the effect of internal corporate governance mechanisms, including board size, independent directors, education level of board members, female directors, duality, and shareholding of board members on agency costs. We analyze a sample of 149 firms listed on the Ho Chi Minh Stock Exchange from 2009-2020 and find that the effect of female directors and duality positively related to the asset utilization ratio as an inverse proxy for agency costs. Moreover, there is a nonlinear relationship between directorial shareholdings and agency costs. Based on the research findings, the firms should pay attention to the role of women on board and board leadership structure and align the interests between shareholders and executives through managerial ownership.

Keywords: corporate governance, female directors, directorial shareholding, agency costs, conflict of interest

1. Introduction

Corporate governance and agency problems have been extensively studied since the 1970s. The agency problem is associated with agency costs related to conflicting interests between managers and shareholders. Costs have incurred when managers try to exploit company assets for their benefit instead of maximizing shareholder wealth. The primary reason for this conflict of interest is information asymmetry, whereby managers have better information than shareholders. According to Jensen & Meckling (1976), agency costs happen when shareholders attempt to prevent these problems.

The valuable and influential corporate governance mechanisms may help to control the conflicts of interest between the management and shareholders and minimize agency costs (Sehrawat et al., 2019; Mehmood et al., 2019). Many research works concentrate on the effects of corporate governance mechanisms on agency costs in many different aspects. However, these results are still inconsistent due to differences in the characteristics of each country, the study period, and research methods. In addition to varying research results, many studies mainly do research on reviewing the board's characteristics, including board size, duality, outside directors, and board ownership affect agency costs. Nevertheless, few studies mention the impact of gender diversity on board on agency costs and the nonlinear relationship between the board members' shareholding ratio and agency costs, especially in the Vietnamese context (see, for example, Nguyen et al., 2020; Pham, 2020).

This study aims to determine the association between internal corporate governance mechanisms and agency costs. Our study results show that gender diversity on board and duality are inversely associated with agency costs. Moreover, we also find a non-monotonic relationship between the directorial shareholdings and agency costs. Our results, therefore, are helpful for policymakers and listed firms to enhance corporate governance activities effectively.

The rest of the paper proceeds as follows. The next section reviews the relevant literature on the relationship between internal corporate governance and agency costs to formulate testable hypotheses. The third section describes data and methodology, followed by results in the fourth section. The fifth section provides a summary and conclusion.

2. Literature Review

2.1 Agency Costs

Agency theory focuses on an agency relationship as a contract whereby a principal hires an agent, and the agent acts on behalf of the principal to perform specific tasks and is allowed to make related decisions (Jensen & Meckling, 1976). The problem is that the managers do not always act in the employers' best interests (Eisenhardt, 1989); therefore, the shareholder has to supervise the manager and pay for the supervision, and the manager will accept to bear the bonding costs. Conflicts of interest also create residual losses because welfare is not maximized. The sum of supervision costs, bonding costs, and residual losses are known as agent costs because these costs arise from the relationship between the principal and the agent. One effective means that can reduce agency costs is internal corporate governance mechanisms (Florackis, 2008; McKnight & Weir, 2009).

2.2 Internal Corporate Governance Mechanisms and Agency Costs

2.2.1 Board Size

Many studies have shown that board size tends to associate with agency problems. According to Pearce and Zahra (1991), small-sized boards perform more inefficiently than large-sized. Companies with many board members will contribute to limiting agency costs. This result is consistent with the research of Singh and Davison (2003). There is a negative relationship between board size and agency costs.

In contrast, Eisenberg et al. (1998); Beiner et al. (2006) again provide evidence that, when the board size increases, there will be potential costs of information sharing, consensus problems, and dependence on supervision, thereby increasing the agency problem. This view is consistent with Florackis (2008) and Chaudhary (2021); the larger the board, the higher the agency costs, causing inefficient performance for the company.

Two different views focus on the influence of board size on agency costs. However, too many board members will appear to lack coordination and free rider problems (Lipton & Lorsch, 1992; McKnight & Weir 2009). Therefore, the research builds hypotheses as follows:

H₁: There is a positive relationship between board size and agency costs.

2.2.2 Independent Director

According to the agency theory, independent directors represent shareholder interest and supervise managers better than inside members (Weisbach, 1988) and play a role in controlling and limiting agency issues. Many studies have shown the usefulness of independent non-executive directors as a good proxy for shareholders' interests, such as Hermalin and Weisback (1991) and Byrd and Hickman (1992). Supporting the above views, the study of Chaudhary (2021) concludes that agency costs will decrease when the proportion of independent non-executive directors is high.

Moreover, in companies with many independent members, the level of information disclosure to the public will be more publicized (Chen & Jaggi, 2000), which is likely to decline the information risk between uninformed investors and inside shareholders (Armstrong et al., 2014; Elbadry et al., 2015), leading to building hypotheses as follows:

H₂: There is a negative relationship between independent directors and agency costs.

2.2.3 Educational Qualification of Board Members

The upper echelons theory proposes that managers' beliefs, striving, knowledge, and experience are valuable factors for organizational success. In other words, the organization's strategic choices are a function of the top leadership's academic background (Hambrick & Mason, 1984; Wally & Baum,

1994). Managers with a high level of education, training, and expertise are more ready to disclose information about the company's business activities outside (Ahmed & Nicholls, 1994), thereby increasing in timeliness and reliability of the information on financial statements (Yunos, 2012) and limiting the firm's private information (Chemmanur et al., 2009).

Empirical studies have shown that managers with a high level of education are more accountable for disclosure (Lewis et al., 2014), and board members with extensive financial knowledge have a positive relationship with stock liquidity (Elbadry et al., 2015). As a corporate governance mechanism, board members can apply their trained skills and knowledge in control activities (Fama & Jensen, 1983; Mizruchi, 1983), which tends to lower agency costs. Therefore, the hypothesis is built as follows:

H₃: Board members' educational qualification has an inverse association with agency costs.

2.2.4 Female Director

The presence of female directors on the board is a proxy for board diversity (Carter et al., 2003). According to the authors, gender diversity on board increases the board's independence and enhances the ability to monitor and control managers' self-interested behavior. From the agency perspective, female board members are considered a meaningful way to handle agency conflicts due to their better supervisory role (Adams & Ferreira, 2009). Unlike men, women on the board are more independent, industrious, and responsible (Li & Li, 2020) and less willing to engage in unethical business practices (Orazalin, 2019).

Few studies, for example, Wellalage & Locke (2013) and Jadiyahappa et al. (2019), have shown that female boards do not play much of a role in mitigating agency conflicts. However, most empirical studies such as Jurkus et al. (2011), Yang et al. (2019), Ain et al. (2020), and Amin et al. (2022) all show a negative relationship between female board members and agency costs, leading to setting hypotheses as follows:

H₄: The proportion of female directors on board is negatively associated with agency costs.

2.2.5 Duality

Duality exists when the chairman also holds the CEO position. While separation of roles between chairman and CEO provides a mechanism to monitor the CEO and supports a greater degree of board independence, duality reduces the board's independence. Moreover, duality increases the concentration of power in an individual, entrenchment opportunities, and agency costs. Therefore, Jensen (1993) recommends that the board should not maintain this characteristic; namely, the chairman and CEO should be in two distinct positions. Although Rashid (2013) and Nguyen et al. (2020) find no relationship between duality and agency costs, in the view of Fama and Jensen (1983), the way to reduce agency conflicts is to separate the roles of chairman and CEO. Therefore the hypothesis is set as follows:

H₅: Duality is positively related to agency costs.

2.2.6 Directorial Shareholdings

According to the agent theory, aligning interests between shareholders and the board of directors through managerial ownership will help the board to perform more effectively in solving the agency problem (Jensen & Meckling, 1976). Managerial ownership is an incentive mechanism of corporate governance that binds and directs managers to pursue shareholders' interests, reducing agency costs more effectively (Vijayakumaran, 2019).

Besides the linear relationship between directorial shareholdings and agency costs, there is a nonlinear relationship (Henry, 2010; Florackis, 2008) because of the alignment and entrenchment effect (Florackis, 2008). According to Hu and Zhou (2008), using the shareholding of board members is likely to be a double-edged sword. Therefore, the hypothesis is set as follows:

H₆: There is a nonlinear relationship between the directorial shareholdings and agency costs.

3. Data and Methodology

3.1 Sample and Data

This paper collects data related to the board characteristics and company from corporate governance reports, annual reports, meeting documents of the general meeting of shareholders, and year-end financial reports of listed firms on the Ho Chi Minh City Stock Exchange (HOSE). The research sample does not include financial institutions such as banks, securities companies, insurance companies, investment funds, and firms without disclosing information related to research variables. The final sample includes 149 companies from 2009 to 2020, with 1687 observations.

3.2 Econometric Model

To estimate the relationship between the internal corporate governance mechanisms and agency costs, we use the regression equation as follows:

$$ATR_{it} = \beta_0 + \beta_1 \underset{-}{BoardSize}_{it} + \beta_2 \underset{+}{OutDir}_{it} + \beta_3 \underset{+}{Education}_{it} + \beta_4 \underset{+}{Gender}_{it} + \beta_5 \underset{-}{Duality}_{it} + \beta_6 \underset{+}{DirOwn}_{it} + \sum_{k=1}^K \varphi_k \underset{+}{ControlVar}_{k,it} + \varepsilon_{it} \quad (1)$$

Below is Table 1, which outlines the definition and measurement of research variables in Equation (1).

Table 1. Definition and Measurement of Variables

Variables	Definition	Measurement
<i>ATR</i>	The asset turnover ratio	Ratio of net sale to total assets
<i>BoardSize</i>	Size of board	Number of director members
<i>OutDir</i>	Outside directors	The proportion of independent and non-executive board members
<i>Education</i>	Educational qualification of directors	The proportion of board members with postgraduate education
<i>Gender</i>	Female directors	The proportion of women on the board
<i>Duality</i>	Duality	<i>Duality</i> = 1, if Chairman also holds the CEO position; otherwise <i>Duality</i> = 0
<i>DirOwn</i>	Directorial ownership	The shareholding ratio of board members
<i>Opp</i>	Level of growth opportunity	<i>Opp</i> = 1, if market value plus total debt is greater than total assets (high growth opportunity) <i>Opp</i> = 0, if market value plus total debt is less than total assets (low growth opportunity)
<i>Bank_St</i>	Short-term bank loan ratio	Ratio of short-term bank loan to total assets
<i>Bank_Lt</i>	Long-term bank loan ratio	Ratio of long-term bank loan to total assets
<i>FirmYear</i>	Age of firm	Natural logarithm of number of years since the establishment
<i>FirmSize</i>	Size of firm	Natural logarithm of market value

Equation (1) describes the internal corporate governance mechanisms likely to affect the agency costs corresponding to the expected mark. The left-hand side of Equation (1) is a dependent variable measured by the asset turnover ratio (*ATR*) as an inverse proxy for agency costs. The right-hand side consists of the following explanatory variables, including *BoardSize*: the number of board members; *OutDir*: the proportion of independent non-executive board members; *Education*: the ratio of board members with postgraduate education; *Gender*: the ratio of women on the board; *Duality*: chairman also holds the CEO position; and *DirOwn*: the shareholding ratio of board members and control

variables (*ControlVar*), including *Opp*: the level of growth opportunity; *Bank_St*: short-term bank loan ratio; *Bank_Lt*: long-term bank loan ratio; *FirmYear*: age of firm; and *FirmSize*: size of the firm.

To determine the nonlinear relationship between directorial shareholdings and agency costs, we add the variable (*DirOwn*)² into Equation (1) and get Equation (2) as follows:

$$ATR_{it} = \beta_0 + \beta_1 BoardSize_{it} + \beta_2 OutDir_{it} + \beta_3 Education_{it} + \beta_4 Gender_{it} + \beta_5 Duality_{it} + \beta_6 DirOwn_{it} + \beta_7 (DirOwn)_{it}^2 + \sum_{k=1}^K \varphi_k ControlVar_{k,it} + \varepsilon_{it} \quad (2)$$

The estimated results of the regression coefficient β_6 of the variable *DirOwn* and β_7 of (*DirOwn*)² could be the basis for rejecting or accepting the research hypothesis.

4. Results

4.1 Characteristics of Research Sample

Table 2 below presents descriptive statistics of the study variables, including mean value, minimum value, maximum value, and standard deviation. In Table 2, the Board of Directors has six members on average. The maximum number of members on the board is 11, and the lowest is 3. Concerning the outside directors, there are 54.4% of independent non-executive board members (*OutDir*); however, there are still some firms with the absence of these members. The proportion of board members with post-graduate education (*Education*) accounts for 27.1%. Surprisingly, the presence of women on the Board of Directors (*Gender*) is not much, only 15% on average. In addition, the number of companies with a chairman holding the CEO position accounts for 29.9%. Finally, the average shareholding rate of board members (*DirOwn*) is 10.5%, the lowest is 0%, and the highest is 83.6%.

Table 2. Descriptive Statistics of Variables

Variables	Mean	Min	Max	Std. Dev.
<i>ATR</i>	1.18	0.01	12.73	1.21
<i>BoardSize</i>	6	3	11	1
<i>OutDir</i>	54.4%	0.0%	100.0%	20.7%
<i>Education</i>	27.1%	0.0%	100.0%	24.5%
<i>Gender</i>	15.0%	0.0%	80.0%	16.5%
<i>Duality</i>	29.9%	0	1	45.8%
<i>DirOwn</i>	10.5%	0.0%	83.6%	15.4%
<i>Opp</i>	48.1%	0	1	50.0%
<i>Bank_St</i>	15.3%	0.0%	73.4%	15.6%
<i>Bank_Lt</i>	7.9%	0.0%	66.7%	12.2%
<i>FirmYear</i>	29	4	113	15
<i>FirmSize</i>	3,888,328	38,514	363,000,000	20,603,314

ATR: the asset turnover ratio; *BoardSize*: number of board members; *OutDir*: the proportion of independent and non-executive directors; *Education*: the proportion of board members with postgraduate education; *Gender*: the proportion of women on the board; *Duality*: chairman also holds the CEO position; *DirOwn*: the shareholding ratio of board members; *Opp*: the level of growth opportunity; *Bank_St*: short-term bank loan ratio; *Bank_Lt*: long-term bank loan ratio; *FirmYear*: number of years since the establishment; *FirmSize*: market value of firm (mil. vnd).

4.2 Regression Results

Before performing the regression equation, the study estimates the pairwise correlation coefficients between the studied variables. Table 3 below presents the matrix of correlations and the *VIF* index. The correlation coefficient between *DirOwn* and *Duality* is highest (26.8%), and the maximum *VIF* is 1.26, showing that the multicollinearity problem in the model is negligible.

Table 3. Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	VIF
(1) <i>ATR</i>	1											----
(2) <i>BoardSize</i>	0.124	1										1.08
(3) <i>OutDir</i>	0.030	0.018	1									1.20
(4) <i>Education</i>	0.009	0.039	0.042	1								1.05
(5) <i>Gender</i>	0.156	0.085	0.025	0.092	1							1.07
(6) <i>Duality</i>	0.033	0.017	0.295	0.049	0.066	1						1.18
(7) <i>DirOwn</i>	0.100	0.089	0.199	0.127	0.132	0.268	1					1.26
(8) <i>Opp</i>	0.105	0.067	0.131	0.098	0.019	0.002	0.083	1				1.09
(9) <i>Bank_Lt</i>	0.237	0.044	0.128	0.055	0.103	0.106	0.268	0.175	1			1.15
(10) <i>Bank_St</i>	0.272	0.080	0.029	0.026	0.127	0.076	0.003	0.057	0.133	1		1.08
(11) <i>FirmYear</i>	0.085	0.013	0.156	0.100	0.004	0.078	0.169	0.021	0.025	0.089	1	1.10
(12) <i>FirmSize</i>	0.061	0.237	0.089	0.080	0.125	0.034	0.062	0.151	0.066	0.081	0.030	1.12

ATR: the asset turnover ratio; *BoardSize*: number of board members; *OutDir*: the proportion of independent and non-executive directors; *Education*: the proportion of board members with postgraduate education; *Gender*: the proportion of women on the board; *Duality*: chairman also holds the CEO position; *DirOwn*: the shareholding ratio of board members; *Opp*: the level of growth opportunity; *Bank_St*: short-term bank loan ratio; *Bank_Lt*: long-term bank loan ratio; *FirmYear*: natural logarithm of number of years since the establishment; *FirmSize*: natural logarithm of market value. The probability values are reported in parentheses.

Table 4 below shows the results of regression applying the fixed effects (FE) model according to Columns [1] and [2] and the feasible generalized least squares (FGLS) according to Columns [3] and [4]. More specifically, Columns [1] and [3] present the regression results for linear effects of internal corporate governance mechanisms on agency costs, while Columns [2] and [4] show the test results for a nonlinear relationship between directorial shareholdings and agency costs.

Column [1] in Table 4 shows that *BoardSize*, *OutDir*, and *Education* regression coefficients are not statistically significant at the 10% significance level. In Column [3], using the FGLS model, only the regression coefficient of *BoardSize* is negative and statistically significant at the 5% significance level (-0.030; $p < 0.05$). In other words, *BoardSize* negatively and significantly affects the asset turnover ratio (*ATR*) as an inverse proxy for agency costs. This result accepts Hypothesis H₁: There is a positive relationship between the number of board members and agency costs.

Also, in Table 4, *Gender* is positively and significantly related to *ATR* at the 1% significance level, according not only Columns [1] (0.245; $p < 0.01$) but in [3] (0.999; $p < 0.01$). This result accepts

Hypothesis H₄: The presence of women on board tends to narrow agency costs. Similar to *Gender*, *Duality* is positively and significantly associated with *ATR* at the 5% significance level, presented in Column [1] (0.084; $p < 0.05$) and [3] (0.114; $p < 0.05$). This result rejects Hypothesis H₅: There is a serious agency problem in firms where the chairman is also the CEO.

Concerning the relationship between directorial shareholdings and agency costs, Columns [1] and [3] present a linear relationship; however, Columns [2] and [4] reveal the result nonlinear. Particularly, *DirOwn* is negatively and significantly related to *ATR* at the 10% significance level (-0.210; $p < 0.10$) in Column [1] and at the 1% significance level (-0.756; $p < 0.01$) in Column [3]. Nevertheless, Column [2] illustrates that the regression coefficient of *DirOwn* is negative and the coefficient of $(DirOwn)^2$ is positive, and these two coefficients are statistically significant at the 5% significance level. Moreover, using the FGLS approach, the regression results on the nonlinear relationship between *DirOwn* and *ATR* in Column [4] have not changed. Columns [2] and [4] result in accepting Hypothesis H₆: There is a nonlinear relationship between the board's ownership and agency costs.

Table 4. Regression Results

Variables	FE Model		FGLS Model	
	[1]	[2]	[3]	[4]
<i>Constant</i>	2.585 ***	2.625 ***	2.799 ***	2.830 ***
<i>BoardSize</i>	-0.006	-0.005	-0.030 **	-0.026 **
<i>OutDir</i>	-0.023	-0.026	-0.060	-0.066
<i>Education</i>	0.067	0.073	-0.065	-0.073
<i>Gender</i>	0.245 ***	0.249 ***	0.999 ***	1.007 ***
<i>Duality</i>	0.084 **	0.084 **	0.114 **	0.115 **
<i>DirOwn</i>	-0.210 *	-0.622 **	-0.756 ***	-1.172 ***
$(DirOwn)^2$	----	0.744 **	----	0.794 **
<i>Opp</i>	0.144 ***	0.145 **	0.323 ***	0.323 ***
<i>Bank_St</i>	-0.894 ***	-0.897 ***	1.249 ***	1.250 ***
<i>Bank_Lt</i>	-0.980 ***	-0.978 ***	-1.417 ***	-1.428 ***
<i>FirmYear</i>	-0.020	-0.025	0.090 ***	0.089 ***
<i>FirmSize</i>	-0.090 ***	-0.090 ***	-0.114 ***	-0.115 ***
<i>IndustryEffect</i>	No	No	Yes	Yes
<i>Observation</i>	1687	1687	1687	1687
<i>R² adj.</i>	87.9%	87.9%	51.4%	29.4%
<i>Breusch-Pagan</i>	5671.947 ***	5671.711 ***	----	----
<i>Hausman</i>	49.819 ***	49.622 ***	----	----

*** significant at the 1% level; ** significant at the 5% level; * significant at the 10% level

BoardSize: number of board members; *OutDir*: the proportion of independent and non-executive directors; *Education*: the proportion of board members with postgraduate education; *Gender*: the proportion of women on the board; *Duality*: chairman also holds the CEO position; *DirOwn*: the shareholding ratio of board members; *Opp*: the level of growth opportunity; *Bank_St*: short-term bank loan ratio; *Bank_Lt*: long-term bank loan ratio; *FirmYear*: natural logarithm of number of years since the establishment; *FirmSize*: natural logarithm of market value; *IndustryEffect*: dummy variable indicates the industry sector; dependent variable *ATR*: the asset turnover ratio as an inverse proxy for agency costs.

5. Conclusion

This paper aims to estimate the effects of internal corporate governance mechanisms, including board size, independent directors, educational qualification of board members, women on board, and duality

on asset turnover as an inverse proxy for agency costs. Moreover, we determine whether there is a nonlinear relationship between directorial shareholdings and agency costs. We find that the presence of female directors on board and duality are negatively related to agency costs, while board size positively impacts agency costs but not robustly. In addition, there is a nonlinear relationship between directorial shareholdings and agency costs. Based on the research finding, some recommendations to reduce agency problems are as follows. Firstly, companies should not construct a board with too many members. And then, increasing the presence of female directors on the board should be emphasized. Finally, companies not only align the interests between shareholders and directors through directorial ownership but ensures powers or incentives are suitable for board members' responsibilities.

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Digital Crowd Funding to Create an Endowment Program as a National Social Protection Scheme – A New Paradigm in Financial Inclusion

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Abstract: The World Bank and IMF have been aggressively pursuing the effort to improve financial inclusion worldwide. They are concerned that nearly 2 billion individuals in the world do not have bank account. They are worried about Africa because less than 20% of individuals there maintain banks accounts. China have been aggressively promoting financial inclusion the digital way using Alipay and we-chat achieving over 80% success rate. But what really is the strategy of financial inclusion. World Bank mission statement is ‘to make financial inclusion as a key enabler to reduce extreme poverty and boost shared prosperity’. Financial inclusion allows individuals and businesses to have access to useful and affordable financial products and services that meet their needs – transactions, payments, savings, credit, and insurance. Accessibility to a transaction account allows people to store money, send and receive payments. It is a gateway to other financial services. It has been proven that financial inclusion is not a sustainable objective. Having a bank account or getting bank facilities will only give a short-term gains and euphoria leading to a loss of discipline in financial management. Many casualties and crisis were caused by this such as the Sub-prime crisis in the USA. We need a better mechanism to up-lift the individual wellbeing in the economy. Using the principle of social protection and protecting sharing scheme, a new version of financial inclusion is proposed by creating a convenient system of contribution into an endowment scheme to allow individual from all walks of life to contribute 1% to 2% of their payment when they make their retail and online purchases, pay bills, pay toll, pay air tickets, pay cinema ticket, pay whatever transaction to an established endowment fund scheme. The fund will be invested and managed by fund management institution. The recurring return on the investment will be distributed into a form of social protection system which include the income protection scheme, Healthcare protection, Education protection, family protection, natural disaster, and calamity protection for everyone living in the nation. This can be created through some form of global insurance scheme with the social protection institution paying the annual premium from the endowment income. The endowment fund principal will stay in-tact and grow daily enabling it to increase the level of protection to every individual living in the nation. The contribution will be made voluntary but with strong encouragement with the spirit of ‘protecting each other’. So financial inclusion here is re-define to mean bringing every individual into social protection system that involve some voluntary contribution by all the participants.

Keywords: financial inclusion, endowment scheme, social protection, global insurance, social protection benefit, digital finance, crowd funding

1. Introduction

Financial Inclusion has been identified as enabler for seven of the 17 sustainable development goals of the World Bank with G20 is committed to advance financial inclusion worldwide. The mission statement of the World Bank is ‘to make financial inclusion as a key enabler to reduce extreme poverty

and boost shared prosperity'. Financial inclusion has been defined loosely as the accessibility to useful and affordable financial products and services that meet the individuals and business need.

The conventional measure of financial inclusion is 'having a bank account'. Between 2011 to 2017, over 1.2 billion adults have gotten access to a bank account. As of 2017, 69% of the world's adults had a bank account. Today the percentage is 77%. In China, Kenya, India, and Thailand, 80% of their adults have banks account. However, nearly 1.7 billion of world adults were still unbanked in 2017 with 50% of them are women.

2. The Race for Financial Inclusion

All countries in the world have been 'forced' to achieve a total bank inclusion. Since 2010 more than 55 countries have made commitments to financial inclusion. More than 60 countries have either launched or are developing a national strategy on financial inclusion. In Africa however only 21% of the household have bank accounts. 1.2 billion residents in India were made to have bank accounts through some form of public policies.

Why should everyone have a bank account to progress in this world?

Financial inclusion allows individuals and business to have access to useful and affordable financial products and services that meet their needs – transactions, payments, savings, credit and insurance. Accessibility to a transaction account allows people to store money, send and receive payments. It is a gateway to other financial services.

3. Why the Fuss of Financial Inclusion

Could this fuss about Bank inclusion be a marketing ploy for the financial and banking industry. The banking system is imposing on all the household to have an account with them to guarantee them a market accessibility. The banking system want every individual and business to save their money with the banking system which form as a source of their credit creation capacity. The banking system also want every individual and business to use bank facilities – take loans, credit cards, trade facilities so they will have more business.

So, in the end does it matter whether individuals and business will be better off having a bank account? Like many developing countries Malaysia and China has been promoting financial inclusion aggressively – Malaysia achieved over 95% financial inclusion index currently. In China the government have advanced in the financial inclusion by promoting Alipay and WeChat resulting in more than 85% inclusion rate

3.1 The Flaws of Financial Inclusion Objectives

Extensive research by Xuluo Yin et al. (2019), revealed that most financial inclusion impact are not sustainable presumably because it was done in a rush making financial inclusion itself as the target objective when the actual ultimate objective is the prosperity of the individual and businesses in the economy.

Zhu, Zhai and He (2018) has proven that there is an imbalance in the development of financial inclusion in China's regions. From 2006 to 2016, the Gini coefficient and the structural balance of China's financial inclusion show a significant downward trend making financial inclusion un-sustainable.

Hence it has been proven that financial inclusion in itself is not a sustainable objective. Having a bank account or getting bank facilities will only give a short-term gains and euphoria. This is normally lead to a loss of discipline in financial management.

Many casualties and crisis were caused by this such as the Sub-prime crisis in the USA. In Malaysia,

the private household debts rate is the highest in the region (up to 93.2% of GDP in 2020) because of the high temptation to spend as a result of the financial services availability. Fortunately, the average value of household debts is still manageable at nearly RM 40,000 per household.

3.2 *The Flaws and Prospect of Financial Inclusion*

Encouraging the household to open a bank account is not a crucial effort. It is cumbersome and could be costly. Having a virtual account that can be operated on a smart phone however can make a drastic change on the society's behaviour and lifestyle. It could facilitate many things in life and could promote economic progress quite rapidly.

It is the encouragement to use banking facilities – especially the private financing that may be disastrous if un-checked, especially when the household groups are not well exposed to the basic financial management. This will lead to the temptation to live beyond one's means as shown happening in the developed nation like USA: Average American are landed with USD96,371 of personal debts with an additional mortgage debt of USD 220,380 making a total household debt in the economy of USD 11.39 trillion.

3.3 *So Financial Inclusion Need Some Refinement*

What is missing in Malaysia for example is a broad and comprehensive social protection system for the household as a whole. Malaysia has a very refined and solid employee's financial protection system under a system called the Employees contribution system with compulsory contribution mechanism on both by the employees (11%) and the employers (13%) of the gross salary, creating a substantial force-saving mechanism of salaries on the monthly basis from day one of their employment to their retirement. With the compounding mechanism of the saving balance and the solid assets management discipline practiced by the institution, every employee is supposed to be guaranteed a substantial enough saving to retire. Unfortunately, the system does not cover the self-employed, farmers, fishermen, grab driver and riders and many other individuals including the housewife. The system also does not consider the natural disaster, calamity risk and other risk of income lost and the loss of income source. Hence, we need this comprehensive form of social protection system for all household groups in the economy.

4. **The Need to Re-Define Financial Inclusion**

In the conventional perspective, opening a bank account is seen as a road to financial access and hence the mean to succeed in life. The big assumption is that with bank account each individual and business will have access to financial facilities which allow them to leverage and improve their life and business performance. The big assumption is in the mechanism to access financing and the ample availability of financial facilities to all individuals and businesses. Beyond that, how the fund will be utilized, and its impact is presumed to generate some sustainable improvement in life. It is not a protection, but it is an opportunity created for all.

Inclusion means bringing everyone into the desired system. It does not promise anything positive from there as how individuals and businesses obtain financing and use the financing is up to individual ingenuity and capability.

What we need is a simpler and direct mechanism to bring every individual into a system or scheme that will protect all of them financially and will bring sustainable improvement in their wellbeing.

The proposal proposed here is to re-define financial inclusion as a process of bringing in all individuals into a financial protection system that will ensure everyone in a society will be well protected and will have a sustainable wellbeing in life. Instead of just having bank account, the system will include everyone in the safety net system, so they are well protected financially.

5. The Challenge in Creating a Sustainable Social Protecting System

A social protection system must not only have contributors to make sure regular fund are available to be used to provide the social benefit to the targeted groups in the society. The fund must be sustainable with some recurring income substantial enough to meet the distribution need. It requires an endowment principle to enable a principal sum be invested with substantial income generated on a monthly and annual basis.

The endowment fund and the compounding effect need to be created with an institution like the established Employers Provident Fund (EPF). The model can quite conveniently be created with the success and track record of EPF behind.

What is needed is a substantial sum as an endowed fund to start with and a consistent (daily, weekly, monthly, and annual contribution) that is sustainable and not burdening anyone in the society.

6. Endowment Contribution Mechanism as the Potential Proven Mechanism

Endowment fund success story have been related – with as recent as the Norway Oil Fund – created from the natural resources discovered in the economy – oil well in the North Sea – which was only started in 1993 but today it is worth over 10 trillion.

In Malaysia wealth contribution had traditionally been made in the form of land for mosques side and the graveyards. There are millions of contributed land available with the Religious Council (Majlis Agama Islam) all over Malaysia. Some are effectively utilized to build investments properties other than mosques and the graveyard side. Occasionally, where there is natural disaster of casualty, there will be initiative to raise fund through some form of crowd funding. Contribution will just be bank in into the conventional bank accounts provided in the promotional documents.

7. The Need for a New Formal Trust Endowment Institution

A national endowment trust institution needs to be incorporated under the government umbrella like the EPF to gains the public support and acceptance. But it must be run totally independent of the government machinery with no political interference. Its mission will be to accumulate public wealth and invest it professionally to grow to a suitable size to be used as a social protection institution in the economy.

As an initial effort, the government may transfer some of its related assets in the Government owned companies, Government listed companies, Government lands and buildings and other least productive assets to the trust fund as the seed capital of the endowment institution. This will start the ball rolling immediately and income from investment be generated right from the start. The endowment institution will recruit professional and specialist to management the wealth in the institution with the target of generating the optimal value of return annually.

8. Creating a Scheme of Trust Inclusion in a Society

Instead of focusing on Bank and financial inclusion in the economy, the government will need to focus on making endowment contribution as an inclusive activity for everyone. It must provide every opportunity to the public (ummah) to make waqf and practice it as a habit and way of life. All walk of life from a commoner – a child, housewife, head of household, employees, business owner, retirees, companies, organization, and government organization may be exposed to some form of opportunity to contribute to waqf at every opportunity moment. Endowment contribution mechanism must be available at any point where the ummah is dealing with money or transactions in life.

At point of purchase or payment when Individual must initiate payment, they will have the opportunity to include some waqf contribution directly and indirectly with the help of an artificial intelligence system to capture, separate and remit the contribution to the national Waqf fund.

9. Involving Every Individuals in the Non-Muslim in Waqf Activity

Collecting public fund is regarded as an honorable activity to every religion and individual in this planet. There is no need to feel embarrassed to ask for people to contribute to a good cause. We could create a global and comprehensive system of social protection with the fund collected – to cover every walk of life in the nation - if they live in the country. When there is excess later, we should also share the fund with the rest of the world in term of our contribution to the whole world. But as an endowment scheme, what will be distributed will be just the net income from investment in the Waqf fund - can be done monthly or annually.

10. Mechanism to Allow Every Individual to Contribute to the Endowment Fund

We will create a mechanism that make it so convenient for everyone to contribute into the endowment scheme directly or indirectly during their daily activities. The mission is to make everyone consciously invest for their long-term happiness - the Hear-after.

While doing our daily chore we will conveniently allocate and invest some fund as an investment for the hear-after through this endowment contribution. This mechanism must be made available at as many points of household activities – such as the toll-gate payment, the retails stores – supermarket, hyper market and any bills payment such as telecommunication, electricity, water, and any payment gate system. The point is we will create a mechanism for making the endowment contribution as effortless as possible at every convenient moment in our life.

11. The Mechanic of Endowment Fund Contribution

Imagine that we are passing through the toll gate travelling from some destination. When we swipe our Touch & Go card, we will contribute 1% to 2% of the toll fee to the endowment fund. The amount will be automatically deducted from our Touch & Go balance on top of the toll fee. The amount will directly be credited into the Waqf fund bank account.

The same will happen when we pay at the hypermarket, restaurants even Mamak's stall. The online payment mechanism using digital mode will enable the contributed fund to be channeled to the Waqf Endowment fund which will immediately be invested to benefit from the compounding effect.

12. The Voluntary Nature of Contribution

The endowment scheme must be introduced as a voluntary scheme of contribution. But it must be promoted well to create incentive to all walk of life to contribute.

The important thing is to create a discipline, habit, and culture of making contribution among all citizen as a way of life.

We have heard of story about a small society in Turkey and in Pakistan where when they buy bread or coffee, they pay extra to create a reserve for anyone to come later and claim for free bread or coffee if they need it.

13. Creating a Private Endowment Contribution

The endowment contribution system will be made sophisticated enough to allow the formation of a specific saving activities. Specific endowment scheme means a person could create a specific endowment fund with a bank for their children education, healthcare and possible disaster for them and their family member. Arrangement will be made with a particular bank who will manage the Private waqf. They will determine the target beneficiary that may include a mosque, charitable institutions, orphan house, the family members – spouse, children, and others.

The family heads can be the trustee of the family fund with immediate distribution to family members, specific target beneficiaries and the National Endowment institution. The bank act as the fund manager and the distributor. The idea is everyone will have the freewill of how they want to distribute the profit from their endowment fund as long as they are contributing to a trust Fund.

14. Trust Endowment Institution Governance Mechanism

The Waqf Endowment Institution must have a very strict corporate governance mechanism to:

- a. Making sure that it is professionally run.
- b. That it is clinically clean and neat financially
- c. It is transparent and open for public scrutiny
- d. It is run using a strict fund management rules and laws.

The waqf institution board members and Trustees must be dignified public servants and volunteers that are elected based on their professional experience in the field. The national Trust Endowment Institution will stay as the Government link institution that will report to the parliament and the Securities Commission on a periodic basis.

15. Distributing Benefit to the Targeted Group in the Society

The beneficiary of the trust institution will be every single soul in the nation and beyond including peoples from the rest of the world.

Distribution will only be made from the profit from the endowment investment – leaving the principal fund intact as long-term investment until the judgement day. The institution will form suitable mechanism for each target of the beneficiaries. Each type of benefit will have its own sub-fund and scheme to fit the target group.

The distribution may be complimented with the enhancement scheme using the insurance principle of sharing risk with the maximum number of peoples on the globe. There will be specific takaful, such as:

- a. Group protection insurance
- b. Education insurance
- c. Health insurance
- d. Family protection insurance
- e. Natural Calamity insurance
- f. Loss of income insurance

16. Distribution in the Form of Effort in Financing Potential Micro Business to Grow

As an effort to develop the micro businesses and help every individual to become entrepreneur, the fund will also be used to finance viable micro businesses – to ‘provide the rode rather than giving fish all the time. Hence the fund must also set up a financing mechanism for the micro businesses and small and

medium businesses. The financing should be in the form of equity participation to create some serious attention on each investee institution. This will solve the issue of financial exploitation against the small businesses.

17. Conclusion

The proposal here is to create a mechanism for every individual on earth to have the spirit of giving and contributing for a common goal of SHARED PROSPERITY worldwide. There are ample capacity and capability for every human being to contribute to the system at every opportunity in our life. The act of contributing to the endowment fund is a form of investment in preparing us to arrive at the more permanent life in the hereafter – as a fulfilling act of submission to our great creator.

At the same time, the fund accumulated will be used to generate income to be distributed to the specific beneficiary group - the needy group in the society through all sort of mechanism.

Only income from the fund will be distributed leaving the principal sum intact and continue generating income for the beneficiaries for as long as the world continue to exist. So, the fund will not only sustain but grow consistently to become bigger and more established in the future. This new version of financial inclusion is hoped to spread wealth and well-being of the world population more equitably and sustainably.

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**INFORMATION
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Application of the Artificial Intelligent in Supply Chain Management: A Bibliometric Analysis

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Abstract: A significant amount of literature has been published on the evolution and application of artificial intelligence in supply chain management. However, a complete bibliometrics examination of the topic is still lacking. As a result, the purpose of this study is to fill this gap by improving readers' comprehension of the most recent research literature by the application of bibliometric analysis and visualization tools to document the quantitative analysis and visual analysis of supply chain management research. We analyzed 358 Scopus-indexed papers using SciMAT, a software tool for science mapping and bibliometric analysis. We investigate the thematic evolution of the application of artificial intelligence in the supply chain across three consecutive sub-periods (2000–2009, 2010–2019, and 2020–2022). Results indicate that research on artificial applications in supply chain management has consistently increased since 2000. However, it has only been since 2010 that technological developments have shown that AI has a wide range of applications. These advancements have made headlines by adapting procedures in a variety of industries, including supply chain management. Through the bibliometric analysis, three major thematic focus areas have been identified: (1) blockchain in supply chain management; (2) artificial intelligent; (3) smart internet of things. The SciMAT analysis results confirmed and strengthened these conclusions. In addition, this study also demonstrates that supply chain risk management concerns have received more attention over time. Importantly, the focus has been mostly on the Internet of Things, which is the smart sensor. The paper also provides future recommendations and research suggestions for different types of analysis methods.

Keywords: bibliometric analysis, artificial intelligent, supply chain management, SciMAT

1. Introduction

Artificial intelligence (AI) has shown to be incredibly beneficial for supply chain management in recent years. Due to AI's ability to process, analyse, and most importantly predict data, it can give organisations with precise and consistent demand forecasting. This helps them to source products and services more efficiently, which lowers costs for shipping, warehousing, and supply chain management. Despite the fact that a number of useful artificial intelligence (AI)-based supply chain applications have surfaced recently. Despite this, only a small number of research have looked at the use of AI in supply chain risk management. Technologies like as robotics, machine learning, and natural language processing have the ability to support supply chain reforms and risk management.

Previous study indicates that the application of AI in SCM is not novel. To trace the growth of publications on this subject through time, a bibliometric analysis is required. This compilation will examine the geographic regions where this topic is discussed, the primary authors, and the primary journals where it has been published, as well as the topic's evolution over time. By doing so, it will be possible to have a sense of the subjects that will be researched soon. As a result, the study's main objective was to conduct a bibliometric analysis of recently published papers that dealt with the use of AI in supply chain management.

2. Methodology

The primary purpose of this paper is to conduct a bibliometric analysis of the available research on the use of artificial intelligence to the management of supply chains. Firstly, this study has implemented the PRISMA 2020 guideline, an important guideline for reporting systematic reviews to assess the appropriateness of the methods, and therefore the trustworthiness of the findings. The detailed flow chart of the research framework is shown in Figure 1.

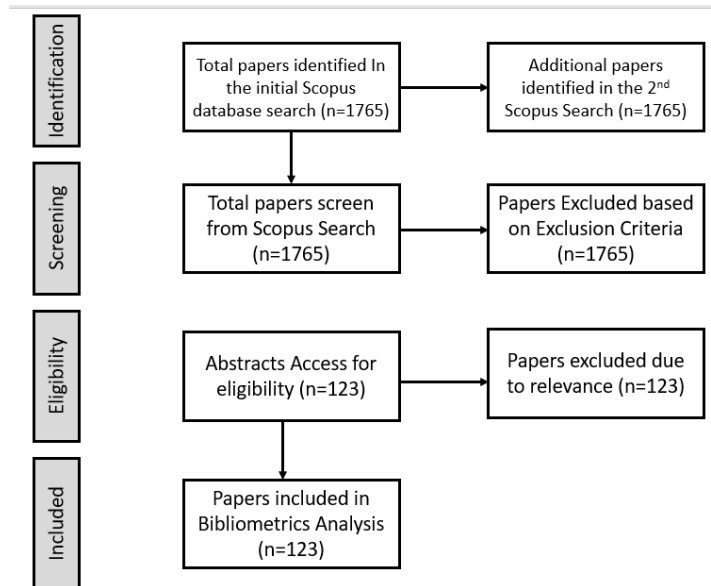


Figure 1. The PRISMA 2020 Guidelines of Systematic Review

2.1 Identification

First, the study objective and search criteria are defined. The search procedure consisted of four steps based on the PRISMA structure: (i) recognition; (ii) screening; (iii) qualification; and (iv) participation. First, data was retrieved from the Scopus database using the following search terms: "artificial intelligence AND supply chain management", "artificial intelligence AND supply chain risk management", "Smart Internet of Things (IoTs) AND supply chain management" and "Logistic Management AND artificial intelligent. The search terms were centered on coordinated supply chain management. Supply chain management, collaboration, and cooperation are all pertinent terms because SCCM is a broad concept. In the inclusion criteria, databases were filtered and restricted based on their English language content and publication date after 1999. After applying the filters language (English), publication year (>1999), and content type, we obtained 358 search results (article & conference paper). Table 1 displays the search terms and total number of documents discovered.

Table 1. The Search Keywords and the Total Documentation Found

Search Keyword	Filter	Query String	Total Documents Found
Artificial Intelligent & Supply Chain Management	1. Publication year: >1999 2. Language > English 3. Document Type: Article & Conference Paper	TITLE-ABS-KEY (artificial AND intelligent AND & AND supply AND chain AND management) AND PUBYEAR > 1999 AND (LIMIT-TO (LANGUAGE , "English")) AND (LIMIT-TO (DOCTYPE , "cp") OR LIMIT-TO (DOCTYPE , "ar"))	207
Artificial Intelligent & Supply Chain	1. Publication year: >1999 2. Language > English	(TITLE-ABS-KEY (artificial AND intelligent) AND TITLE-ABS-KEY (supply AND chain AND risk AND management)) AND PUBYEAR > 1999 AND (LIMIT-TO (LANGUAGE , "English")) AND	14

Risk Management	3. Document Type: Article & Conference Paper	(LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "cp"))	
Smart Internet of Things & Supply Chain Management	1. Publication year : >1999 2. Language > English 3. Document Type: Article & Conference Paper	TITLE-ABS-KEY (smart AND internet AND of AND things AND & AND supply AND chain AND management) AND PUBYEAR > 1999 AND (LIMIT-TO (DOCTYPE , "cp") OR LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (LANGUAGE , "English"))	367
Logistic Management & Artificial Intelligent	1. Publication year : >1999 2. Language > English 3. Document Type: Article & Conference Paper	TITLE-ABS-KEY (logistic AND management AND & AND artificial AND intelligent) AND PUBYEAR > 1999 AND (LIMIT-TO (DOCTYPE , "cp") OR LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (LANGUAGE , "English"))	192

2.2 Screening and Eligibility

The titles and abstracts were then studied to see whether the papers were pertinent to the topic and purpose of this study. The second inspection step consisted of reviewing each article's full text to determine its suitability for inclusion in this study. Following this approach, 29 articles failed to match the extraction requirements and were eliminated from consideration. After normalizing the keywords into singular, plural and from the same context, the final screening procedure yielded 358 papers that satisfied the inclusion criteria for this evaluation.

2.3 Included

Using SciMAT, we are able to identify the most important research topics and evaluate them based on their performance and impact metrics. SciMAT provides a variety of bibliometric tools and techniques for achieving consistent results via a keyword co-occurrence analysis and an evolution map. SciMAT is distinguished from other scientific mapping software tools by three features: (a) a sophisticated preprocessing module for cleaning raw bibliographical data; (b) the application of bibliometric measures to investigate the influence of each researched element; and (c) an analysis configuration wizard. Two procedures comprised the bibliometric study: a paper search using keywords and a theme evolution analysis using SciMAT (See Figure 2).

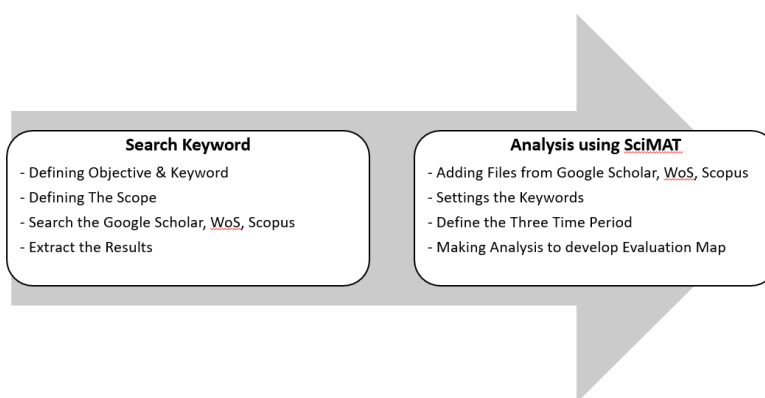


Figure 2. Bibliometric Analysis Steps using SciMAT

3. Analysis using SciMAT

Initially, the raw data were acquired from Scopus as plain text (.ris) and imported into SciMAT to construct the knowledge base for subsequent science mapping analysis. It includes the bibliographic data Scopus has stored for each research document. Words representing the same concept were grouped together. Due to the fact that some publications lacked any keywords, a manual inclusion of descriptive keywords matching title terms with keywords already available in the knowledge base was performed

for the sake of completeness. In addition, several irrelevant terms, such as stop words and words with a very broad and general meaning, were eliminated.

This data was displayed with the software SciMAT, employing a filtering procedure to exclude duplicate documents and words. Finally, the analysis tool of SciMAT was employed to draw links between various time periods and significant issue clusters over the years. From the Scopus documents discovered, descriptions were generated based on the data classification of three basic aspects: time span between 2000 and 2022. In accordance with Cobo et al. (2011) the bibliometric analysis was conducted using the SciMAT software (2012). The method consists of three parts. "Management module for the knowledge base" "Module for conducting the science mapping analysis." And 'Visualization module'. In the 'Module to administer the knowledge base' import files to construct the knowledge base. ris, edited entities, ceased duplicating documents, and periods were defined. In the 'Module to Conduct the Science Mapping Analysis', periods, units of analysis, data reduction, network type, network reduction, normalisation, clustering, document mappers, quality measurements, and longitudinal analysis were selected. The Visualization module concluded with visualisation and interpretation. The configuration for analysis is as shown below:

- a. Unit of analysis: Words (authorRole=true, sourceRole=false, addedRole=false)
- b. Kind of network: Co-occurrence
- c. Normalization measure: Association strength
- d. Cluster algorithm: Centers simples
- e. Max cluster size: 10
- f. Min cluster size: 1
- g. Evolution measure: Association strength
- h. Overlapping measure: Inclusion index

4. Findings

This study shows the results in supply chain management based on the strategic diagram; evolution map and cluster associated.

4.1 Strategic Diagram

4.1.1 Strategic Diagram for Period 2000 - 2009, 2010 - 2019, and 2020 - 2022

SciMAT employs strategic diagrams to analyse the most influential research domains throughout time. The strategic diagram is a four-quadrant, two-dimensional map based on two parameters: centrality and density (Callon et al., 1991; Cobo et al., 2011) (see Fig. 4). We produced a comparable diagram for each phase of the investigation. There are four quadrants on each chart: (a) The top right quadrant, which is quadrant 1, displays the motor theme, which is both central and developed; (b) The top left quadrant, quadrant 2, has peripheral but developed issues; (c) The bottom right quadrant, quadrant 3, contains central but underdeveloped themes; and (d) The bottom left quadrant, quadrant 4, contains peripheral and underdeveloped topics.

In this study, we build a co-occurrence analysis to synthesis texts using a strategic diagram (Callon et al., 1991). Co-occurrence is the occurrence of two terms in the same document. This enables the identification of relationships between terms (Cobo et al., 2011). This method provides the depiction of the connection and its strength between multiple topics using strategic maps. In these diagrams, keywords are depicted as nodes and are connected if they can be found in the same document (Cobo et al., 2011).

Figure 3 depicts the strategic diagram for period 2000 - 2009, 2010 - 2019 and 2020 - 2022. The Figure 3 (a) which is period 2000 to 2009, consists of 2 themes. INTELLIGENT-AGENTS and ALGORITHMS are two of the growing subjects within this period. The INTELLIGENT-AGENTS theme has the highest density (17.36), centrality (1.85), number of documented (21) (refer to Table 2 &

Figure 4), followed by the ALGORITHM theme, which has centrality (1.85), density (9.79) & number of documents (7). This indicates that INTELLIGENT-AGENTS theme was extensively explored and implemented in supply chain management during this period. This demonstrates the significance of algorithms such as Random-Forest and Decision-Trees in supply chain management technology research during the past decade. For example, there are many researchers discussed about the advance of the application of intelligent agents and algorithm integration for supply chain management.

Figure 3 (b) shows the strategic diagram for period 2010 to 2019. There are total of four themes identified. INTERNET OF THINGS (IOTS) one of the basic and transversal topics with high density (1), Centrality (7.86), documents counted (20). This demonstrated that IOTs are important but underdeveloped subjects. This topic has considerable potential for investigation. The motor theme with the highest density (3.85), centrality (2.05), and number of documents counted is BLOCKCHAIN (24). SUPPLY CHAINS also appear as the motor theme with high density (2.41), centrality (0.75) and documents counted (24). BLOCKCHAIN & SUPPLY CHAIN themes started to gain popularity and is a hot topic during that period. ARTIFICIAL NEURAL NETWORK as the only one theme at quadrant 2 with the density (10), centrality (2.06) and documents counted only 3. It is a distinct but developing theme. This suggests that this issue is seen as connectors of other clusters or developing subjects that are becoming central but have not yet been the subject of a substantial number of contributions.

Figure 3 (c) shows the strategic diagrams for period 2020 to 2022. There are total of four themes identified (refer Table 3), which are (a) SUPPLY-CHAINS, (b) INTERNET-OF-THINGS, (c) ARTIFICIAL-INTELLIGENCE-OF-THING, and (d) INTELLIGENT-LOGISTICS

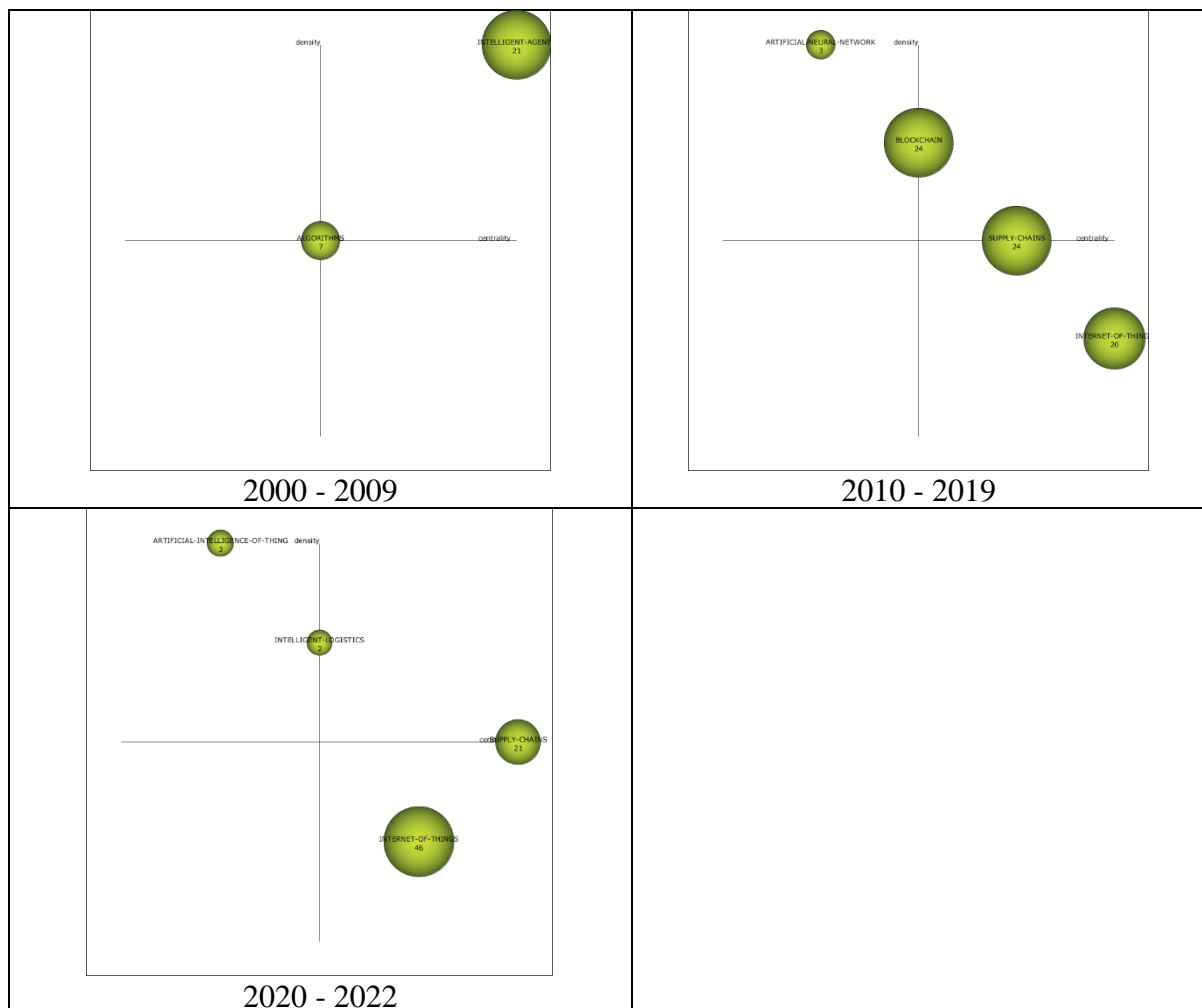


Figure 3. Strategic Diagram of the Three Periods based on Document Counted

Table 1. Cluster Found in the SciMAT Analysis for Year 2000 to 2009

Cluster	Centrality	Centrality Range	Density	Density Range
INTELLIGENT AGENTS	1.85	1	17.36	1
ALGORITHMS	1.85	0.5	9.79	0.5

Unit of Analysis = Words

Table 2. Cluster Found in the SciMAT Analysis for Year 2010 to 2019

Cluster	Centrality	Centrality Range	Density	Density Range
INTERNET-OF-THINGS	7.86	1	1	0.25
SUPPLY-CHAINS	7.19	0.75	2.41	0.5
BLOCKCHAIN	4.47	0.5	3.85	0.75
ARTIFICIAL-NEURAL-NETWORK	2.06	0.25	10	1

Unit of Analysis = Words

Table 3. Cluster Found in the SciMAT Analysis for Year 2020 to 2022

Cluster	Centrality	Centrality Range	Density	Density Range
SUPPLY-CHAINS	14.81	1	9.44	0.5
INTERNET-OF-THINGS	7.14	0.75	1.66	0.25
ARTIFICIAL-INTELLIGENCE-OF-THING	0.9	0.25	24.24	1
INTELLIGENT-LOGISTICS	1.09	0.5	10	0.75

Unit of Analysis = Words

4.1.2 Evolution Map

In order to visualize the evolution of supply chain management study based on the time period analyzed following the strategic diagrams, an evolution map was created in the research (see Figure 4). The evolution map shows the recurring relationships between themes that emerged during each of the three (3) periods. On this map, the dashed lines indicate that topics that are interconnected share common key phrases whereas the straight lines indicate a thematic connection. Figure 1 depicts the evolution map for the years 2000 to 2022. When the number of themes was subdivided into the various time periods within the period 2000–2022, it was found that there were 2 themes in the years 2000–2009, 4 themes in the years 2010–2019, and 4 themes in the years 2020–2022. The technology and theme of IOTs become the hot research topics since 2010. During period 2019 to 2022, researchers about application of IOTs in supply chain extensively conducted and become one of the hot topics at recent years. For the period 2020 to 2022, Artificial Intelligence of Things (AIOTs), which is combination of Internet of Things (IoT) and Artificial Intelligence (AI) had gain popularity and become emerging topics for supply chain management.

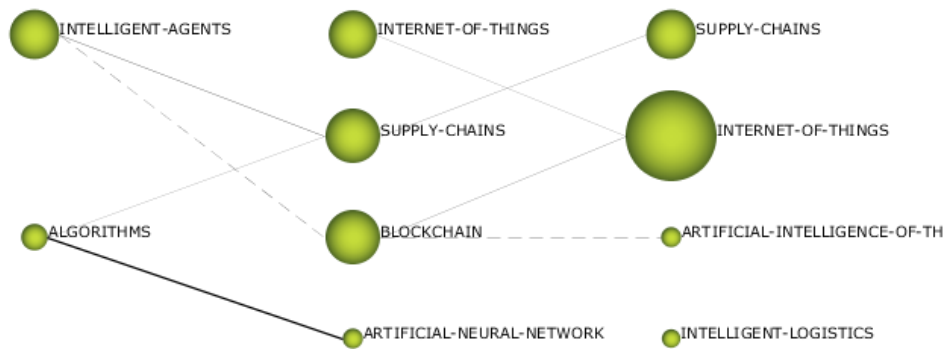


Figure 4. Keyword Evolution Map

(Source: Compiled by the authors based on SCOPUS data as of 7 August, 2021)

4.1.3 Overlapping Map

Figure 5 shows Supply Chain Management keyword changes over time. In the first period, 31 keywords are observed; 7 disappear, and 24 enter the next. Second period: 70 new keywords. Together, they total 94. 46 keywords disappear at the end. After the period are 48 keywords. Third period: 28 emerging keywords. 76 keywords remain from the second phase. The terms' consistency over four time periods is 0.77 and 0.63. Supply Chain Management-related keywords rose substantially from 2000 to 2019. From 2019 through 2022, both new and total keywords decline. Few keywords were kept based on each era's coefficient, and the evolution of Supply Chain Management keywords has not yet stabilised.

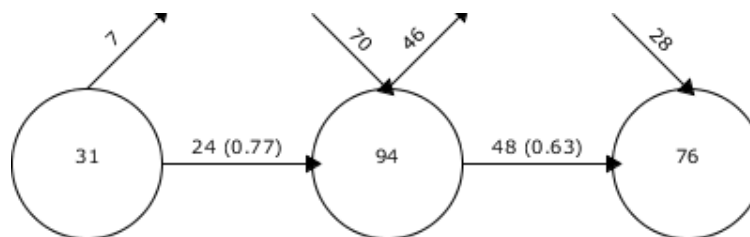


Figure 5. Overlapping Map

4.1.4 Clusters' Network Analysis for Period 2020 to 2022

As shown in Figure 6, comparing c and d, SUPPLY CHAINS (Refer Figure 6a) and INTERNET OF THINGS (IOTS) (Figure 6b) are relatively important hot issues. There are total of 17 topics related with these two clusters emerged. With the development of the blockchain and supply chain technology, the amount of information grows explosively. During this period, researchers' research on SUPPLY CHAIN was mainly on COST-ESTIMATIONS (weight:0.13) and SUPPLY CHAIN RISK (weight: 0.25) and INTELLIGENT-APPLICATION (weight:0.14). This change may be related to COVID-19. Due to the long-term impact of the epidemic, research on how to save the cost, manage the risk may grow further. Instead of this, researchers also noticed that new keywords “, which is one approach, techniques or algorithm that used to solve supply chain network design problems had been studied since 2019.

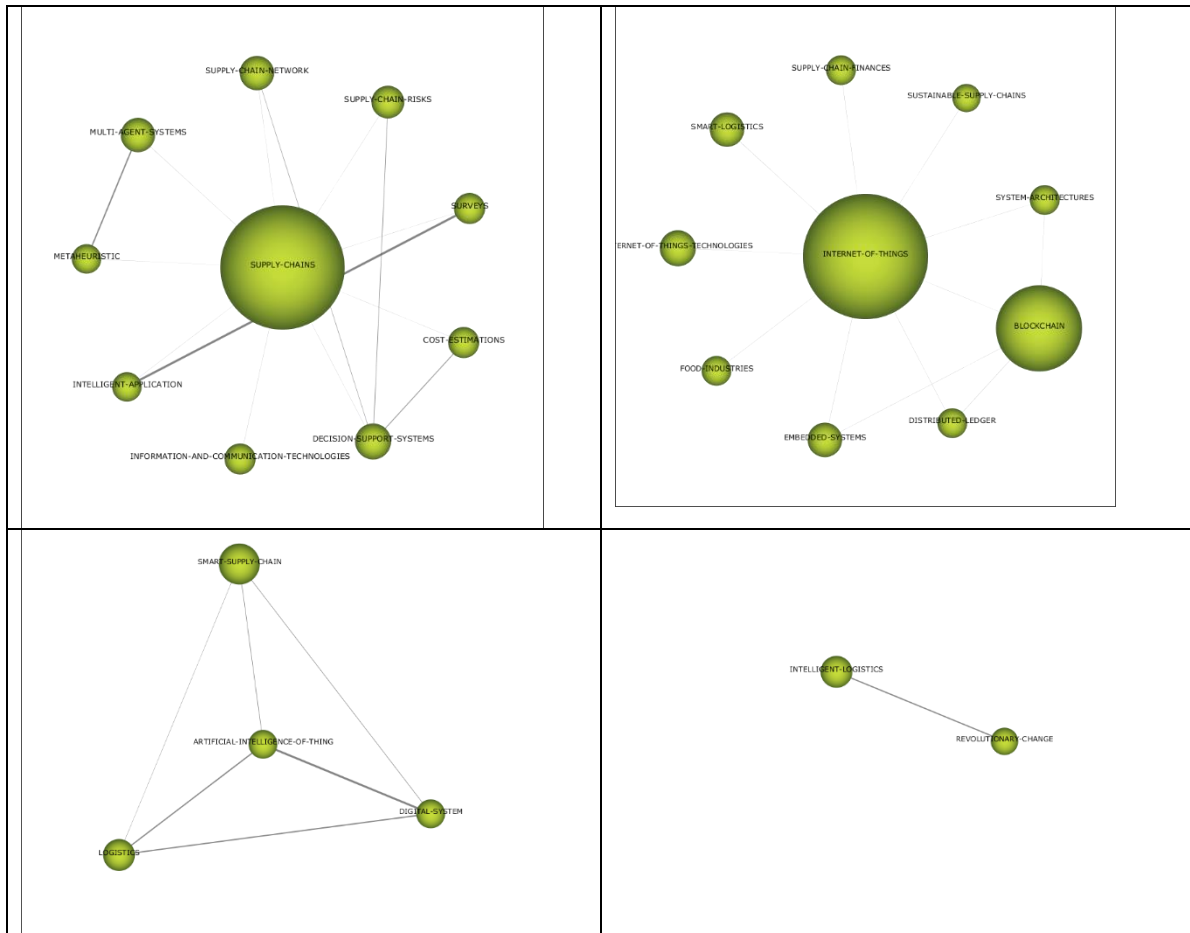


Figure 6. (a) The Cluster network of; (b) Supply Chain; (c) Internet of Things (IOTs); (d) Artificial Intelligence of Things; and (e) Intelligent Logistics

5. Conclusion

This research intends to conduct a bibliometric analysis utilising the Scopus database and the search terms "artificial intelligence AND Supply Chain Management" between 2009 and 2022. For data visualisation and analysis, the bibliometric programme SciMAT was utilised, which illustrates the pertinent concerns that occur throughout time and may be important to future research. The acquired results are a study of the stated growth rate.

The number of publications related with the search term "AI in supply chain management" has increased steadily throughout the years. With the SciMAT software, the smart Internet of Things emerged as the dominant theme (IoT). In addition, it illustrates the emergence of extremely relevant new topics, such as mobile technology and the study of algorithms, as an outgrowth of signal processing.

Based on the articles analysed between 2000 and 2022, it is possible to conclude that numerous studies have studied the application of AI in Supply Chain Management. Findings also indicate that artificial intelligence combined with IOTs, i.e. Artificial Intelligent Internet of Things (AIOTs), are the hottest supply chain management study subjects of late.

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Design and Development of a Healthcare Dashboard Analytic System

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Abstract: The objective of the study was to uncover common deficiencies in diabetes self-management abilities and self-efficacy, in addition to additional traits that serve as facilitators and obstacles to optimum diabetic self-management. A dashboard analysis solution for the healthcare industry was built with the help of Power BI. Information from the National Institute of Diabetes and Digestive and Kidney Diseases was utilized in the process of compiling the dataset for this investigation (publicly available at: UCI ML Repository). The primary purpose of this research was to build and develop a healthcare analysis dashboard with the intention of visualizing the information that was obtained from a specialized database. The empirical-analytical group addresses the research of dietary supplements in a way that is comparable to how the natural sciences are studied. This kind of study puts an emphasis on objective knowledge, research questions that can be answered with yes or no, and operational descriptions of the variables that are going to be assessed. The empirical-analytical group is responsible for formulating hypotheses that may be tested through the use of deductive reasoning that is founded on previously established theories. This strategy places an emphasis on providing an explanation. Health care professionals have the potential to gain important insights into the process of getting better health outcomes by educating diabetes patients and assisting them in self-management of their condition. The proposed dashboard analytics will assist practitioners in establishing whether a patient has diabetes based on certain diagnostic parameters contained within the dataset. This determination will be made based on certain diagnostic parameters contained within the dataset.

Keywords: dashboard analytic, diabetes self-management, Power BI, data mining

1. Introduction

Diabetes is the most common reason for amputations of the lower limbs, as well as blindness, renal failure, heart attacks, and strokes. The number of people who died prematurely as a result of diabetes rose by 5% between the years 2000 and 2016. The World Health Organization (WHO) rated diabetes as the ninth leading cause of death in 2019, with an anticipated 1.5 million lives lost to the disease. Recent research has placed an emphasis on the cumulative effect of attitudes, preferences, and conceptualizations in the form of identity. These studies have evaluated the impact that illness identification has on social connections with others, including health care providers, and how this identity can influence behaviours. The function of the support group in goal formulation and achievement for diabetic self-management practices is not well evaluated in the research that is currently available. As a result, the purpose of this study is to investigate the influence of identification with and membership in support groups on the formation of goals and the accomplishment of those goals in people who have type 2 diabetes. This study aims to find common deficiencies in the talents and self-efficacy required for optimal diabetic self-management, as well as other attributes that function as facilitators and impediments to such management. Practitioners have the potential to gain knowledge that can lead to improved health outcomes when they train and assist diabetic patients in the process of learning self-care skills.

Enablers of self-management are processes or variables that make it easier for patients to comply to the self-management regimen that has been recommended to them. These elements include social support as well as assistance and encouragement from members of the family, peers, or close relatives who have previous experience managing diabetes. On the other side, an individual's determination to avoid or

reduce the risk of developing diabetic complications is something that can contribute to self-management motivation. According to studies, trust, respect, and joint decision-making in setting health goals are the defining characteristics of effective communication between patients and the medical professionals who care for them. The provision of patient support through the utilisation of health technology interventions, such as applications for mobile phones, as well as education regarding self-management, adds additionally to the successful treatment of diabetes.

The capacity of a patient to maintain control of their diabetes is also impacted by personal factors such as their educational background and gender. In addition, adequate self-management skills as well as self-efficacy (confidence) in one's ability to put these skills into practise are essential components that drive engagement in diabetes self-management. Because of this, having both skills and a high sense of one's own self-efficacy encourages full participation in self-management. The development of self-management skills begins with an understanding of the illness being managed, as well as the interrelationships among the various self-management activities and the influence these actions have on health outcomes. On the other hand, self-efficacy is "one's trust in his or her own natural capacity to execute particular activities required to attaining a goal," according to one definition of the term. People will not take action unless they believe their activities will lead to the outcomes they want, regardless of whether or not other circumstances make it simpler for them to do so.

2. Methodology

This study's dataset was compiled with information from the National Institute of Diabetes and Digestive and Kidney Diseases (publicly available at: UCI ML Repository). The primary objective of analysing these data was to determine whether a patient has diabetes based on the diagnostic parameters included in the dataset. While selecting instances from a larger dataset, numerous constraints were encountered. Both the dataset and the position are textbook illustrations of supervised binary classification. The Pima Indian Diabetes (PID) dataset consists of $9 = 8 + 1$ (Class Attribute) characteristics, 768 records pertaining to female patients (500 were negative (65.1%) and 268 were positive), and $9 = 8 + 1$ (Class Attribute) characteristics (34.9 percent).

2.1 Data Processing

Real-world data can include missing numbers, inconsistencies, and noise. If data quality is poor, it is likely that no high-quality results will be found. Data must be preprocessed in order to produce high-quality results. The data undergoes cleansing, integration, transformation, reduction, and discretization during preprocessing. Improving the data's usability for data mining and analysis is crucial in terms of time, money, and quality. Next, data cleansing involves filling in missing values and removing noisy information. Outliers in noisy data are eliminated to resolve differences. The values for glucose, blood pressure, skin thickness, insulin, and BMI in our dataset are all 0. Therefore, the median value of the characteristic was substituted for each value of zero.

2.2 Mining Association Rules

The techniques of data mining are also used to construct rules by extracting crucial data. Association rule mining is an essential subfield for discovering patterns and common objects in a collection. It is divided into two parts: (1) select the most common item collections; and (2) establish rules. In 1994, Agrawal and Srikan devised an association rule mining technique based on a performance evaluation of a Walmart store's Apriori-algorithm-based item purchases. Association rule mining is utilised in both medical and corporate data research to discover and characterise interesting and significant patterns.

2.3 Random Forest Machine Learning

Random forest (RF) is a set of tree-based machine learning predictors. It is flexible, quick, and simple. Typically, random forest produces favourable outcomes. It is tough to enhance its performance, and it can handle a variety of data kinds, including numeric, binary, and nominal. Random forest produces

and mixes a huge number of decision trees to give more accurate and relevant outcomes. It has been utilised for classification as well as regression. Machine learning relies heavily on classification. It utilises the same hyper parameters as decision trees and bagging classifiers. Simply investigated is the truth behind random forest, which is the overlap of random trees.

3. Design and Development of the Dashboard Analytic for Healthcare System

3.1 Design the Database for Prediction using Machine Learning Algorithms

This algorithm has a dependent variable that must be predicted given a defined set of predictors (independent variables). This function transforms inputs into outputs based on this set of variables. In the presence of uncertainty, supervised machine learning generates a data-driven model that provides predictions. A type of supervised learning directs a model's decision-making. Predicting feasible answers to incoming data using a given set of input data and previous replies. The objective of machine learning is to design algorithms that can learn and provide statistical models for data analysis and prediction. The machine learning algorithms should be able to learn autonomously from the available data and generate accurate predictions.

3.2 Coding

The Jupyter Notebook is a free and open-source web application that allows data scientists to create and share documents that include live code, equations, computational output, pictures, and other multimedia features, as well as explanatory text. Another popular use case for Jupyter among developers is the provision of documentation or tutorials. Instead of using 16 internal comments in your code, you might find it more convenient to capture your thought process in a notebook. Notably, the kernels do not need to be installed on the user's computer. When future LSST users review their data with Jupyter notebooks, the code will be executed on an Illinois supercomputer with more computing power than a desktop PC.

```
In [12]: split_index=abundance.columns.get_loc('k_Archaea')
diabetes_metadata=abundance_diabetes.iloc[:,0:split_index]
diabetes_species=abundance_diabetes.iloc[:,split_index:]

In [13]: #finding the columns with entry as na
cols = ( diabetes_metadata.isna().sum() != len(diabetes_metadata) )
#deleting the columns with every entry as na
diabetes_metadata_short =diabetes_metadata[cols[cols].index]
diabetes_metadata_short.shape

Out[13]: (588, 58)
```

```
In [14]: diabetes_metadata_short

Out[14]:
```

dataset_name	sampleID	subjectID	bodysite	disease	age	gender	country	sequencing_technology	pubmedid	...	fgf-19	hscrp	c-peptide	tnfa	il-1
2951	I2dmeta_long	CON-001	con-001	stool	n	21	female	china	illumina	23023125	...	NaN	NaN	NaN	NaN
2952	I2dmeta_long	CON-002	con-002	stool	n	53	female	china	illumina	23023125	...	NaN	NaN	NaN	NaN
2953	I2dmeta_long	CON-003	con-003	stool	n	61	female	china	illumina	23023125	...	NaN	NaN	NaN	NaN
2954	I2dmeta_long	CON-004	con-004	stool	n	55	female	china	illumina	23023125	...	NaN	NaN	NaN	NaN
2955	I2dmeta_long	CON-005	con-005	stool	n	53	female	china	illumina	23023125	...	NaN	NaN	NaN	NaN
...
3471	WT2D	S655	s655	stool	n	71.45	NaN	sweden	illumina	23719380	...	120.59	3.52	0.55	1.66
3472	WT2D	S77	s77	stool	n	69.67	NaN	sweden	illumina	23719380	...	72	1.69	0.81	0.81

Figure 1. Python Coding using Jupyter

3.3 Development of Dashboard Analytic using Power BI

Power BI is a collection of software services, apps, and links that facilitate the integration, visual appeal, and interactivity of different data sources. Excel is less user-friendly and intuitive than Power BI. Power BI is easy to master. Power BI contains complicated features for power users, which may be challenging for trainees to understand.

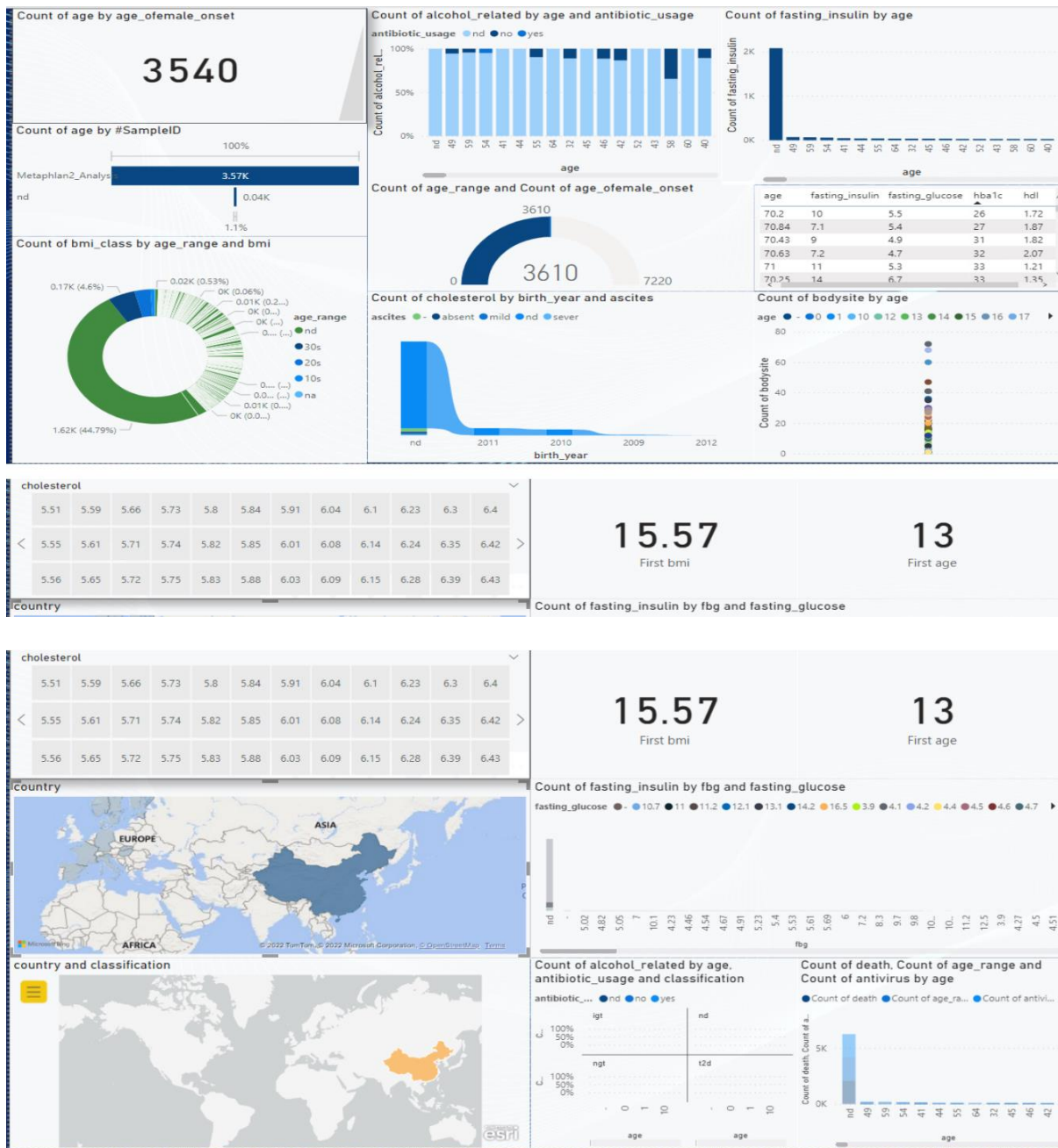


Figure 2. Power BI Dashboard Analytics for Diabetes Healthcare System

4. Conclusion

Predictive analytics is a powerful tool for improving the clarity and comprehension of your organization's decisions. Even if collecting important data and developing a system for sorting through it takes a large amount of time, the results will be well worth the effort. Furthermore, predictive analytics is used to anticipate customer responses or purchases and to boost cross-selling opportunities. Predictive models make it easier to acquire, keep, and expand the most profitable consumers. enhanced operations Predictive models are often used in business for inventory forecasting and resource management. Data is collected, a statistical model is built, predictions are generated, and the model is validated (or adjusted) as new data becomes available. Machine learning and data mining are effective disease detection methods. The capacity to forecast diabetes at an early stage is critical for designing an effective treatment strategy for a patient. This study assesses the diagnostic accuracy of existing diabetes classification systems. A difficulty with categorising was discovered in the precise expressions. Three machine learning algorithms, as well as training and validation on a test dataset, were used to analyse

the diabetes dataset for Pima Indians. Our model implementation results show that ANN outperforms the other models. The link between BMI, glucose, and diabetes was established through mining association rules.

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A Zero Watermarking Algorithm Based on Quaternion Fractional-order Polar Harmonic-fourier Moments in Wavelet Domain

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Abstract: In this paper, a zero-watermarking algorithm against rotation attacks was described by employing quaternion fractional-order polar harmonic-Fourier moments based on wavelet-transformation. Initially, the wavelet- transformation was applied to every component of the RGB three-channel colour host image. The sub-bands of low frequency corresponding to each component were then extracted. The low-frequency sub-bands of the three RGB components of the host colour image were represented by quaternion algebra, and multiple QFr-PHFMs were calculated. Finally, the invariants of the QFr-PHFMs were employed to build the watermark system. The watermark extraction technique is also more convenient. Image detection requires a two-level wavelet transform, followed by the calculation of many invariant moments of its low-frequency sub-image. The corresponding experimental outcomes were displayed and compared to methods of a similar character. Experiments with simulations demonstrate that this method can produce high-quality visual effects and is resistant to noise, filtering, JPEG compression, and cropping attacks.

Keywords: zero watermarking, quaternion fractional-order polar harmonic-fourier moments, wavelet transform, invariant moments

1. Introduction

With the rapid development of multimedia and information network security technology, network information security has become a hot topic in the current academic field. Nowadays, the innovations of digital image watermarking scheme have become an effective method to solve information security and copyright protection (Hosny et al., 2021; Xia et al., 2019). The traditional digital watermarking algorithm proves the ownership of multimedia works by embedding watermarks in the original data. Most of these algorithms achieve the purpose of embedding watermark information by modifying the spatial or frequency domain information of an image (Liu et al., 2021; Yuan et al., 2020). In order to avoid suspicion, the media information embedded in the watermark has been modified. Many scholars have proposed visual masks based on the human visual system (HVS). However, adding a visual mask will complicate the process of embedding and extracting watermarks, and the computational cost will increase, which is not conducive to the application and transformation of practical results. Moreover, this method is not safe. If the tamper understands the method of adding a visual mask, he or she cannot rule out using professional detection software to detect small changes in the image, so as to find the existence of the watermark and remove the watermark, which limits the security of the digital watermark.

In recent years, the newly proposed zero-watermarking technology has solved the above-mentioned problems of traditional watermarking algorithms very well. Zero-watermarking technology does not involve modifying some information in the original multi-media data and mainly adapts the special features of the original multi-media data to finish the watermark information, which can enhance robustness and security for zero-watermarking at the same time. The concept of zero digital watermarking was first proposed by Wen et al. (2003). It is a new research direction for the contradiction between robustness and imperceptibility of digital watermarking. The principle of zero digital watermarking is to use the significant characteristics of the original carrier media data to construct a uniquely identifiable watermark. As a result, the original work is thought to be capable of copyright protection because it contains the watermark data information. The biggest advantage of zero digital

watermarking is that it can protect the original media work without changing any data from the original media. Therefore, there are no problems such as the degradation of the visual quality of the media or the limited number of watermarks embedded. However, since the zero digital watermarking was discussed according to the carrier media data, it does not have the same specific content as the traditional watermarking. Thus, it is necessary to establish an intellectual property right (IPR) as the certificate of data copyright authentication. The zero-watermarking technology has been rapidly promoted after Wen's proposal, and some related research results and reports in the field are also increasing rapidly (Ma et al., 2021). However, most of the existing algorithms (Xia et al., 2022) are only suitable for resisting non-geometric attacks such as noise, lossy compression, filtering, and cropping, and are less robust to geometric attacks on rotation, scaling, and translation. In our work, a colour digital image zero-watermarking scheme against rotation geometric attack is proposed in the wavelet transform domain. The proposed QFr-PHFMs can effectively resist the geometric attacks caused by rotation and have nice robustness to noise, lossy compression, filtering, cropping, and other attacks.

2. Wavelet Transform

Wavelet analysis is a new time-frequency analysis method developed from Fourier analysis. Because of its multi-scale analysis characteristics, it is also called the time-scale analysis method. The wavelet transform has good localization properties in both the time domain and the frequency domain, and the scaling ratio wavelet is consistent with the characteristics of computer vision and human vision. In 1988, Mallet (2021) applied the wavelet transform theory to signal processing, proposed the concept of scaling analysis approaches, and exhibited an algorithm for decomposing a two-dimensional image into different frequency channels and an algorithm for image reconstruction using decomposed features. The discrete wavelet transform of an image signal can be regarded as the higher- and lower-pass filtering of the columns and rows of the two-dimensional signal, which is equivalent to a four-channel filter operation, and the two-dimensional signal can be obtained in the sub bands LL1, LH1, HL1, and HH1. The transform coefficients on the sub-bands can be decomposed continuously as needed until the required series is reached. The absolute value of the lowest frequency coefficient is larger, which occupies main of the energy of two-dimensional original image, and the process of three-level wavelet decomposition is shown in Figure 1. Therefore, it is usually possible to extract the low-frequency coefficients of the image to perform related calculations.

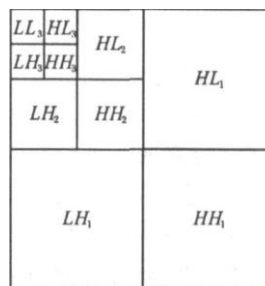


Figure 1. The Diagram of Three-level Wavelet Decomposition

3. QFr-PHFMs

Firstly, let $f^c(x, y)$ be an image in RGB color space; then, $f^c(x, y)$ could be described as follows:

$$f^c(x, y) = f_r(x, y)i + f_g(x, y)j + f_b(x, y)k \quad (1)$$

Where $f_r(x, y)$, $f_g(x, y)$ and $f_b(x, y)$ are respectively the red, green, and blue components of a color image, and, i and j are unit imaginary numbers.

Subsequently, the proposed real-order (fractional-order) polar harmonic-Fourier moments (Fr-PHFMs) can be defined as:

$$P_{nm}^{\alpha} = \frac{2}{\pi} \int_0^{2\pi} \int_0^1 f(r, \theta) [R_n^{\alpha}(r) \exp(im\theta)]^n r dr d\theta \quad (2)$$

Where $f(r, \theta)$ represents a grayscale image in polar coordinates, and $R_n^{\alpha}(r) \exp(im\theta)$ with real number $\alpha > 0$ is the kernel functions of Fr-PHFMs, and the radial basis functions (RBFs) $R_n^{\alpha}(r)$ are given below :

$$R_n^{\alpha}(r) = \begin{cases} \frac{1}{\sqrt{2}} \sqrt{\alpha} r^{\alpha-1} & n = 0 \\ \sqrt{\alpha} r^{\alpha-1} \sin((n+1)\pi r^{2\alpha}) & n = \text{odd} \\ \sqrt{\alpha} r^{\alpha-1} \cos(n\pi r^{2\alpha}) & n = \text{even} \end{cases} \quad (3)$$

Finally, QFr-PHFMs of an original RGB color image are defined as:

$$M_{nm}^{\alpha} = \frac{2}{\pi} \int_0^{2\pi} \int_0^1 f^c(r, \theta) R_n^{\alpha}(r) \exp(-\mu m \theta) r dr d\theta \quad (4)$$

According to Eq. (4), the QFr-PHFMs has rotation invariance inherently, and the proof process mainly includes the following steps: Firstly, let the rotated color image be $f^q(r, \theta + \varphi)$, and φ is the angle of rotation. Then, the QFr-PHFMs of the rotated color image are described as follows:

$$M_{nm}^{\alpha}(I^r) = \frac{1}{2\pi} \int_0^{2\pi} \int_0^{\infty} f^q(r, \theta + \varphi) R_n^{\alpha}(r) \exp(-\mu m \theta) r dr d\theta \quad (5)$$

By letting $\theta' = \theta + \varphi$, we have $\theta = \theta' - \varphi$ and $d\theta = d\theta'$. Eq. (5) can be rewritten as:

$$\begin{aligned} M_{nm}^{\alpha}(I^r) &= \frac{1}{2\pi} \int_0^{2\pi} \int_0^{\infty} f^q(r, \theta + \varphi) R_n^{\alpha}(r) \exp(-\mu m \theta) r dr d\theta \\ &= \left[\frac{1}{2\pi} \int_0^{2\pi} \int_0^{\infty} f^q(r, \theta') R_n^{\alpha}(r) \exp(-\mu m \theta') r dr d\theta' \right] \exp(\mu m \varphi) \\ &= M_{nm}^{\alpha}(I) \exp(\mu m \varphi) \end{aligned} \quad (6)$$

Taking the module on both sides of Eq. (6), we have

$$(7) \quad |M_{nm}^{\alpha}(I^r)| = |M_{nm}^{\alpha}(I)|$$

4. Proposed Zero-Digital Image Watermarking Methodology

In the section, the proposed QFr-PHFMs were applied to zero-digital image watermarking color image. As we all known, the classical 2D watermarking methods can effectively resist the traditional image processing operations (e.g., noise-addition, image compression and smooth filtering), however, the problem of image distortion caused by geometric transformation is still a huge problem for the existing digital watermarking technology challenge in this field. In order to solve these problems, this paper attempts to use wavelet transform and QFr-PHFMs to achieve the design task of zero watermarking algorithm against geometric transformation operations.

4.1 The Registration Stage of Zero-watermarking Methodology

Figure 2 shows the registration implementation of our proposed zero-watermarking method.

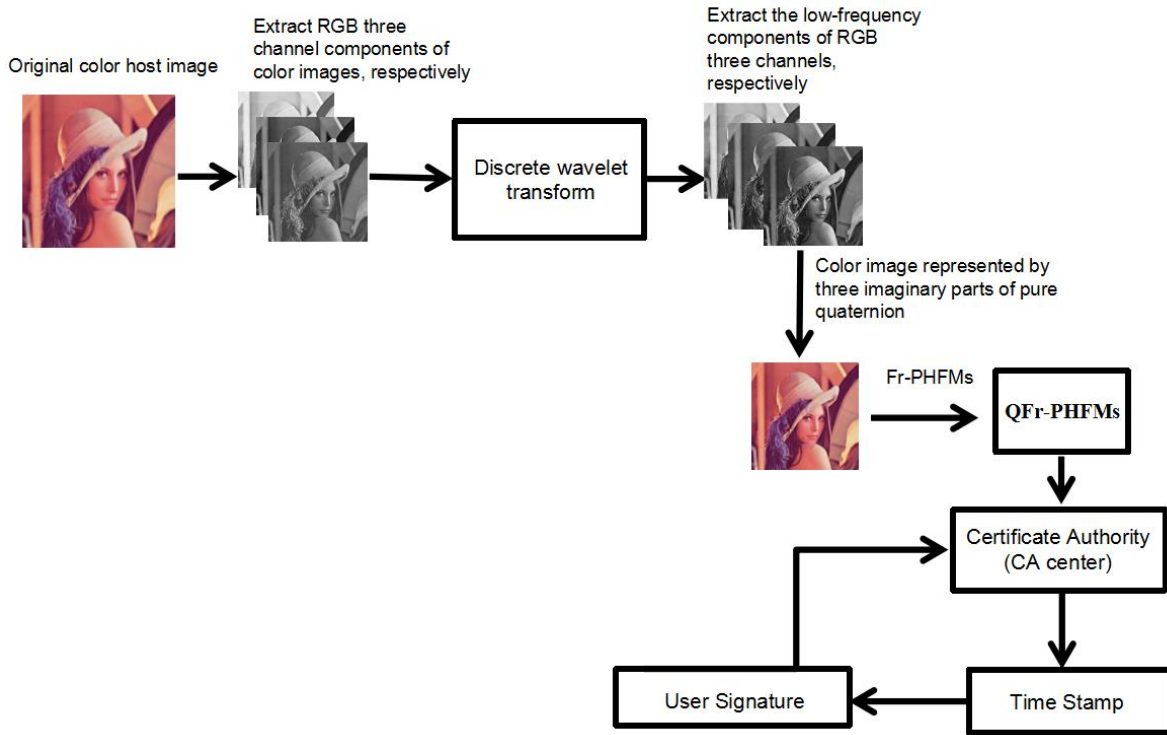


Figure 2. Watermark Registration Scheme

The algorithm proceeds by the following steps:

Step 1: Extract the components of R, G and B channels of the original color host image and perform a two-dimensional wavelet transformation on each channel component, and then the low-frequency components of RGB three channels is extracted, respectively. Finally, three imaginary parts of pure quaternion are used to represent the three low-frequency components into a whole vector, that is, quaternion representation of color image.

Step 2: A few of lower-order image moments' features of the designed QFr-PHFs are extracted, which can be regarded as the one-dimensional vector $H_k^{(RGB)}$, $k=1,2,\dots,25$. Here we set $H_k^{(RGB)} = \{h_{nm}^{(1)}, h_{nm}^{(2)}, \dots, h_{nm}^{(k)}, k=25\}$, h_{nm}^k represents the lower-order image moments' features of $M_{nm}^{(\alpha)}$ in Eq. (4). Then, the one-dimensional vector is registered in the copyright protection certificate authority center (Abbreviation: CA center).

Step 3: The watermark information and the user's signature information are registered in the CA center in the order of registration time. Then, the host image is declared to be protected by copyright.

4.2 The Detection Stage of Zero-watermarking Methodology

Step 1: Complete the scaling normalization of the color host image. Scaling normalization is generally performed by one of two methods: (1) mapping the color image to a $[0,1] \times [0,1]$ square region in Cartesian coordinates, or (2) scaling the size of the color image to a fixed-size template while performing interpolation operations. In this paper, the image was normalized by the second method as follows:

Let a color image $\bar{f}^{(RGB)}(x, y)$ be the target image after the scaling operation. Obtain $\bar{f}^{(RGB)}(x, y)$ by $\bar{f}^{(RGB)}(x, y) = A_s[\bar{f}^{(RGB)}(x, y)]$, where $\bar{f}^{(RGB)}(x, y)$ is a scaled image, and A_s is the following transformation matrix:

$$A_s = \begin{bmatrix} \mu & 0 \\ 0 & \nu \end{bmatrix} \quad (8)$$

In this matrix, the parameters μ and ν represent the row and column scaling factors, respectively, of the image matrix. Image processing or pattern recognition also requires interpolation operations. Different interpolation approaches affect the visual quality of the scaled image. The MATLAB-based simulation environment adopts bilinear interpolation if $0.5 \leq \mu, \nu \leq 1$, and bicubic interpolation when $0 \leq \mu, \nu \leq 0.5$ or $\mu, \nu \geq 2$.

Step 2: This step performs the translations. First, the geometric moments $M_{pq}^{(RGB)}(x, y)$ are computed from the color image $\bar{f}^{(RGB)}(x, y)$. These moments specify the coordinate position of the image's center of gravity: $x_a = x - \frac{M_{10}^{(RGB)}}{M_{00}^{(RGB)}}$, $y_a = y - \frac{M_{01}^{(RGB)}}{M_{00}^{(RGB)}}$. Image $\bar{f}^{(RGB)}(x, y)$ is then translated to $\bar{f}^{(RGB)}(x_a, y_a)$. Finally, the resulting centered color image is obtained.

Step 3: After processing the rotation, scaling, and translation steps, the color image is processed by steps 1 and 2 in the watermark registration scheme, thus obtaining a new feature vector $\tilde{H}_k^{(RGB)}$, $k = 1, 2, \dots, 25$.

Step 4: Extract one-dimensional vector $H_k^{(RGB)}$ from the CA copyright protection center, then, the absolute difference between the one-dimensional features $\tilde{H}_k^{(RGB)}$ and the one-dimensional features $H_k^{(RGB)}$ obtained in previous step is calculated, and subsequently the sum is accumulated. The specific calculation process is as follows:

$$d = \min \left\{ \frac{1}{cnf^2} \sum_{n=1}^{cnf} \sum_{m=1}^{cnf} |h_{nm}^{(k)} - \tilde{h}_{nm}^{(k)}| \right\}. \quad (9)$$

In the paper, $cnf = 10$ and $k = 1, 2, \dots, 25$. If $d \geq \varepsilon$ (here, ε is the empirical threshold, which can be set according to the specific experimental environment) and the time stamp at the watermark registration stage does not match the information provided by the CA center correctly, the verification ends. At this time, it is proved that the watermark information does not exist.

4.3 Simulation Results and Analysis

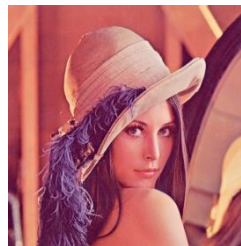


Figure 3. Original Color Host Image

In order to measure the stability of the proposed QFr-PHFMs based zero-watermarking scheme, we take the Lena color image with the size of 512×512 in Fig. 3 as the host image. The experimental process was conducted in two groups. Experiment 1 mainly studies the stability of the proposed algorithm against various existing image processing attacks, and we also test the performance of the proposed watermark system against strong geometric attacks, including rotation, scaling, and translation geometric operations. To prove the reliability of the algorithm, the second experiment determined whether other images can be misjudged, namely, it investigated the false-alarm rate problem). For the evaluation of the original image and the attacked image, the PSNR is used, while for the evaluation of the zero-watermarking performance, we use equation (9) to measure. When the value is closer to 0, the zero-watermark performance becomes more robust.

Experiment 1: In the process of network communication, an image inevitably suffers from noise interference. In the validation experiment stage, we mainly tested the Lena color host image infected with 25% Salt & Pepper noise and Gaussian noise with variance of 0.04. Since noise interference can frequently be processed by smoothing filtering, 2D filtering is another traditional attack in image analysis field. Therefore, we mainly test the filtering performance of the color host image in this experiment. In the filtering process, we mainly use the median and mean filtering methods to process the image. In addition, lossy compression will also cause loss to image content. Therefore, this paper also carries out relevant performance verification experiments for lossy compression. We compared the proposed algorithm with other algorithms (the method based on direct grayscale and the method based on single channel). See Table 1 for the experimental results.

The most common geometric transformations for color host images are rotation, scaling, and translation. These attacks change the pixel position in the image and increase the difficulty of watermark detection. These geometric attacks mainly disrupt the arrangement of pixel positions in the image, resulting in an increase in the coefficient of difficulty in watermark detection. In the experiment, we rotated the color image by 20° , 30° , and 90° , respectively. Meanwhile, scaling the color image by factor of parameters 0.7, 1.2, 1.8, and 2.5, respectively. Finally, the translation parameters are detailed in Table 2. By comparing our proposed algorithm with the experimental data of existing schemes, we find that the overall performance of the proposed scheme is better than other methods.

Experiment 2: This experiment verified the false-alarm rate of the proposed zero-watermarking scheme. In digital watermarking, the false-alarm rate detects the number of un-registered images (that is, images not granted copyright protection in the CA center), but which have been falsely detected based on the watermark information. To verify whether the proposed watermarking algorithm detects un-registered images, 16 other color images were selected from the traditional image database. The selected images were common color images used in image processing, such as Baboon, Plane, and Salt and Pepper (see Figure 5 for all images). Figure 6 compares the false-alarm rates of the proposed zero-watermarking scheme and the direct graying-based method. The direct graying-based method falsely detected two of the 16 images, judging their values as below the warning line (the threshold $\varepsilon = 0.02$), However, the proposed algorithm gave only one false detection. In addition, the d of the proposed algorithm was obviously higher than that of the direct graying-based method, indicating a large degree of division, and a reduced propensity to misjudge the watermark detection. Therefore, in terms of zero-watermark detection and false-alarm rate, the QFr-PHFMs based method in the proposed zero-watermarking scheme outperforms the direct graying-based method (Jin et al., 2017) and single channel-based method (Hong et al., 2017).

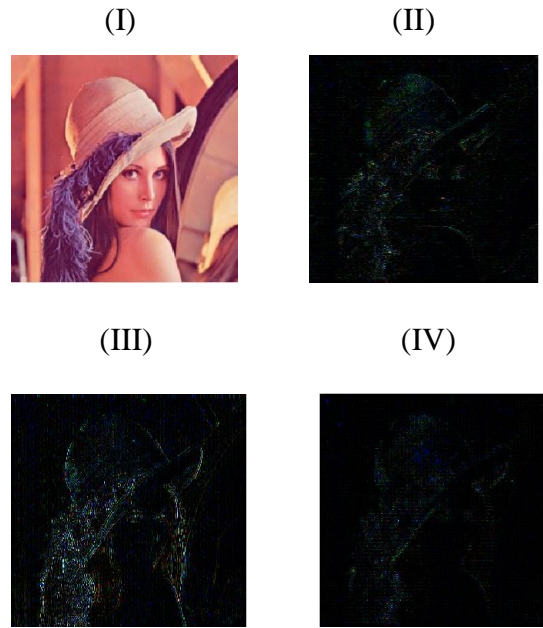


Figure 4. Wavelet Decomposition (I) Low-frequency; (II) Horizontal Component; (III)Vertical Component; (IV) Diagonal Detail Component

Table 1. Typical Results of Host Image Subjected to Non-geometric Transformations

Attacks	PSNR	<i>d</i>		
		Traditional direct grayscale method	Traditional single channel method	The proposed method
Salt & Peppers noise (Density: 25%)	13.28	0.00584	0.00632	0.00246
Gaussian noise (Parameter: 0.04)	12.51	0.0082	0.0039	0.00183
Median filtering (Size of window: 7)	23.31	0.00086	0.00045	0.00022
Smoothing filtering (Size of window: 5)	27.68	0.00022	0.00016	0.00011
Image compression (Parameter: 70%)	23.67	0.00042	0.00038	0.00019

Table 2. Experimental Results of Host Image Subjected to Geometric Attacks

Attacks	<i>d</i>		
	Traditional direct grayscale method	Traditional single channel method	The proposed method
Rotation 20°	0.000032	0.0000023	0.0000008
Rotation 30°	0.000088	0.000072	0.000056
Rotation 65°	0.00029	0.00062	0.000078
Rotation 90°	0	0	0
Scaling factor:0.7	0.0099	0.0087	0.0042
Scaling factor:1.2	0.00042	0.00068	0.000058

Scaling factor:1.8	0.034	0.023	0.002
Scaling factor:2.5	0.09	0.053	0.012
Translation up to 20 pixels	0.00002	0.00001	0.0000019
Translation left to 20 pixels	0.00004	0.00005	0.0000025
Translation right to 40 pixels	0.00006	0.00009	0.0000034
Translation down to 40 pixels	0.00006	0.00009	0.0000032

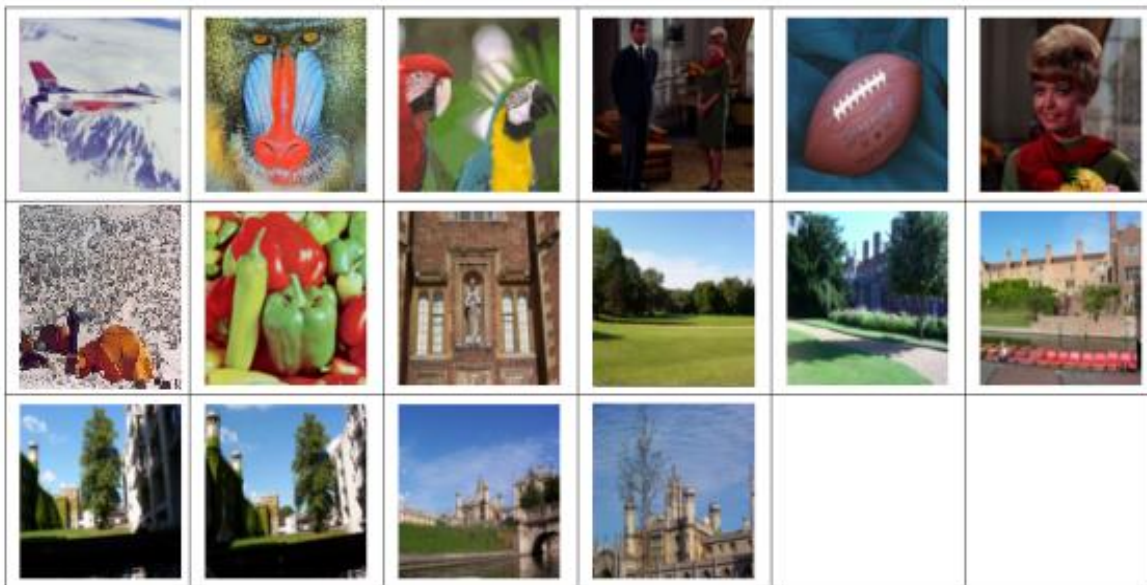


Figure 5. The 16 Color Images Selected for Checking the False-alarm Rate

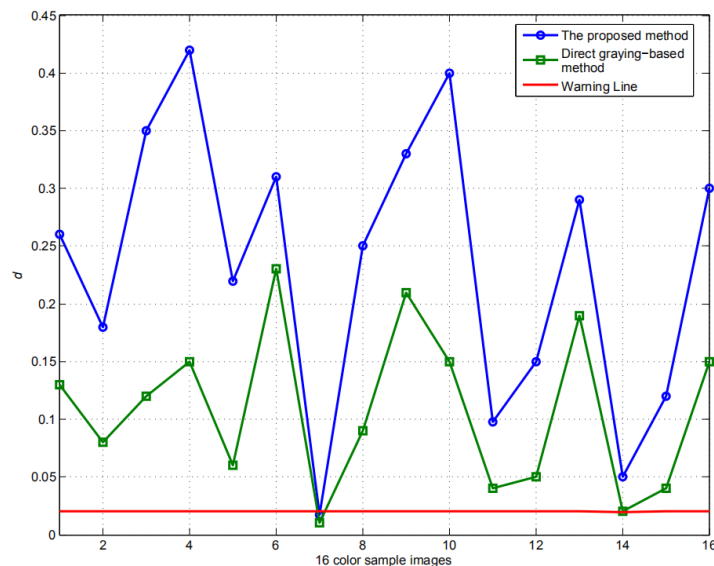


Figure 6. False-alarm Rates off Watermark Detection on the 16 Color Sample Images in Figure 5

5. Conclusion

A new digital zero-watermarking scheme based on the Wavelet-transformation and QFr-PHFMs to realize colour image copyright protection is introduced in this paper. Our scheme is very effective and robust against noise and geometric transformation attacks, especially rotation geometric transformation. To sum up, the color image zero-watermarking technology proposed in this paper, has significant

practical value in copyright protection. In addition, we plan to apply the feature-extraction method proposed in this paper to 3D zero-watermarking technology and other related fields to expand the application of zero-watermarking algorithm.

Acknowledgement

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Development of Attributes for Cyber Resilience Management in Organisations

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Abstract: Cyber resilience is considered the way forward in protecting the organisation against cyberattacks remained largely uncharted on its own and lacks academic exploration. This research aims to develop cyber resilience management attributes for organisations to continuously adapt to face adversaries and stay relevant and sustain amidst the evolving cyber risk landscape. The researcher has focused on finding synergies among the study context and concept of cybersecurity and resilience both national and internationally. Existing frameworks, models, studies, and surveys were conducted to identify and evaluate common attributes for managing cybersecurity and organisational resilience. The novelty lies in the converged model with attributes that were derived based on its relevance and the factors that contribute towards achieving cybersecurity and cyber resilience. The subject of the survey is Cybersecurity professionals in the industry in Malaysia.

Keywords: cyber resilience, cybersecurity, cyber risk, cyberattack, organisational resilience

1. Introduction

As technologies continue to shape the globe, and the pace of organizations transforming themselves to embrace cyberspace has heightened so does the need to be secure against cybercrime (Chetri, 2018). In the wake of globalization where businesses are interconnected and interdependent, disruption can come from unforeseen directions and have unanticipated effects. Organizations that become victims of cyberattacks can cause damage and loss of millions of dollars (World Economic Forum, 2019). The recent Covid-19 pandemic saw businesses transition towards digital and rapidly embrace remote working which opened more vulnerabilities (McKinsey, 2020). In the past few years, the technological risk reported as one of the top 10 risks globally includes risks related to cyber (Global Risk Report, 2019), and in 2021 cybersecurity failure was listed as one of the top 5 concerns (Global Risk Report, 2021). The rapid development in technological advancement is faster than the ability of an organization to understand the environment it is operating. The strategic resilience approach helps organizations continuously develop the capacity to reinvent business models, and strategies and adjust to changes or setbacks (HBR, 2020) and is deemed crucial in the current transformational era. Its high time for organizations to consider cyber resilience management as the way forward for functioning in cyberspace.

2. Background

2.1 Current Approach

The current cyber security approach is predominantly using a detection and prevention strategy. It is considered insufficient to manage the constantly evolving cyber risks (Annarelli et al., 2016; Dupont, 2019; Ridley, 2017). The rationale for the need for the cyber resilience approach and considered vital to organizations include challenging conditions, a highly uncertain environment (Dupont, 2019), and volatile cyberspace filled with unknown risks (World Economic Forum, 2021). In 2012 the World Economic Forum published principles and guidelines for cyber resilience, and in 2021, it highlighted six principles to unite businesses for cyber-resilience. Although “resilience” is a commonly used term in cybersecurity, it has multiple meanings and lacks precision” (Ridley, 2017). In addition, existing framework implementation is according to the organizational capacity (Annarelli et al., 2020), scoped to a predetermined set of criteria, and alignment to cyber resiliency not widely researched (Dupont, 2020; Enisa, 2013). There is a need to investigate the development of cyber resilience as there is a gap

in the construction and evaluation of resilience measures when it comes to addressing risk in cyberspace (Dupont, 2019). Moreover, the existing research literature surrounding the concept of resilience is very broad and ambiguous across transdisciplinary makes it challenging for researchers to understand the benefits of its application and hinders consistent and effective policymaking, framework implementation, and its effectiveness in decision making (Annarelli et al., 2020; Kharrazi et al., 2016).

2.2 *Rationale – Why Cyber Resilience Management is Needed*

Compared to other business risks, cyber risk is hard to predict due to its constantly evolving nature. It is becoming evident that the traditional approach to cybersecurity which was initially intended to protect information systems and IT infrastructure of the organization alone will not suffice to sustain in this era. Several types of research have pointed out cyberattacks are inevitable and the phenomenon where humans and machines are increasingly integrated, resilience is needed to manage the risks (Dupont, 2019). Organizations are recommended to revisit their existing cybersecurity solution and foster cyber resilience strategies towards managing cyber risks (Cybersecurity Malaysia, 2021) by measuring their capability to detect, prevent, contain, and respond to cyberattacks and enhance their security implementation. An integrated approach is needed to identify the broad subject and prioritize major characteristics that contribute to resiliency. The organization is required to have a new resilience mindset, by replacing the “protection” and “prediction” concepts as current security measures will degrade with the evolving nature of the cyber realm (MITRE, 2013). The cyber resilience approach enables continual functioning in the face of adverse cyber events and allows the organization to incorporate countermeasures and contingency plans to warrant business to sustain even when compromised due to a cyber issue.

3. Literature Review

3.1 *Overview*

Resilience approach was introduced as either complementing or alternative to existing cyber security practices. In the last few years, several cyber resilience initiatives have been introduced globally by government and commercial sectors, but it often overlaps with cyber risk management and discussed synonymously as cyber security. Cyber resilience remained largely uncharted on its own and lacks theoretical approach. The concept of resilience is broad and to progress further, an integrated study of existing resilience practices in different frameworks across multiple industries and technologies needs to be derived and distinguished to obtain a complete understanding. The research hopes to resolve the ambiguities that exist in the cyber resilience taxonomy, establish a common reference point and extend a formal representation of the traits enhancing the cyber resilience management model.

3.2 *Existing Resilience Models and Frameworks*

The majority of the existing resilience framework can be categorized as foundational which describes the traits or base of resilience concepts. These concepts are focused mainly on adaptability with the implementation providing a limited approach towards protection, mitigation, and problem-solving. Criteria from earlier studies related to resilience such as bouncing back (Hollanagel, 2017), robustness (Tierney, 2003), absorb and thrive (Berkes & Ross, 2013; Seville, 2009), learn and develop (Xiao & Cao, 2017) were strategically perceived and are the fundamental building block for existing frameworks.

3.3 *Organization Resilience Frameworks*

The International Organization for Standardization (ISO) developed ISO22316 Security and resilience intending to provide principles and guidelines related to establishing organizational resilience. In the standard, organizational resilience is defined as “the ability of an organization to absorb and adapt in a changing environment to enable it to deliver its objectives and to survive and prosper”. The standard states that there is no single approach to achieve resilience (ISO, 2017). The attributes that are included

in the standard are as follows: (1) shared vision and clarity of purpose; (2) understanding and influencing; (3) Effective and empowered leadership; (4) supportive culture; (5) Sharing information and knowledge; (6) Availability of resources; (7) development and coordination of management disciplines; (8) Continual improvement; and lastly (9) ability to anticipate and manage change. The organization resilience standard activities that are discussed predominantly revolve around management organization, development, and coordination, and activities that are dedicated to supporting continual improvement and managing changes while establishing principles and activities into building organizational resilience.

3.4 Cybersecurity Frameworks

There are several frameworks developed by standards organizations to secure and serve as a guideline for business operations when operating in cyberspace. Among them is the International Organization for Standardization's 27000-series of information security standards and the National Institute of Standards and Technology's Cybersecurity Framework (NIST). Both are the most used frameworks and are considered industry leaders for cybersecurity (Dupont, 2019). Although ISO27000 series does not mention cyber resilience explicitly, there are several controls that are aligned towards some attributes that are used for resilience. The same can be said about NIST where controls are mapped to similar measures or controls found in other cybersecurity standards. However, unlike ISO Standard which consists of a formal compliance process that needs to be accredited by an accreditation body, NIST Cybersecurity Framework is self-assessed voluntary guidance that can be implemented according to the organization's need.

3.5 ISO27001

ISO27001 is often referred to as the "common language" for information security (Disterer, 2013) and is generally used to assess an organization's ability to meet information security requirements and implementation of a risk-based approach to cybersecurity (ISO, 2017). It is important to note that there is a difference between information security and cybersecurity although the terms have been used interchangeably (Solm & Niekerk, 2013). Regardless of how information security and cybersecurity are perceived, the concepts stated in the ISO27001 standard can be used to assess and manage cybersecurity risks and have certain attributes that contribute towards cyber resilience. ISO27001 standard typically focuses on the preservation of confidentiality, integrity, and availability of information assets through systematic management of three main components which are defined as people, process, and technology. The implementation is using a risk-based approach. Clauses 1 to 10 are referred to as high-level structures and are identical throughout the ISO Standards and the difference lies in the alignment towards information security which is achieved through further clauses, objectives, and controls. These are used as measurement and as requirements for compliance towards the standard.

Several researchers observed, that ISO27001 does not indicate the acceptable level of risk and the organization's management can decide on the type and level of security it wants (Bcs, 2020; Dupont, 2019). If the risk management in the organization is poor and risk awareness is low, this may result in the ineffective implementation of the cybersecurity program using ISO27001. This is evident from the list of requirements usually stated in Annex A that comes with the ISO27001 standard, which provides direction in readiness, resistance, response, and recovery however the robustness depends on the organization's risk approach. In terms of adaptability, the standard has a control that directs the organization to learn from a past incident, however, there is no mention of adjusting to the changing nature of the environment the organization operates, which is one of the attributes of being resilient. A revised version of ISO 27001 is expected to be published by October 2022 to which some changes that include cyber security concepts.

Table 1. *ISO27001 Domains*

Domains

	Operational security
IT security policies	Communications security
Organisation of information	System acquisition, development and maintenance
Human resources security	Supplier relationships
Asset management	Information incident Management
Access control	Information aspects of business
Cryptography	continuity management
Physical and environmental security	Compliance

3.6 NIST

NIST framework is a high-level, voluntary framework that consists of standards, guidelines, and practices to manage and improve the cybersecurity of critical infrastructure. NIST Cybersecurity Framework is referred to as a voluntary framework due to no enforcement or mandated provision of the controls (Voluntary Product Standards Program, 2020) unlike ISO’s 27001 Standard which requires certain controls as mandatory. The framework consists of three main components: the Core, Implementation Tiers, and Profiles. The core component focuses on the technical security controls, while the implementation tier evaluates the risk assessment practices and the profile tier helps to reflect the adoption towards the specific industry or organization. The core framework comprises four elements which are Functions, Categories, Subcategories, and Informative References. These elements are concurrent and continual life cycles to provide a high-level, strategic view of an organization’s management of cybersecurity risk (Framework for Improving Critical Infrastructure Cybersecurity, Version 1.1., 2018).

The framework uses a risk-based implementation where organizations can decide on the method of risk management suitable for them, similar to ISO27001’s approach. However, this approach was criticized as the organization may be complacent when determining the level of risk which could lead to a weak cybersecurity program implementation. Another factor to be considered is that NIST Framework is predominantly developed for dealing with cyber-attack rather than achieving resilience. Also, usually, when a voluntary approach is used where the guideline is not mandatory, most likely investment towards achieving secured cyberspace would be sidelined if the implementation is expensive or higher resources are needed (Gyenes, 2014).

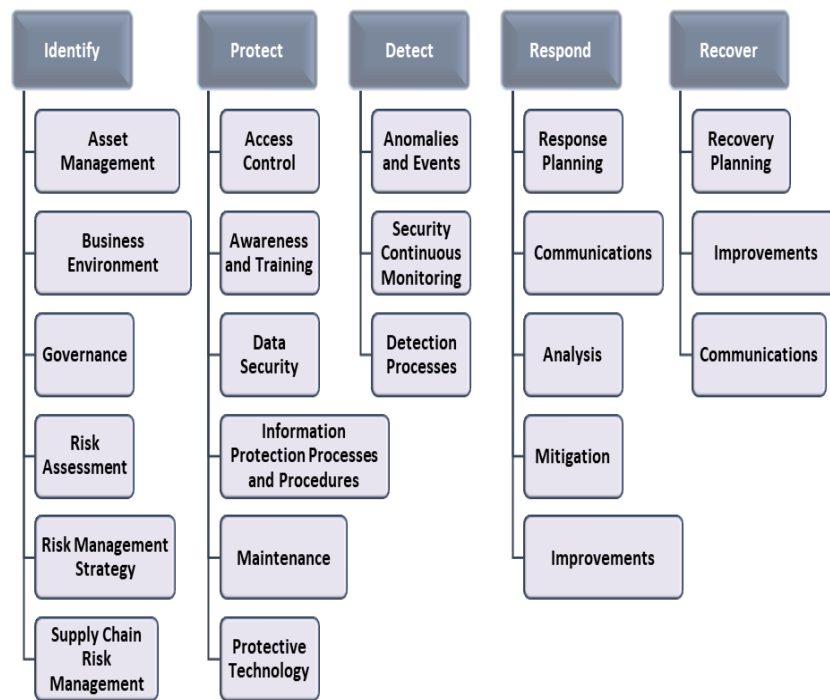


Figure 1. NIST Framework

3.7 NIAC

US’s National Infrastructure Advisory Council initially constructed the NIAC Resilience Model upon realizing a resilience approach needed for critical infrastructure. The council formed a working group that come up with resilience constructs identified as “robustness”, “resourcefulness”, “rapid recovery” and “adaptability”. However, the NIAC model’s main purpose is to discern the resilience goals from the perspective of the industry-specific sector. The model provides a high-level resilience goal that enables the organization to interpret resilience in their business context. At this stage, NIAC agrees that each sector defines resilience in different ways and uses different terminology depending on the business environment. While this approach allows the organization to independently choose and implement resilience constructs which they might deem important, the broad approach is open to interpretation and may defeat the purpose of cyber resilience if not properly executed.

Table 2. NIAC Model Attributes and Description

NIAC Resilience Model	
Resilience Construct	Description
Robustness	The ability to keep operating. Having substitute or redundant systems.
Resourcefulness	Primarily on people, to skillfully manage disaster, control damage and communicating decisions.
Rapid Recovery	Capacity to get back to normal as quickly as possible after a disaster.
Adaptability	Absorb new lessons, revise plans, and introduce new tools and technologies to improve robustness, resourcefulness, and recovery capabilities.

3.8 CREF

Cyber resiliency engineering framework also known as CREF, developed by MITRE almost a decade ago in the year 2011 was one of the initial frameworks to manage cyber threats. It has four generic

goals; to be able to anticipate threats or adversaries that might pose a threat to the business, to be able to withstand any successful attack or adversaries, ability to recover or restore business to the maximum extent possible subsequently after an attack, and to be able to evolve or change the business functions to minimize the impact of an attack. The framework includes goals, objectives, practices, costs, and metrics for resilience. The design is modeled to protect an organization against cyber threats when cyber security was still at its infancy stage. It uses resilience engineering, mission assurance engineering, and cyber security concepts to determine cyber resilience and align the organization for cyber threats.

However, the model is designed with a primary focus on managing cyber threats, while recent studies have shown to achieve cyber resiliency, the coverage shall consider various aspects of adversaries within cyberspace (Dupont, 2019). The model assumes that basic cyber security aspects exist hence focused on actions to ensure business continuity in the event of an attack (MITRE, 2017). Thus, the model is believed to be a “complementing” model to an existing cyber security model. CREF provides a structure for understanding the interrelated aspects of cyber resiliency rather than defining the attributes. When a comparison is made with ISO’s Security and Resilience framework, one of the crucial parts for resilience is “clarity of purpose”, in which clear articulation is needed for decision making at all levels to ensure resilience is absent in the MITRE CREF model.

Table 3. Cyber Resiliency Engineering Framework (CREF)

Objectives	Description
Understand	Maintain useful representations of mission dependencies and the status of resources with respect to possible adversity
Prepare	Maintain a set of realistic courses of action that address predicted or anticipated adversity
Prevent / Avoid	Preclude the successful execution of an attack or the realization of adverse condition
Continue	Maximize the duration and viability of essential mission / business functions during adversity
Constrain	Limit damage from adversity

3.9 Initial Findings and Gaps

Since the study of cyber resilience is considered still in its early stage of development, there are limited studies on this topic in general. Researchers from the existing studies found several are mapped towards industry-specific needs. For example, Maziku and Nikol (2018) have developed a model to measure security scores to determine the resilience of the system. However, the study is limited only to the persistent attack on the smart grid domain rather than securing the whole cyberspace. The research related to Smart Grid systems resilience on its ability to detect, monitor, mitigate and operate when facing persistent attacks did not make any inference towards resilience attributes and the relevance towards the security controls for the smart grid system. Also, the software-defined network modeling was developed with the main aim of quantifying the security score rather than establishing the attributes needed for resilience.

Also, previous studies are carried out with industry-specific alignment or objective-driven based on cyber security studies. Several studies have used the ISO27001 Standard and NIST framework to build the resiliency model. There is no common approach that was used to determine the resilience attributes and the researchers have not attempted to demonstrate its application in the policies, framework, or processes towards being cyber resilient. Linkov (2013), in one of his initial research projects, has presented resilience metrics for cyber systems, however, the study is specific towards measuring matrix from the defensive approach. The application of resilience attributes remained focused on managing disaster and recovery. MITRE’s CREF is the only model developed a decade ago with the intent to evolve as the discipline of cyber resilience mature (MITRE, 2011). As it was in the initial stage, the

framework was developed in a very comprehensive manner mainly utilizing engineering principles such as survivability, dependability, fault tolerance, business continuity and contingency resulting in a large and complex model. Though the CREF Model is quite comprehensive, it is constricted towards “defending” against adversaries as it assumes that resilience is built upon an existing conventional cyber security.

4. The Research Framework

4.1 The Proposed Framework

In the current evolving cyberspace and technology, consideration from various aspects is needed to ensure adequate coverage of cyber risks. In the event, the organization becomes a victim of a cyber-attack, being cyber resilient becomes a factor to ensure the organization survives and provides a means to bounce back to business. The terms resilience and security were used interchangeably in securing cyberspace while resilience studies have specifically mentioned security alone does not mean resilience. In this study, the attributes that contribute towards establishing resilience from the existing frameworks and cyber security models are systematically scrutinized. This study proposes an integrated model by identifying main resilience objectives from ISO’s Security and Resilience (ISO22316) and CREF’s cyber security management for a complete cyber resilience approach. The intent is to resolve the gaps in the current cyber security models which are focused mainly on survivability, and technical security aspects. The core resilience variables are constructed based on their ability to identify with the factors that contribute towards achieving resilience.

The challenge is towards identifying the core attributes that communally demonstrate the aspects of being resilient. ISO22316 standard which was developed explicitly for organization security resilience found to be ideal to complement MITRE’s Cyber Resilience Engineering Framework (CREF) to develop an integrated model for cyber resiliency. The key attributes identified in ISO22316 were selected based on its relevance in bridging the gaps that exist in CREF and to provide a base to construct an enhanced framework for cyber resilience. The CREF is founded on 3 main concepts which are Systems Security Engineering, Security Operations and Management and Systems Engineering for Performance and Management focusing on cyber threats. Organizational resilience as in ISO22316 identifies management’s key role to embedding resilience culture.

Furthermore, throughout the review, many attributes were identified with several frameworks found to have an overlapping set of attributes that coincides. For this study, the attributes are narrowed down based on its ability to identify with securing cyberspace and being resilient which aligns with the ISO’s resilience principles and attributes. In the earlier constructs, resilience practices related to cyber security consist of four abilities which are: (1) Robustness; (2) Resourcefulness; (3) Rapid Recovery; and (4) Adaptability (NIAC, 2010) and a subsequent work by several researchers defined similar attributes from which the NIST Cybersecurity framework derived its own set of functions as an enhancement from the earlier works. ISO22316 framework emphasizes the management role in making the organization more resilient as crucial. This is evident in the attributes that mandate management’s role in having a clear purpose, strategy in influencing and enhancing the organization’s culture towards being resilient. On the contrary, CREF framework which was introduced in 2018 has several objectives that complement goals for achieving resilience, but the management perspective was omitted, which could be due to the framework itself being developed as a complementing framework. Hence, through this study, the existing gaps will be addressed by developing a model with a converged cyber resilience approach.

5. Conclusion

In contrast with cyber security, the topic of resilience incorporated into securing cyberspace is still considered relatively new. The comparison of cyber security and cyber resilience will help to understand the similarities and differences between these two concepts. A good understanding of the differences will serve as guidance to be able to identify the overlapping controls and classify the prospects of integration between security and resilience. There are several cyber security management and framework available, however, from the literature review, it is noticed that the models are developed

predominantly on the concept of protecting and preventing and lack a resiliency approach. Also, the current approach of cybersecurity is considered insufficient to secure business and a resilient approach is considered a more apt way to secure cyberspace. It is crucial to be able to identify the gaps that exist in the existing models which will help to address the main issues in achieving cyber resiliency.

This research will help to examine the existing framework, standards, and models from a “resilience” perspective which helps to derive the attributes that are significant and relevant towards defining the characteristics as a basis for modeling cyber resilience and preventing misconception and misrepresentation. This research further explores the requirements from a business approach towards resilience and to complement managing issues related to the ever-evolving cyber risks. This research also aims to scrutinize the practicality of employing “resilience” to face the rising challenges industry in mitigating cyber risk, as the cyber resilience approach is widely discussed and generally being trusted to be able to close the gap of the traditional cyber security approach.

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A Review of Prediction of Energy Consumption of Smart Devices in Smart Buildings

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Abstract: The energy production firms, especially in the smart grid context, utilise a variety of energy consumption prediction algorithms to forecast the future energy demand of registered consumers. The prediction approaches enable smart grids to produce energy in advance in response to anticipated consumer demand. It also decreases energy and other resource waste associated with energy generation. This paper provides a systematic literature analysis of how to improve energy efficiency of energy consumption predictions in smart buildings. In nonresidential and residential structures, many forecasting methods are applied. The literature is then scrutinized in terms of forecasting objectives, input variables, forecasting methodologies, and prediction horizon. Finally, the research investigates future issues for building energy consumption predictions.

Keywords: prediction model, energy consumption, smart devices, PRISMA 2020 guidelines

1. Introduction

The connectivity of smart devices in smart buildings has grown significantly thanks to advancements in Internet of Things (IoT) and home area network (HAN) communication technologies. IoT has been widely used in a variety of fields, including education, transportation and logistics, healthcare, and smart homes (Gunasekaran et al., 2017). IoTs facilitate data collection and exchange by utilising embedded microcontrollers, sensors, and software. For example, manufacturing (for example, Siemens, Gree, and Midea), intelligent transportation (for example, Shanghai Automotive, Huawei, and FutureMove Auto, Didi, and Uber), logistics and distribution, the garment industry, and healthcare have all embraced IoT technology. There are many different energy prediction models that have been proposed in the scientific literature. However, these models still struggle with certain problems, such as overfitting and underfitting issues in machine learning techniques, which continue to be the primary cause of incorrect predictions. There are issues with data pre-processing and the elimination of outliers, both of which result in incorrect neural network training and, ultimately, incorrect predictions.

The majority of the energy prediction models make their forecasts for the future based on information on the consumption of energy in the past. On the other hand, in practice, the behaviour of people operating equipment in buildings or dwellings is unpredictable (Mariano-Hernández et al., 2020). Because of how inconsistently people use energy, the building's pricing systems are not flexible enough to meet the needs of a large enough number of residents.

Thus, to accurately forecast the amount of electricity that will be used in smart buildings, it is important to review recent literature to identify how other scholars have proposed to solve the identified issues, such as the inaccurate forecasting of electricity.

2. Methodology

This paper provides a literature review on methods that have been shown to increase the accuracy of energy consumption predictions in smart buildings. The review will focus on methods that have been proven to increase accuracy. The construction of residential and nonresidential buildings makes use of a wide variety of different methodologies for the purpose of forecasting. Following this, the research that has been carried out up to this point is analyzed in terms of the forecasting horizons, objectives,

input variables, and methodologies that were utilized. We utilized the PRISMA 2020 guideline (Page et al., 2020), which is a fundamental collection of reporting requirements for systematic reviews. Figure 1 presents the detailed flowchart that serves as the basis for the research framework. We utilized the PRISMA 2020 flowchart for newly published systematic reviews, and Scopus was the sole database that was taken into consideration. The PRISMA 2020 Guidelines for searching and filtering published works are depicted in Figure 1.

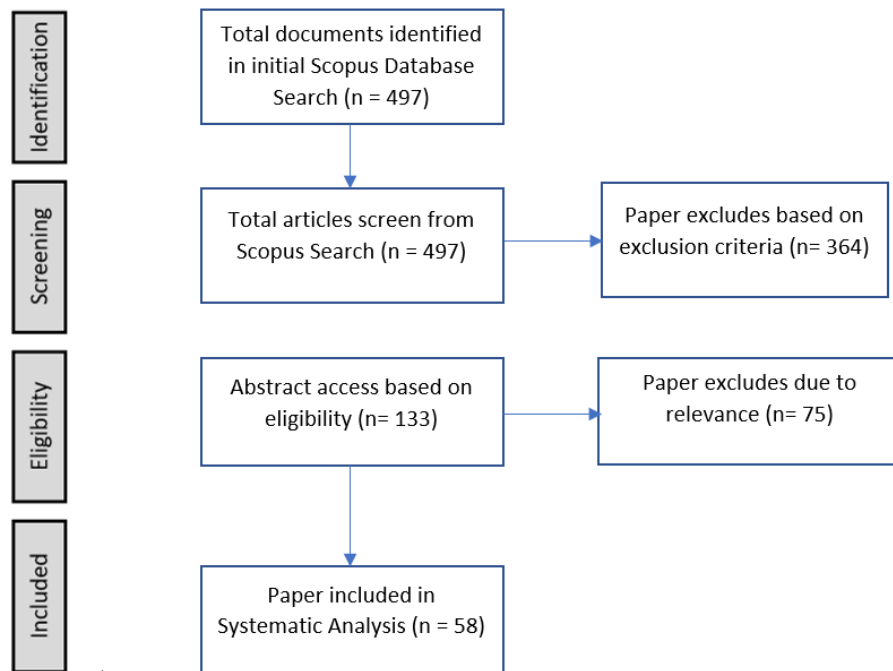


Figure 1. PRISMA 2020 Flow Diagram for Systematic Review

a. Search Strategy

The search technique included four steps based on the PRISMA structure: i) identification, ii) screening, iii) qualification, and iv) participation. First, information was extracted from the Scopus database. The SCOPUS database was utilized for the systematic literature search. During the document search, terms such as “prediction of Energy Consumption for Smart Home” and “smart building energy prediction consumptions” were utilized.

b. Search Criteria

The search terms that were utilized to obtain the titles and abstracts of each individual article. Additional editing of the articles was done so that any instances of duplicate content that may have been present in either of the databases could be removed. In addition, these are the inclusion criteria that are utilized by SCOPUS; they are research outcomes, original publications, free full texts, and English. Because there was a restriction on the amount of time that could be spent reviewing the material, this investigation did not cover other types of articles, such as reports or various kinds of trial research. In the inclusion criteria, databases were filtered and restricted based on their English language content and publication date from 2018 to 2022. We obtained 145 search results after applying the following filters: language (English), publication year (>2018), and document type (article, review paper, conference paper & conference review paper) for the search key term “prediction energy consumption for smart home”. While for the search key term “smart building energy prediction consumption”, we obtained total of 352 documents after applying the following filters: language (English), publication year (>2018), and document type (article, review paper, conference paper & conference review paper), subject area

(Engineering, Computer Science, Energy, Mathematics, Environmental Science, Decision Science). Table 1 shows the search keywords and the total documentation found.

Table 1. *The Search Keywords and Total Documentation Found*

Search Keyword	Filter	Query String	Total Documents Found
prediction energy consumption for smart home	1. Publication year: >2017	TITLE-ABS-KEY (prediction AND energy AND consumption AND smart AND home)	145
	2. Language > English	AND PUBYEAR > 2017 AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (
	3. Document Type: Article, Review Paper, Conference Paper & Review Paper	DOCTYPE , "cp") OR LIMIT-TO (DOCTYPE , "cr") OR LIMIT-TO (DOCTYPE , "re"))	
smart building energy prediction consumption	4. Publication year: >2017	TITLE-ABS-KEY (smart AND building AND energy AND prediction AND	352
	5. Language > English	consumption) AND PUBYEAR > 2017 AND (LIMIT-TO (DOCTYPE , "ar") OR	
	6. Document Type: Article, Review Paper, Conference Paper & Review Paper	LIMIT-TO (DOCTYPE , "cp") OR LIMIT- TO (DOCTYPE , "cr") OR LIMIT-TO (DOCTYPE , "re")) AND (LIMIT-TO (SUBJAREA , "ENGI") OR LIMIT-TO (SUBJAREA , "COMP") OR LIMIT-TO (SUBJAREA , "ENER") OR LIMIT-TO (SUBJAREA , "MATH") OR LIMIT-TO (SUBJAREA , "ENVI") OR LIMIT-TO (SUBJAREA , "DECI")) AND (LIMIT-TO (LANGUAGE , "English"))	
	7. Subject Area: Engineering, Computer Science, Energy, Mathematics, Environmental Science, Decision Science		

c. *Data Extraction*

Articles and reviews are indexed. Also, applicants were eliminated using these criteria: Not published before 2018; not in Engineering, Computer Science, Energy, Mathematics, Environmental Science, Decision Science; not written in English; having a topic covered by other studies; not being conclusive. After conducted the screening and applied exclusive criteria, we obtained total of 133 documents. After that, we assessed the abstract eligibility and finally there are total of 75 papers excluded due to relevance. Thus, the total papers that we reviewed are 58 papers which includes journal, conference paper, conference review paper and journal review paper.

3. **Discussion**

Based on the systematics review of the papers extracted. We identified some of the findings. This study examined some of the most recent publications about estimating energy usage in smart buildings and the utilization of sensor data. In later phases, a further, more in-depth review will be done to identify the necessary research gaps. Mariano-Hernández et al. (2020) did a literature study on energy consumption prediction approaches, variables, prediction methods, and obstacles. Yassine et al. (2019)

have utilized fog nodes for data services to simplify their data processing, classification, and storage difficulties. Wu et al. (2017) have developed a low-energy adaptive clustering hierarchy using household energy consumption data from both short- and long-distance nodes (LEACH). The free space and multi-path fading models have been successfully utilized to manage the overall energy consumption of the nodes. LEACH provides an average technique for distributing energy to nodes, which helps to reduce energy consumption. The strategy has improved the survival rate of nodes, which has resulted in a decrease in the network's energy consumption. Elshrkawey et al. (2018) have focused their efforts on discovering solutions to reduce the energy consumption of wireless sensor networks. Utilizing the scheduling features of TDMA, they were able to reduce their overall energy use by up to 60 percent. Ang et al. (2017) focused on energy usage to determine the best node clusters for large-scale wireless and mobile data collectors. Shin et al. (2005) conducted research on the energy consumption of the sensor networks that comprise smart grids. Zungeru et al. (2013) also did research on the extraction of data from sensor nodes and the utilization of sensor networks. Mergen et al. (2006) concentrate on mobile-access sensor networks to reduce energy consumption.

Pau and Salerno (2019) created fuzzy rules to manage the length of time that wireless sensor nodes in smart homes spend sleeping to limit the amount of energy they consume and the amount of labor they must perform. It is not necessary to purchase expensive equipment in order to use the method. According to Anisi et al. (2017), increasing the energy efficiency of wireless sensor networks is one of their greatest challenges. The authors have examined the issues associated with routing in wireless sensor networks. Wang et al. (2014) utilized fuzzy logic active and sleep controllers has extended the battery life of sensor nodes in a wireless sensor network. A fuzzy controller was used to accurately place the sink by controlling the sink's movement. The distributed fuzzy logic presented has been utilized to successfully govern the wireless nodes' message transmission. These strategies have concentrated on the decrease of energy consumption in sensor nodes; however, smart devices also consume significant quantities of energy, and it is required to forecast future energy consumption to create the correct quantity of energy. Bourhnane et al. (2020) employed machine learning algorithms to forecast and schedule building energy consumption.

4. Conclusion

The monitoring of current energy use and the production of energy in response to that monitoring will be facilitated for energy production businesses and occupants of smart homes by the paper's discussion of projecting future energy consumption. This proposal provides a summary of problems that have been identified with previously proposed models for energy prediction. After that, an overarching strategy for estimating energy consumption is presented, which is followed by an explanation of the research questions and objectives of the study.

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Applications of Space Time Coding in Massive Multiple Input Multiple Output (MIMO) Systems

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Abstract: With the rapid advancement of wireless communication technologies, there is a growing demand for communication services with greater capacity and faster speeds. Recent research in the field of information theory has demonstrated that the installation of multi-element antenna arrays at both ends of a wireless link constitutes a multi-input multi output (MIMO) system, which can significantly increase the communication capacity, and that space-time coding requires the use of multiple antennas at both the transmitting and receiving ends. Because space-time coding simultaneously uses time and space to construct codewords and introduces transmitted signals into joint correlation in space and time domain, it not only achieves diversity gain and coding gain, but also reduces the impact of multipath fading and achieves high spectral efficiency. This study examines the challenges related with the deployment of space-time coding technology to boost the MIMO system's capacity. This work explores the principle, design objectives, system model, and design criteria of space-time coding based on the MIMO channel model and gives the core design concept for the design of space-time coding. 5G Massive multi-antenna technology based on space-time coding can improve the diversity and gain of multi-antenna space and increase communication throughput. Consequently, an increasing number of experts have done essential research on it.

Keywords: space time coding, massive multiple input multiple output systems, 5G wireless communication systems, transmit diversity

1. Introduction

Space-time coding is a method that combines error control coding, modulation, and transmission diversity. It also mixes the spatial transmission signal with the two-dimensional transmission signal of time. The goal of this method is to improve the error performance of multi antenna transmission. The space-time coding technique is the kind of coding technology that is suited for transmission through several antennas.

It is possible to classify MIMO systems into two distinct groups: spatial multiplexing systems and space-time coding systems. These two types of MIMO systems improve transmission rate (efficiency) and get diversity benefit from two distinct vantage points (reliability). One of the ways that MIMO technology can be realised is through space-time coding. In fact, space-time coding technology has been utilised since the inception of the MIMO system all the way up till the present day's communication system.

2. Related Literatures

a. Initial STC in MIMO System

To improve the functionality of multiple input multiple output (MIMO) systems, a signal coding technology known as space time coding (STC) makes use of array antenna processing technology. In the middle of the 1980s, Winters conducted groundbreaking research on the significance of antenna diversity to the capacity of wireless communication. In this regard, Raleigh (1990) and their coworkers made important contributions, and in 1998 they were the ones who first put forward the idea of space-

time coding. Since that time, space-time coding and the MIMO signal processing technology that is related to it have seen widespread use in the field of wireless communication and have seen rapid development.

b. Principle of Space-Time Coding

The most common application of space-time coding is for multiple transmitting antennas. In order to achieve spatial diversity, signals are simultaneously sent out by multiple antennas or received by a variety of antennas. To achieve time diversity, signals are sent over the same subchannel at various periods throughout the transmission. The features of space and time are created by first separating the time domain from the geographical location. The ability of the receiving antenna to receive multiple copies of the transmission signal contributes to an increase in the reliability of the transmission. As a result, space-time coding has the potential to not only lower the bit error rate but also increase band usage. It is possible to double it without requiring more bandwidth resources, which results in an increased capacity for the system. It encompasses things like channel coding, signal modulation, transmit diversity, and receive diversity among other things. The integration of both technologies enables a MIMO system to achieve a higher transmission rate while also realising a high channel capacity. In the process of space-time coding, it is possible to map the information to a variety of transmitting antennas by first converting the high-speed information bit stream that is being input into a number of distinct low-speed bit streams, and then performing independent coding and modulation. Information is recovered at the receiving end utilising several different confidence channels in accordance with the characteristic difference of multipath fading.

c. Design Objectives of Space-time Coding

Space-time coding technology belongs to the category of diversity, so it needs to be applied to multi-collision and multi-path situations. The distance between antennas shall be extended to ensure the independence of transmitted and received signals, to make full use of the multipath effect caused by multiple scatters.

Space-time coding reflects the joint correlation of transmission signals in space domain and time domain. It can not only obtain diversity gain and coding gain at the same time, but also reduce the influence of multipath fading and obtain high spectral efficiency. To obtain the expected coding gain and diversity gain, the initial research focused on the joint design of spatial and temporal independence of transmitted signals. Later, the focus gradually shifted to independent multi transmit antennas using only time domain coding. The difficulty of the research is how to suppress and eliminate the interference between the received signals.

3. Methodology

a. Space-time Coding Design Criteria

The "rules" followed by the design and evaluation of space-time coding are the design criteria of space-time coding. In the digital system, the bit error rate is a measure of its quality, and the bit error rate of the system depends on the Hamming distance between the codeword pairs in the space-time code. In a broad sense, the designed space-time code should be able to maximize the Hamming distance of all codeword pairs, so the codeword with the same redundancy, whose Hamming distance is larger, has better performance. Therefore, the design criterion of space-time coding is to maximize the minimum Hamming distance (Euclidean distance) of all codeword pairs (the minimum Hamming distance directly determines the error correction and detection ability of space-time codes).

b. Analysis of Space-time Coding Design Criteria

This paper only discusses the coding design criteria of AWGN (Additive White Gaussian Noise) channel with slow Rayleigh fading, and the channel characteristic H is known.

At the receiving end of the communication system, if the maximum likelihood decoding method is used, a pairwise error will occur if the following formula (1) holds:

$$\|r - Hc\|_F^2 \geq \|r - Hc'\|_F^2 \quad (1)$$

Where, c' is the error estimation codeword selected by the decoder, $\|\cdot\|_F^2$ is the norm operation symbol.

If the channel parameter H_t and the received signal r are respectively:

$$H_t = \begin{bmatrix} h_{1,1}^t & h_{1,2}^t & \cdots & h_{1,N_T}^t \\ h_{2,1}^t & h_{2,2}^t & \cdots & h_{2,N_T}^t \\ \vdots & \vdots & \ddots & \vdots \\ h_{N_R,1}^t & h_{N_R,2}^t & \cdots & h_{N_R,N_T}^t \end{bmatrix} \quad (2)$$

$$r = Hc + n \quad (3)$$

Substituting (2) and (3) into formula (1) and simplifying it to obtain:

$$\sum_t \sum_{m=1}^{N_R} 2 \operatorname{Re} \left\{ \left(n_t^m \right)^* \sum_{n=1}^{N_T} h_{mn} (c_t^n - c_t'^n) \right\} \geq \sum_t \sum_{m=1}^{N_R} \left| \sum_{n=1}^{N_T} h_{mn} (c_t^n - c_t'^n) \right|^2 = d_0^2(c, c') \quad (4)$$

$d_0^2(c, c')$ is the modified Euclidean distance between the actual transmitted space-time codeword and the error estimated codeword, which can also be expressed as:

$$d_0^2(X, Y) = \sum_m \sum_n \lambda_n |\beta_{m,n}|^2 \quad (5)$$

The codeword difference matrix can be expressed as: $B(c, c')_{N_T \times N_T} = c - c'$, codeword distance matrix $A(c, c')_{N_T \times N_T} = B(c, c') \cdot B^T(c, c')$. Where λ_n is the eigenvalue of $A(c, c')$. v_n is the eigenvector of $A(c, c')$, $\beta_{m,n} = h_m \cdot v_n$, h_m is the row vector of H .

The upper limit value of conditional pairwise error probability based on H , according to the research of (Vahid Tarokh, 1998), (B vucetic, J yuan, 2003), there are two cases (R is the rank of $A(c, c')$):

according to the different values: When RN_R is large, the upper limit of the pairwise error probability is:

$$p(X, Y) \leq 1/2 \exp \left(1/2 \left(\frac{E_s}{4N_0} \right)^2 N_R \sum_{i=1}^R \lambda_i^2 - \frac{E_s}{4N_0} N_R \sum_{i=1}^R \lambda_i \right) \cdot Q \left(\frac{\frac{E_s}{4N_0} \sqrt{N_R \sum_{i=1}^R \lambda_i^2} - \frac{\sqrt{N_R \sum_{i=1}^R \lambda_i}}{\sqrt{\sum_{i=1}^R \lambda_i^2}}}{\sqrt{\sum_{i=1}^R \lambda_i^2}} \right) \quad (6)$$

$$Q(x) \text{ Is an auxiliary error function, } Q(x) = \frac{1}{\sqrt{2\pi}} \int_x^\infty e^{-t^2/2} dt$$

When RN_R is small, the upper limit of the pairwise error probability is:

$$p(X, Y) \leq \left(\prod_{i=1}^R \lambda_i \right)^{-N_R} \left(\frac{E_s}{4N_0} \right)^{-RN_R} \quad (7)$$

Equation (6) and (7) are both directly related RN_R . This obtains the design criteria for coding in the slow Rayleigh fading channel:

- 1) Rank criterion: let $B(c, c')$ full rank, in order to get the full score set gain ($N_T \times N_R$).
- 2) Determinant criterion: let determinant minimum value of $A(c, c')$ is maximized, that is, the minimum non-zero eigenvalue product of $A(c, c')$ is maximized ($\prod_{n=1}^r \lambda_n$), to ensure that the minimum coding gain distance of the code is the maximum, so as to obtain a high coding gain.
- 3) Trace criterion: maximum minimum of $\|B(c, c')\|_F^2$ to achieve high coding gain.

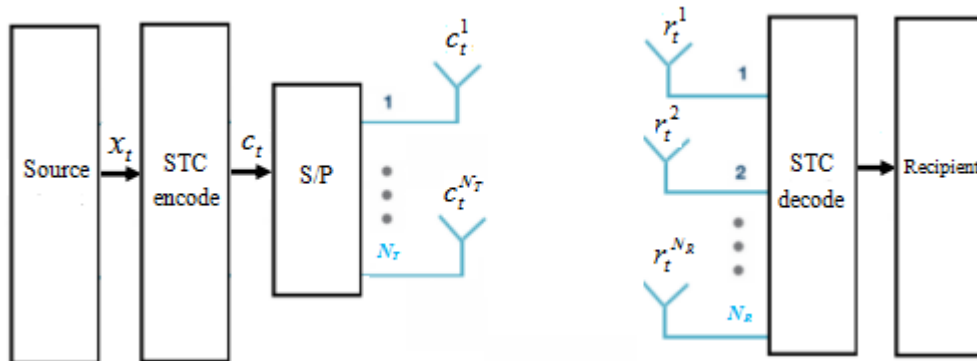
The encoding gain is the power gain measure of the encoding system relative to the unencoding system with the same diversity gain and the same error probability. The above criteria ultimately maximize the minimum distance between the codewords. Therefore, in the process of designing space-time code characters, under the premise of following the design criteria, the key problem of space-time coding becomes how to better combine with diversity technology.

4. Findings and Discussion

a. Model of Space Time Coding System

Space-time coding is a combination of spatial and temporal transmission signals, and its essence is a two-dimensional space-time processing means. Spatial diversity of multiple transmitting and receiving antennas is used to improve the capacity and information rate of wireless communication system; Different signals in time are transmitted using the same antenna in different time slots; And introduce time-domain and space-domain correlation between signals transmitted by different antennas, so that the receiving end can perform diversity reception. Figure 1 is a space-time coding system model

$N_T \times N_R$, which includes a source, an STC encoder, a serial to parallel converter, an STC decoder, and a sink.



$$c_t = (c_t^1, c_t^2, \dots, c_t^{N_T})^T \xrightarrow{H_{N_R \times N_T}} (r_t^1, r_t^2, \dots, r_t^{N_R})^T$$

Figure 1. model of space time coding system

b. Analysis of the Transmitting Model of Space-time Coding System

In this baseband empty-time encoding communication system, at each time t , the source bit stream x_t (composed of m binary information symbols) is first sent to the empty-time encoder and x_t can be expressed as:

$$x_t = (x_t^1, x_t^2, \dots, x_t^m) \quad (8)$$

The m binary information symbols are mapped into a modulation symbol $c = \dots$

$$\begin{bmatrix} c_1^1 & c_2^1 \dots c_l^1 \\ c_1^2 & c_2^2 \dots c_l^2 \\ \vdots & \vdots \\ c_1^{N_T} & c_2^{N_T} \dots c_l^{N_T} \end{bmatrix}$$

through the space-time encoder, and then sent to the string / merge converter (S / P) to form a sequence c_t of parallel N_T symbols that can be represented as a $N_T \times 1$ column vector:

$$c_t = (c_t^1, c_t^2, \dots, c_t^{N_T})^T \quad (9)$$

In this formula, T represents the transpose of the matrix. Then this N_T parallel output symbol c_t^i , $1 \leq i \leq N_T$ corresponding to the i -root emission antenna, c_t^i is emitted simultaneously out by the root antenna within the same time width T_{sec} . The vector of the encoding modulation symbols corresponding to different antennas is the empty time symbol, as shown in Equation (9).

The spectrum utilization rate of the system is:

$$\eta = \frac{r_b}{B} = m \quad \text{bit/s/Hz} \quad (10)$$

In the formula, r_b is the data speed and B is the channel bandwidth. The visible equation (10) is equal to the spectral utilization of the encoding system of a single transmitting antenna.

Assuming that the channel of this wireless mobile communication system is memory-less, then the link from each transmitting antenna to each receiving antenna can be represented by a flat fading model. At time t , the $N_T \times N_R$ MIMO channel can be represented by a channel matrix H_t .

c. Analysis of the Receiver System Model of Space-time Coding System

At the receiving end of the system, each signal on the root receiving antenna is a superposition of the noise after the signal sent by the root transmitting antenna is attenuated by the attenuation channel. The noise column vector n_t at the receiver may be expressed as:

$$n_t = (n_t^1, n_t^2, \dots, n_t^{N_R})^T \quad (11)$$

In the formula, n_t^j is the noise component of the j ($1 \leq j \leq N_R$) root receiving antenna at time t , which is a zero-mean complex Gaussian random variable with a one-sided power spectral density of N_0 .

Therefore, at time t , the received signal column vector on the root receiving antenna may be expressed as:

$$r_t = H_t c_t + n_t = (r_t^1, r_t^2, \dots, r_t^{N_R})^T \quad (12)$$

The receiving signal on the j th receiving antenna at time t is expressed as:

$$r_t^j = \sum_{i=1}^{N_T} H_t \cdot c_t^i + n_t^j \quad (13)$$

It is assumed that the receiver obtains the ideal channel state information (CSI), and the decoder estimates the emission information sequence using the maximum-likelihood algorithm. The judgment measure is:

$$d = \sum_t \sum_{j=1}^{N_R} \left| r_t^j - \sum_{i=1}^{N_T} h_{j,i}^t \cdot c_t^i \right|^2 \quad (14)$$

The decoder selects codewords with minimum judgment measures as the output.

5. Conclusion

The efficient operation of space-time encoding requires the use of multiple antennas at the transmitter and receiver, as space-time encoding requires the construction of codewords in both temporal and spatial dimensions. To improve the error code performance of multi-antenna transmission, the error control coding, modulation and transmission diversity, and the spatial and temporal 2 D transmission signals are jointly designed for multi-antenna transmission. The design goal of space-time encoding is to obtain the maximum diversity gain ($N_T \times N_R$), the maximum encoding gain, and the maximum realized capacity, while having the simplest decoding algorithm. How to integrate space-time coding technology more preferably into 5G systems and next-generation wireless systems is important.

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Small-Sample Image Classification Algorithm based on Multi-Scale Feature Attention

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Abstract: The accuracy of small-sample image classification depends on the ability of neural network models to extract image representations from sample data. A small-sample image classification system based on attention mechanisms and meta-learning is suggested in order to extract more comprehensive information from pictures. The approach may extract richer multiscale features from pictures and enhance classification outcomes through meta-learning because the attention mechanism of multiscale features can concentrate on the data in the sample feature space. To demonstrate the efficacy of the suggested strategy, tests are conducted on the two industry-standard datasets miniImageNet and tieredImageNet for both 5-way 1-shot and 5-way 5-shot tasks. The results are compared with the best existing methods.

Keywords: few-shot learning, meta-learning, attention mechanism

1. Introduction

Over the past few years, tremendous progress has been made in artificial intelligence fields such as natural language processing and computer vision through the application of deep learning (Hinton et al., 2006). In the field of computer vision, many algorithms based on deep convolutional neural networks (Mirza Mehdi & Simon, 2014; Szegedy et al., 2021) and others have been proposed one after another to continuously refresh the best recognition results on large-scale image classification databases such as ImageNet (Deng et al., 2009). Deep learning has shown tremendous success in image classification applications, but it is a data-driven method that requires a large quantity of labelled data to be effective. In actuality, there is a high labor cost associated with categorizing and cleaning up data. Not only that, but data gathering itself may be challenging in many industries, including security and healthcare. Deep neural networks are susceptible to overfitting in the absence of labelled data, which hinders their classification performance. When the concept of few-shot learning with small samples was proposed, it was hoped that deep networks would be able to learn from a limited number of samples in the same manner that humans can (Fei-Fei et al., 2006). The objective of FSL is to create a model that can quickly learn new tasks from a limited sample size. However, gradient descent-based optimization algorithms fail when applied to few-sample learning for possible reasons (Ravi & Larochelle, 2017). Few-sample learning problems have a small amount of training data, which restricts the number of parameter updates during model training. In this situation, traditional gradient-based optimization algorithms cannot find the best parameters; instead, each data set's network parameters must begin with random initialization, which significantly slows down network optimization. To alleviate these problems, a more common approach is transfer learning (Bengio et al., 2011), whose main idea is to use old knowledge to learn new knowledge and to transfer the learned knowledge to a new domain very quickly. Nowadays, knowledge transfer between multiple domains is possible with the help of transfer learning, which simply needs a specific relationship between the source and destination domains.

Data augmentation (Li et al., 2017; Zhang et al., 2019), meta learning (Nichol et al., 2018), and metric learning (Li et al., 2017; Zhang et al., 2019) have become prevalent in small sample domains, as have meta learning (Nichol et al., 2018) and metric learning (Bengio et al., 2011). The most direct solution to the problem of insufficient samples in classification tasks with small sample sizes is to increase the number of samples by rotating, adding noise, cropping, and compressing the images (Goodfellow et al., 2020). Generative adversarial networks (GAN) are primarily comprised of two components: network generator and network discriminator. The fundamental idea is to continuously produce samples that are identical to the authentic samples by emulating known samples with generators. A discriminator is used to distinguish the produced samples from the authentic samples in the input samples. The data

distribution for the current task is small, for instance, the number of samples that can be learned is small, resulting in a restricted sample space for expansion. As a result, the enhanced samples are unable to adequately represent the actual sample distribution, making it difficult to address the overfitting phenomenon, which is caused by insufficient training samples. A technique referred to as meta-learning, which is more suitable for short sample training challenges and is recommended by researchers, enables the network model to learn the commonality prior to the task using a small number of labelled samples so that meta-learning can quickly tackle new tasks. model-neutral meta-learning strategy. Meta-learning permits the model to train a set of initialization parameters by constructing a base learner for training and a meta-learner for prediction. To enable rapid convergence on a variety of sample types, the initialization parameters are continuously adjusted based on a substantial amount of historical data. The metric learning approach (Vinyals et al., 2016) focuses on learning the mapping relationship between the sample data and the features extracted by the network by mapping the feature vectors of the sample data onto the feature space. The distance function is used to determine the degree of similarity between two sets of image data and to place query set samples in the appropriate support set. This occurs after the training process, which gradually decreases the distance between samples of the same category and increases the distance between samples of different categories.

To overcome the challenges posed by the limited number of training samples and the small area for image recognition, fewer training samples and a smaller recognition area are used. This paper proposes multi-scale Attention Feature Interaction (MAFI), i.e., the use of expansion convolution to generate feature maps of different scales to increase the diversity of samples, thereby resolving the problem of a small number of training samples; based on relational networks, this paper introduces the multi-scale space and the multi-scale interaction. This paper introduces the attention mechanism of channels so that the embedding module of the relational network can learn richer multi-scale features and adaptively rescale the features with multi-dimensional channel attention weights, thereby enhancing the classification capability of the model for small samples.

The following are the paper's contributions:

- To address the overfitting issue in image recognition caused by small training samples, we propose the Multi-scale Feature Interaction Framework (MFI Framework) to effectively increase sample diversity and combine multi-scale features for recognition. The proposed MFI Framework is able to effectively increase sample diversity and combine multiscale recognition features.
- The attention mechanism of multi-scale space and channels is introduced to enable the embedded module of the relational network to learn richer multi-scale features and adaptively rescale the attention weights of channels in multiple dimensions to enhance the classification capability of small samples.
- We introduce various effective regularization methods to solve the overfitting problem caused by the small amount of data and to improve the performance of image classification with small samples.

Experiments are completed on two standard datasets, MiniImageNet and tieredImageNet, for both 5-way1-shot and 5 way5-shot tasks, and the results are compared with the current best methods to verify the effectiveness of the proposed methods.

2. Methodology

2.1 Multi-scale Feature Learning

Multi-scale feature learning first generates images of different scales through different preprocessing methods or convolution kernels of different sizes, and then combines the image features of different scales for analysis. Finally, the image recognition task is completed by classification algorithm. At present, scholars have conducted a large number of studies on the influence of multi-scale features on image recognition and obtained good results, as shown in literature (Zhang et al., 2020). FPN (Lin et al., 2017)uses feature pyramid to obtain the same size of small-scale feature image and large-scale

feature image through up-sampling method. Multiple scales are combined for prediction, and good results are achieved in object detection and semantic segmentation. DeepLab (Chen et al., 2016) uses convolution operations with different expansion coefficients for parallel calculation to obtain feature images of different scales and then combine them together.

2.2 Meta-learning

Meta-learning, also known as learning how to learn. With the rapid development of artificial intelligence technology today, the importance of meta-learning is gradually highlighted. Artificial intelligence should be able to learn as efficiently as the human brain. It should actively learn unknown knowledge from what it has learned in the past, learn how to learn, and learn how to think about how to learn to achieve the best effect. Matching Networks (Vinyals et al., 2017) trains an attention model by using the attention mechanism method and previous task experience. Meta Networks (Munkhdalai & Yu, 2017) uses a base learner and a meta-learner with Memory modules to complete the small-sample learning task. Andrychowicz et al. (2016) replaced the traditional optimizer with LSTM and used gradient descent to optimize the optimizer.

2.3 Multi-scale Attention Feature Interaction (MAFI)

As shown in Figure 1, MAFI consists of two networks, Multi-scale Feature Mapping (MFM) and Multi-scale Feature Classification (MFC). MFC consists of several multi-scale classification networks with the same structure. First, the multi-scale classification network is convolved with weights by an attention mechanism for further extraction of multi-scale feature map features. Then, a shared fully connected layer is used to obtain the output. $r = \{r_1, r_2, r_3, \dots, r_K\}$. contains two steps: 1) Utilize the attention module to obtain various weights that will help the network swiftly zero in on the focal parts of the picture while still thoroughly viewing the entire image. This will improve the network's capacity to extract features from the image. MFC defines a multi-scale classification network $N_s = \{N_1, N_2, N_3, \dots, N_K\}$ and the corresponding set of scale scalars $\eta = \{\eta_1, \eta_2, \eta_3, \dots, \eta_K\}$.

Three steps are included:

- Generate convolutional weights for the multiscale classification network Nets using a meta-network. The meta-network consists of multiple perceptron (Pt) $\Phi = \{\Phi_1, \Phi_2, \Phi_3, \dots, \Phi_L\}$, generating the convolution weights of all Nets based on the set of scale scalars $\eta \{W_1^{1:L}, W_2^{1:L}, \dots, W_k^{1:L}\}$.
- Use the attention mechanism to further extract the multiscale feature map features and use the shared fully connected layer to obtain the output.
- Mine the hidden knowledge in the multiscale classification network based on the results after the softmax operation for each network. Where, K is the number of expansion coefficients, the number of scale scalars, and the number of multi-scale classification networks; L is the number of convolutional layers.

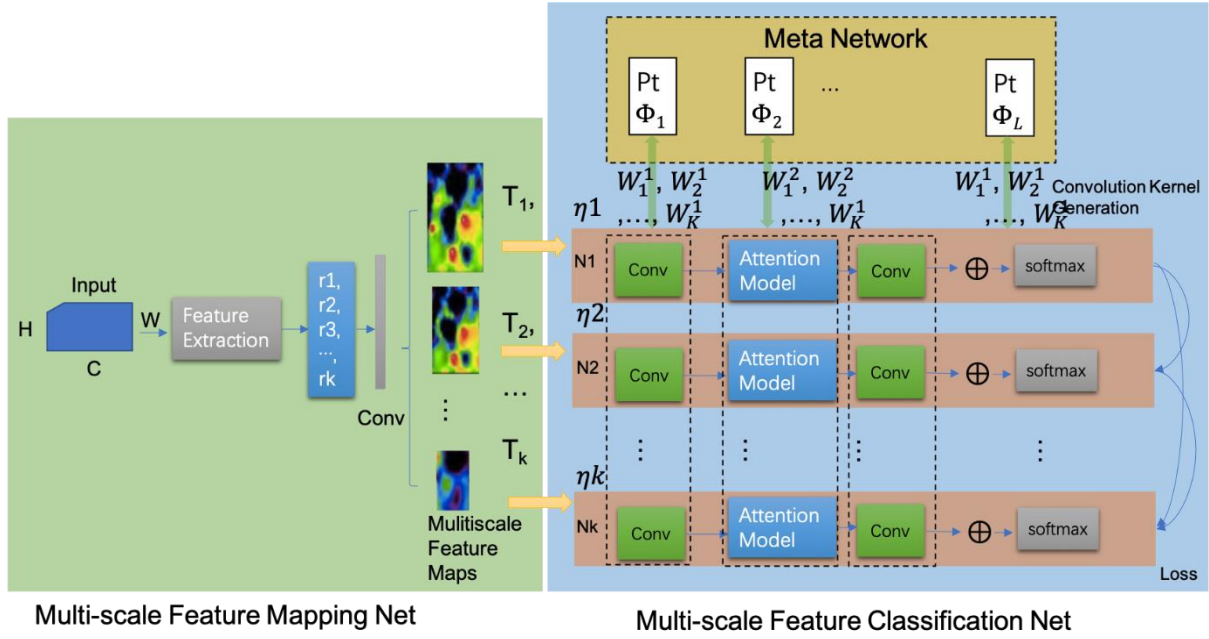


Figure 1. Flowchart of Multi-scale Feature Interaction

2.4 Multi-scale Feature Map Generation

The larger the expansion coefficient, the larger the perceptual field, and the smaller the generated feature maps. The feature maps with different sizes are generated using the expansion convolution to increase the diversity of samples. In this paper, we use different expansion coefficients $r = \{r_1, r_2, r_3, \dots, r_k\}$ to convolve geochemical data to obtain feature maps of different scales. Specifically, the input $x' = \{x'_j\}_{j=1}^N$ is convolved using the convolution kernel $W_d = \{W_d^1, W_d^2, W_d^3, \dots, W_d^K\}$ and the set of expansion coefficients r to obtain the multiscale feature map $f = \{f^1, f^2, f^3, \dots, f^K\}$, where the i -th scale feature map $f' = \{f_j^i\}_{j=1}^N$. Generate f_j^i according to x'_j as the following equation:

$$f_j^i = \gamma(x'_j, r_i, W_d^i)$$

where r_i is the expansion coefficient corresponding to the generation of the i -th scale feature map, W_d^i is the convolution weight corresponding to the generation of the i -th scale feature map, and $\gamma(\cdot)$ denotes the expansion convolution operation.

2.5 Multi-scale Attention Mechanism

The input is transformed into multiscale feature maps in the channel direction from the multiscale feature maps produced using various expansion coefficients. Firstly, Each of the S portions of the input feature map X is identified by $[X_0, X_1, \dots, X_{S-1}]$ and the channel dimension C' , where $C' = C/S$. We introduce the group convolution technique to handle these components independently in multi-scale parallel. The multiscale kernel is related to the group size as :

$$G = 2^{\frac{K-1}{2}}$$

where G is the group size and K is the kernel size.

To acquire the attention vectors in the channel direction, the MFM module extracts the attention weights of different scales of the feature maps.

$$Z_i = SEWeight(F_i), i = 1, 2, \dots, S - 1$$

$$Z = Z_0 \oplus Z_1 \oplus \dots \oplus Z_{S-1}$$

where \oplus is the cascade operator, F_i represents the i -th multiscale feature map, Z is the multiscale attention weight vector, and, Z_i is the attention weight of, F_i . The channel attention mechanism is represented by this module, which also includes the squeeze and excitation operations.

The input X is mapped to the feature map U for each given transformation, where $U \in \mathbb{R}^{H \times W \times C}$. The Squeeze operation, or global average pooling, first reduces the feature U 's spatial dimension to an $1 \times 1 \times C$ vector. The following equation represents the squeeze operation.

$$Z_c = F_{sq}(u_c) = \frac{1}{H \times W} \sum_{i=1}^H \sum_{j=1}^W u_c(i, j)$$

After the squeeze operation, comes the excitation operation, which creates a bottleneck structure with two completely linked layers, assigns a weight value to each channel, and then gathers the set of channel weights to simulate the correlation between channels. The formula of Excitation operation is as follows:

$$s = F_{ex}(z, W) = \sigma(g(z, W)) = \sigma(W_2 \delta(W_1 z))$$

where δ is the ReLU activation function, and W_1 and W_2 are the parameters of the two fully connected layers, respectively. Finally, the obtained normalized weights are weighted to the output of each feature of channel by the Scale operation.

To acquire the attention weights for the multiscale channel calibration, the attention vectors of the channel directions are recalibrated using Softmax.

$$att_i = Softmax(Z_i) = \frac{\exp(Z_i)}{\sum_{i=1}^{S-1} \exp(Z_i)}$$

In particular, the multi-scale channels, which contain all the position data in space and the attention weights in the channels, are calibrated using Softmax. where att denotes the multiscale channel weights after attention cascade.

$$att = att_0 \oplus att_1 \oplus \dots \oplus att_{S-1}$$

The related feature maps, F_i are weighted using the derived multiscale channels' weights.

$$Y_i = F_i \odot att_i, i = 1, 2, \dots, S - 1$$

where \odot denotes channel multiplication.

3. Experiment and Analysis

We experimentally validate the performance of the designed network framework in solving small sample classification problems on the commonly used datasets Mini-ImageNet and Tiered-ImageNet and compare it with state-of-the-art methods. Also, ablation experiments are conducted to verify the effectiveness of the relevant modules in the model.

3.1 Dataset

The Mini-ImageNet dataset is a benchmark dataset in the meta-learning and small sample domain, extracted and derived from ImageNet, with a complex dataset of 60,000 color images in 100 classes, with 600 samples per class, suitable for prototype design and experimental research. The Tiered-ImageNet has a total of 608 classes with 1,281 images per class. On this dataset, it was split and 351, 97 and 160 classes were used for training, validation and testing of small sample learning. For Mini-ImageNet and Tiered- ImageNet, the resolution of all images was adjusted to 84×84.

3.2 Experimental Setup

The experiments first pre-trained the feature extraction network on all the training set image samples and initialized the network in the meta-training phase with the parameters obtained from the pre-training. In the meta-training, the optimizer was chosen as Adam, and the training was started with a learning rate of 10^{-3} , a learning rate halving step of 15000 iterations, 10^{-6} as the weight decay coefficient, and $\alpha=0.2$ as the hyperparameter for label smoothing. In this paper, Pytorch is used as the implementation framework for the experimental code, and the computing hardware for running the code is NVIDIA GeForce GTX Tian X GPU. As in other papers, the accuracy of the model is measured in the form of 5-way 1 shot and 5-way 5 shot. Each task can calculate the corresponding accuracy rate, and the final mean accuracy rate and 95% confidence interval are calculated from the accuracy rates of all tasks. Each new task randomly selects 5 categories, each category has only 1 sample, and then randomly selects 15 images from each category as the support set. 75 support sets are selected to form a 5-way 1-shot task to determine which of the 5 categories these 75 images belong to. The 5-way 5-shot is similar to the 5-way 1-shot, except that there are 5 samples for each of the 5 randomly selected categories.

3.3 Experimental Results and Analysis

The results of comparing the proposed MAFI method with the current state-of-the-art small-sample learning methods on MiniImageNet and TieredImageNet are presented in Tables 1 and 2, respectively. The experimental results demonstrate that the classification accuracy of this paper is improved relative to other state-of-the-art methods, indicating that this model can be utilized more effectively for small-sample classification tasks. Following the description of the above experimental setup, this paper compares the 5-way 1-shot and 5-way 5-shot scales.

3.4 Dataset of Mini-ImageNet

On the Mini-ImageNet dataset, the MAFI model is contrasted with other superior small sample classification algorithms in order to assess the model's performance, and the model achieves good performance on the 5-way 1-shot and 5-way 5-shot tasks.

Table 1. Classification Accuracy of Tasks on Mini-ImageNet

Method	Backbone	Mini-ImageNet	
		5way-1shot	5way-5shot
MAML (Finn et al., 2017)	64-64-64-64	48.71±0.60	63.10 ±0.92
Prototypical Net (Snell et al., 2017)	64-64-64-64	46.61 ±0.71	65.76±0.50
Spot and Learn-CS (Chu et al., 2019)	64-64-64-64	51.34±0.73	67.76±0.78
TPN (Liu et al., 2019)	64-64-64-64	53.75	69.40
PEA (Qiao et al., 2018)	64-64-64-64	54.34±0.65	67.87±0.23
SAML (Hao et al., 2019)	64-64-64-64	55.68±0.43	69.34±0.51
RMN-RPN (Xue et al., 2020)	64-64-64-64	53.34±0.77	69.35 ±0.61
L2F (Baik et al., 2020)	64-64-64-64	52.14±0.51	69.34±0.47
ADM(W. Li et al., 2020)	64-64-64-64	56.71±0.66	72.54±0.52

MAFI(ours)	64-64-64-64	58.54±0.63	74.76±0.48
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The proposed MAFI network significantly outperforms other small sample classification techniques on the MiniImageNet dataset. In the 5way 1shot task, the accuracy is increased by 1.83 percent when compared to ADM. On the 5way 5shot task, the accuracy is enhanced by 2.22 percent in comparison to ADM. MiniImageNet is a multispecies dataset, so the robustness of the model presented in this paper can be validated by its performance on this dataset.

3.5 Dataset of Tiered-ImageNet

To verify the generalization ability of the model, the MAFI model was used on Tiered-ImageNet dataset in two experimental ways, 5-way 1-shot and 5-way 5-shot, and the experimental results are shown in Table 2.

Table 2. Classification Accuracy of Tasks on Tiered-ImageNet

Method	Backbone	Tiered-ImageNet	
		5way-1shot	5way-5shot
MAML(Finn et al., 2017)	64-64-64-64	49.21±0.81	66.22 ±0.47
Prototypical Net (Snell et al., 2017)	64-64-64-64	52.67 ±0.89	70.46±0.74
TPN (Liu et al., 2019)	64-64-64-64	55.75	71.85
PEA (Qiao et al., 2018)	64-64-64-64	52.72±0.51	71.53±0.64
SAML (Hao et al., 2019)	64-64-64-64	53.88±0.73	72.91±0.63
L2F (Baik et al., 2020)	64-64-64-64	54.48±0.58	73.34±0.44
ADM (W. Li et al., 2020)	64-64-64-64	56.11±0.69	75.19±0.56
MAFI (ours)	64-64-64-64	59.74±0.29	78.65±0.51

The MAFI network outperforms other small sample classification methods on the TieredImageNet dataset for the 5 - way 1 - shot and 5 - way 5 - shot tasks. In the 5-way 1-shot task, the accuracy is enhanced by 3.63 percent compared to ADM. In the 5-way 5-shot task, the accuracy is increased by 3.46 percent when compared to ADM. The analysis demonstrates that the proposed multi-scale attention network extracts more detailed feature information from different angles, can effectively mitigate the overfitting phenomenon during the training process by employing the expansion coefficient and channel attention mechanism, and has strong representation ability in different data sets, resulting in a model with good generalization ability.

3.6 Ablation Experiments

To analyze the impact of each module on the network model, ablation experiments are conducted on the Mini-ImageNet dataset using the control variables method: our model MAFI ablates the expansion coefficient branch and retains only the channel attention branch, versus ablating the channel attention branch and retaining only the expansion coefficient branch and MAFI. the final results of the ablation experiments are shown in Table 3.

Table 3. MAFI under Single Attention Network

Method	Accuracy	
	5way-1shot	5way-5shot
only Expansion coefficient	48.13±0.60	67.76±0.52
Only Attention	52.88±0.62	69.76±0.50
MAFI	58.54±0.63	74.76±0.48

The results indicate that the classification accuracy of the model remembered by using both expansion coefficients and multi-size attention will be significantly enhanced; if only a single attention is used, the model's noise immunity for images will be weak, and its classification accuracy will be low. In this paper, the multi-size attention classification model for 5 - way 1 - shot and 5 - way 5 - shot tasks will

use both modules to increase the network's boosting effect, thereby significantly reducing the network's overfitting phenomenon.

4. Conclusion

A multi-scale attentional feature interaction network is proposed for the problem of small image recognition area and small number of experimental training samples. It consists of a multiscale feature mapping network and a multiscale feature classification network. In particular, the multi-scale feature mapping network is responsible for generating multi-scale feature maps. The convolution operation with different expansion coefficients is then used to obtain feature maps of different scales to increase the diversity of data and solve the problem of small number. The multi-scale feature classification network is responsible for computing attention weights for multi-scale feature maps according to different feature maps for further feature extraction and prediction, and it contains multiple multi-scale classification networks, each of which defines a scale scalar corresponding to the size of the input feature map. In addition, by calculating the kl dispersion between the softmax operations of each network, the network performance is improved by mining the hidden knowledge in the multiscale classification network. The experimental data show that each evaluation index of MAFI network is significantly improved, and the effect is also significantly better than the current popular neural networks such as ADM. The effectiveness and generalization ability of this method have great potential and are expected to play a great role in several fields.

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Machine Learning Algorithm in Predicting Chronic Diseases: A Systematic Review

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Abstract: The ability to recognize and predict the condition of patients with chronic illnesses is essential in the realm of healthcare. Patients with chronic diseases are more likely to experience a relapse soon after being discharged from the hospital, and the sickness may worsen. The patient's physical and emotional health will be severely impacted, and their burden will increase. This will cause important medical resources wasted. Nowadays, Artificial Intelligence technology has advanced, chronic diseases can be predicted. By incorporating factors such as the patient's physiological data, disease history, doctor's diagnosis details, and local medical conditions, the machine learning model may be utilized to predict the patient's future state. This paper discusses about the methodology used in develop the Machine Learning algorithm in predicting chronic diseases such as kidney diseases and diabetes. Compared to conventional statistical approaches, the Machine Learning method offers significant benefits and promising future possibilities. It creates an appropriate model based on the properties of the input and automatically learns and corrects during the modelling process.

Keywords: PRISMA 2020, machine learning algorithm, chronic diseases, prediction

1. Introduction

In today's medical practise, to begin the diagnosis and treatment of chronic diseases, it is necessary to first conduct patient interviews and conduct a physical examination of medical records. Most of the patients are unable to articulate the specific symptoms that they are experiencing, which makes the process of diagnosis challenging for specialists. The current situation places an increased pressure on hospitals and physicians, which ultimately results in a reduction in the efficiency of medical professionals. The automated classification of diseases may save doctors time by allowing them to determine, based on the symptoms of the patient, whether the patient has a particular chronic condition or not before the disease reaches a level of danger at which it can cause death. This can occur before the disease reaches a point where it can cause death. Additionally, the diagnosis and treatment of a patient who has a chronic disease is a time-consuming process that requires a significant portion of the time of the attending physician. Therefore, the implementation of the automated system will result in a higher level of accuracy and precision in the identification of persistent diseases, which will lead to a rise in the productivity of medical professionals.

2. Methodology

The major goal of this study is to give a complete examination of the existing body of research on the use of machine learning to the forecasting of chronic illnesses. To evaluate the applicability of the processes and, by extension, the reliability of the results in this study, the PRISMA 2020 guideline (Page et al., 2020), which is a core set of reporting requirements for systematic reviews, was utilised. The comprehensive flowchart of the study framework is shown in Figure 1. The PRISMA 2020 flowchart for new systematic reviews served as the foundation for this, and the only databases considered were Scopus and PubMed. Figure 1 shows the PRISMA 2020 Guidelines for literatures search and filter.

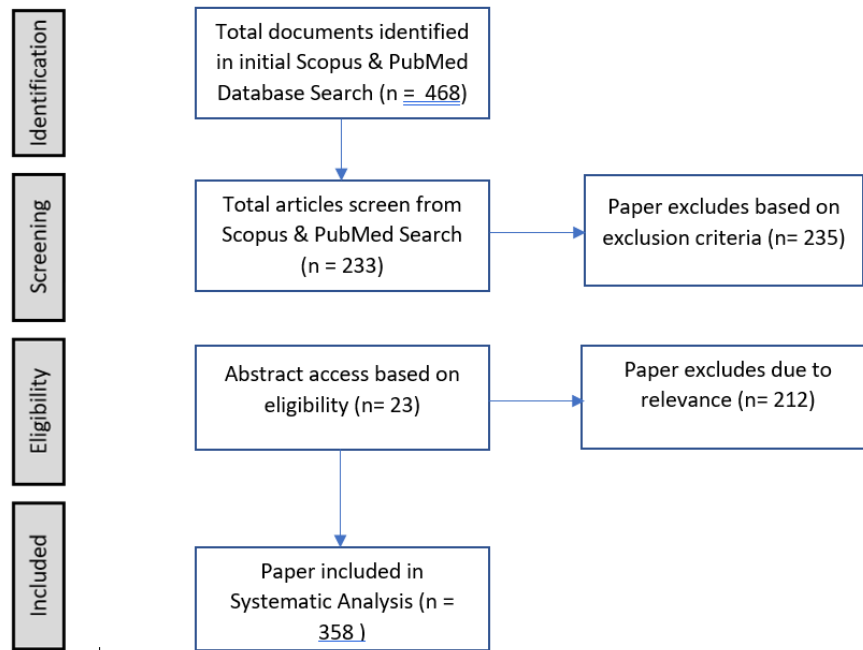


Figure 1. Prisma 2020 Literature Review Search and Filter

2.1 Search Strategy

The PUBMED and SCOPUS database was utilized for the systematic literature search. During the document search, terms such as 'chronic diseases,' 'predictive models,' 'Machine Learning in Chronic Diseases diagnosis,' were utilized. A search was run that yielded 468 documents. To analyze the most recent research on Machine Learning classifiers for Chronic Diseases prediction, the papers were selected based on publication dates from 2018 to 2022.

2.2 Search Criteria

The search terms that were utilised to acquire the titles and abstracts of each article. Additional article editing was carried out to remove any instances of duplication that existed within both databases. In addition, these are the inclusion criteria that are used by Pub Med and CINAHL: research outcomes, original publications, free full text, and English. Other article types such as reports, and other types of trial research were not included in this study due to limitation of time of reviewing. Due to the existence of duplicate documents in PUBMED and SCOPUS datatabase, we removed 235 of them from the overall set of search results, results in 233 searches.

2.3 Data Extraction

A data extraction method was developed. Inclusion criteria: Diabetes and cancer are researched. Human, metabolic, Parkinson's, Alzheimer's, cardiac, hepatic, infectious, and renal diseases are excluded. Data Mining, AI, Big Data, Deep Learning, and Machine Learning are the focus.

Articles and reviews are indexed. Also, applicants were eliminated using these criteria: Not published between 2000 and 2018; not in data mining, AI, big data, deep learning, or machine learning; not an Indexed Journal Paper or review paper such as a conference paper; not written in English; having a topic covered by other studies; not being conclusive. More 2017 papers with important topics and a high citation index were added to the findings.

3. Discussion

3.1 Prediction of Chronic Diseases Using Machine Learning Techniques

Chronic diseases are those that endure for an extended period, have the potential to worsen over time, do not go away on their own, and cannot be cured. They are substantial contributors to morbidity, death, and disability, as well as a decrease in the quality of life (Monzani & Pizzoli, 2020). The World Health Organization (WHO) estimates that the death toll from chronic diseases is between 56 and 80 per 1000 persons. The findings of the study indicated that heart attacks shorten a person's lifespan by around 20 years. The age of 65 is the cutoff point for cardiac arrests and cardiovascular disease (CVD) over the world; nevertheless, even as young as 45 can be impacted (Aryan et al., 2020). People are gaining weight as a result of their intake of fast food, which has led to an increase in the prevalence of obesity. In addition to that, there is a link between hypertension and strokes, cardiovascular disease, and renal illness (Thyssen & Halling, 2018). If these people do not make any changes, it is possible that a greater number of people will become infected with the diseases. When it comes to treating patients who are at an advanced stage of their sickness, both the government and hospitals have challenges.

Cancer is another example of a chronic illness that is to blame for an alarmingly high number of societal deaths (Krisha et al., 2020). Several cancer prediction methods have been proposed, many of which are based on the principles of machine learning; nonetheless, the predicted accuracy of these methods is still insufficient. The detection of cancer in its earlier stages has the potential to save a considerable number of lives. Clinicians typically rely on manual methods of cancer detection, which can take a significant amount of time and are prone to making mistakes. Breast cancer is the type of cancer that affects women the most frequently and was one of the first types of cancer to be classified (Alahe & Maniruzzaman, 2021).

The most major risk factors for heart and cardiovascular disease are smoking, being overweight or obese, developing diabetes or hypertension, having abdominal obesity, and having dyslipidemia (Cifkova et al., 2019). Arrhythmia, cardiac arrest, congestive heart failure, congenital heart disease, congestive heart failure, congenital heart disease, high blood pressure, peripheral artery disease, and stroke are all examples of heart and cardiovascular issues (Benjamin et al., 2019). A condition known as arrhythmia can be identified by an erratic heartbeat. In cardiac arrest, the patient suddenly loses awareness as well as the ability to breathe and function of their heart (Panhuyzen-Goedkoop et al., 2018). A condition in which the heart is unable to pump blood adequately is referred to as chronic heart failure, which is also known by its more common name, congestive heart failure (Jahmunah et al., 2019). Congenital heart disease is the medical term for a birth condition that affects the heart that is present at birth. When the force that the blood exerts on the artery walls is significantly greater than normal, this can lead to a condition known as high blood pressure (Nejad et al., 2018). Peripheral arterial disease is the name of the ailment in issue, and it is characterised by restricted blood arteries that limit blood flow to the extremities (Krishna et al., 2020). When there is a disturbance in the blood flow to the brain, which might cause damage, a person is said to have a stroke (Ezennaka & Dodiya-Manuel, 2021).

3.2 Machine Learning Algorithm in Predicting the Chronic Diseases

According to literature review, most of the illness prediction systems for chronic diseases make use of machine learning algorithms in order to classify and forecast illnesses. Only a very small number of authors have attempted to forecast chronic illnesses using neural networks and deep learning. The approach that has been recommended makes use of the Python platform to construct algorithms like long-term memory (LSTM) and random forest. The experiments are carried out in Python. The fact that LSTM has great predictive capability in deep learning models was a primary factor in its selection as the best model to use. The recurrent neural network known as LSTM is one that is created artificially (RNN). Because of this, the amount of time needed for training is significantly reduced when compared to other models. Image processing, speech recognition, and handwriting recognition are just a few of the areas that have benefited significantly from its use. The support vector machine is another method that may be utilised for the purpose of accurately forecasting chronic illnesses. The support vector

machine, often known as an SVM, has been used in the context of classification problems as a supervised learning model. They can make accurate predictions with only a limited amount of training. As a consequence of this, SVM has been applied to problems of classification that are both linear and nonlinear. It is able to categorise unstructured data effectively using statistical methods.

The random forest has also been used to solve classification problems, where the training data are used to make decision trees. The output of the trees will ultimately serve as the deciding factor in the categorization. The recommended model is a combination of several different approaches, with the goal of using the most effective algorithm possible given the information at hand. The purpose of picking many algorithms is to compare and evaluate those that are most appropriate for a certain category of data. The accuracy of deep learning algorithms was compared to that of machine learning techniques for assessing performance by using prediction accuracy matrices. This was done in order to determine which approach was more accurate. The method for forecasting chronic diseases based on patient data from breast cancer and chronic kidney disease is presented as a possibility by the model that has been provided. For the purpose of the experiment, data was taken from several datasets that were already in existence; hence, no data collection was carried out. The data was cleaned and pre-processed using the moving average method, and any missing values were taken into consideration throughout the analysis. Because the accuracy of the prediction depends on how the features are chosen, statistical methods are used to find the most useful characteristics for choosing features and analysing them afterward.

4. Conclusion

This work reviewed the application of machine learning (ML) algorithm on chronic illness prediction using Scopus papers from 2018 to 2022. Filter Data Mining, AI, Big Data, Deep Learning, and Machine Learning using inclusion and exclusion criteria. The results analyse the stated growth rate. In supervised learning, linear regression, logistic regression, SVM, ID3, KNN, Nave Bayes, and Bayesian Networks are common. Logistic and linear regression are others. SVM models are used to create nonlinear class boundaries. Using a dataset, these methods create decision trees. Fix and Hodges (1957) were the first to utilise the KNN method, which classifies a new instance based on its distance from previous examples. The new instance was compared to the others. The great majority of studies didn't report on missing data, making it difficult to tell if sample groups are underrepresented, for example in favour of sicker people with more data. Most studies didn't report on missing data treatment. Research enquiries provide more manageable datasets with better control over factors and inclusion criteria. Research using national or regional databases, EHRs, or daily home monitoring benefits from large, representative samples. ML was created for massive datasets.

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A Review of the Application of Seismic Signal Denoising and Reconstruction and Its Challenges

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Abstract: In seismic research, surface waves can be observed as intense interference waves. These waves significantly reduce the resolution of seismic records and the signal-to-noise ratio of these records. Deep learning is a data-driven approach that can learn from many data samples the difference between an effective signal and noise. It helps to create an adaptive deep neural network to suppress noise. This paper discussed about literature review of the Seismic Signal Denoising and Reconstruction Method, and its challenges. PRISMA 2020 is used as a guideline to conduct systematic literature review. There are total of 45 recent year article have been reviewed (year 2015 to 2022). The purpose of this study is to examine different methods and current Seismic Trace Reconstruction Algorithms to achieve denoising of seismic signals. The methods of denoising seismic signals were then summarized in assessment matrix of systematic review. As a results, this study proposes a suitable deep learning algorithm model for the processing of noisy seismic signals.

Keywords: seismic signal denoising, reconstruction method, systematic review

1. Introduction

Artificial blasting triggers earthquakes to generate seismic waves, which are reflected by the formation and then collected to form seismic signals. Due to the complex and harsh geological environment and the influence of exploration equipment interference, the actual collected seismic signals often contain a lot of noise and missing seismic traces. The noise existing in the seismic signal will seriously interfere with the effective seismic signal due to the interweaving of the information, which not only hides the corresponding geological structure and rock formation geological information, reduces the validity of the data, but also affects the reliability of the seismic data. The lack of seismic traces may cause serious aliasing in migration imaging, which has a great impact on the interpretation of subsequent seismic data. Aiming at the problems of noise and missing seismic traces in seismic signals in the actual exploration process, the deep learning method is used to conduct research on noise reduction and seismic trace interpolation processing.

2. Research Background and Current Situation

How to successfully apply deep learning technology in the field of seismic exploration is of great significance and urgent at the national long-term strategic level and the discipline's own development level. It is also the most concerned research hotspot of major oil companies and oil service companies. At present, the use of deep learning technology and artificial neural networks has gradually emerged worldwide to pick up the first arrival wave of earthquakes, seismic fault identification, seismic data random noise suppression, oil and gas reservoir prediction, Seismic inversion and other research reports on exploration and application, but it has not achieved such remarkable success in the fields of image recognition and natural language processing.

2.1.1 Traditional Seismic Signal Noise Reduction Method

In recent years, in response to the phenomenon of noise contained in seismic signals, researchers at home and abroad have conducted research on seismic signal noise reduction methods and achieved a series of results. Traditional seismic signal noise reduction methods mainly include Fourier transform noise reduction wavelet transform, empirical mode decomposition noise reduction and so on.

2.1.2 Fourier Transform Noise Reduction

Fourier transform is the most used classic method in seismic signal processing. It can build a bridge between the time domain and frequency domain of seismic signals. The basic principle is to convert the seismic signal from the time domain to the frequency domain and remove the noise by analyzing the frequency range of the noise and the clean seismic signal. However, the Fourier transform cannot express the time and frequency information of the seismic signal at the same time, so the global frequency spectrum of the seismic signal cannot be obtained, and the local signal characteristics of the non-stationary seismic signal cannot be obtained.

2.1.3 Wavelet Threshold Denoising Method

Wavelet threshold denoising uses wavelet transform to map the signal from one-dimensional time domain to two-dimensional time-frequency domain to reduce noise. After the transformation, it can simultaneously express information in the time domain and frequency domain and can handle non-stationary seismic signals well. Wavelet threshold denoising requires the selection of thresholds, including hard thresholds and soft thresholds. In these two methods of threshold processing, the advantage of hard threshold is that it has a better meaning of mean square error, but at the same time the disadvantage is also obvious. The signal smoothness after noise reduction is not good, and there is a jump phenomenon in the signal; it is like the hard threshold. Compared with the use of a soft threshold, the signal will not have additional oscillations after noise reduction, but there are also shortcomings. The signal after noise reduction will be compressed, and there will be a certain deviation compared to the original signal.

2.1.4 Empirical Mode Decomposition (EMD) Noise Reduction Method

The Empirical Mode Decomposition (EMD) noise reduction method is to decompose the signal according to the time scale characteristics of the signal itself. In this process, there is no need to pre-set any basis function. EMD is a part of the Hilbert-Huang transform proposed by Huang et al. (1998). The biggest feature is the ability to perform adaptive analysis on the signal ; Applying empirical mode decomposition on constant frequency slices and removing the first intrinsic mode function can effectively remove random noise and coherent noise ; in 2015, Jiajun Han and Mirko van der Baan proposed an ensemble-based empirical mode decomposition (EEMD) The seismic noise reduction method combined with the adaptive threshold method has verified the potential of the algorithm in the denoising of microseismic and reflection seismic .

2.1.5 Seismic Trace Interpolation Reconstruction Algorithm

In the actual seismic signal acquisition in the field, due to the impact of the complex and steep acquisition environment and limited construction costs, in order to reduce the cost and workload of field acquisition, the distance between the detectors during the seismic data acquisition process is relatively large, making the space The sampling rate is low, and the low sampling rate will lead to the phenomenon of spatial aliasing, which will affect the effect of seismic migration imaging, so it will always lead to the lack of seismic signals, and the follow-up processing of geological structure mapping and seismic data requires no missing seismic signals, so It is necessary to reconstruct the missing trace seismic signal. The essence of seismic trace interpolation is to insert correct seismic traces in the original seismic data with low sampling rate by using appropriate seismic data trace interpolation method.

The current seismic trace reconstruction algorithms roughly fall into the following three categories:

2.2.1 Algorithms Based on Wave Equations

Use the physical properties of seismic waves to propagate in the stratum to reconstruct the seismic wave field. This algorithm has a relatively large amount of calculation and will be accompanied by aliasing. produce.

2.2.2 Algorithm Based on Predictive Filtering

Pitz et al. used the F –X domain in seismic trace interpolation and used the frequency spectrum of the spatial prediction filter to represent the coefficients of the linear equation in the F –X domain, but this algorithm has large errors.

2.2.3 Algorithms Based on Mathematical Transformations

Use mathematical transformations to process seismic signals and reconstruct them in the transform domain. The key to this type of algorithm is to select the appropriate transform algorithm to optimize the sparse seismic signal. The reconstruction effect of this type of algorithm is good and the calculation efficiency is high, but there is still room for improvement.

2.2.4 Future Seismic Trace Interpolation Algorithm

In recent years, deep learning has shown a blowout trend in the field of image reconstruction, in the field of seismic data interpolation and reconstruction. In 2018, Mandelli et al. proposed the use of convolutional autoencoders to reconstruct missing traces in the prestack domain, and then applied the network to solve the joint problem of synthetic data interpolation and Gaussian noise attenuation. (2018) proposed a generative adversarial network (GAN) based seismic data reconstruction technique to achieve missing data reconstruction without considering the sampling rate. Wang et al. designed an eight-layer ResNets network based on convolutional neural network in the same year to realize seismic data interpolation. In 2018, Schlemper et al. proposed a deep cascaded CNN network to reconstruct dynamic MR images and achieved good reconstruction results.

3. Deep Learning Algorithm Model

3.1 Research on Seismic Signal Denoising Based on Convolutional Neural Network

3.1.1 Convolutional Neural Network Principle

A seismic signal denoising algorithm based on deep convolutional neural network is realized by using the ability of automatic, efficient, and high-precision feature learning of convolutional neural network. Convolutional Neural Networks (CNN) is the most classic model structure of computer vision technology. Common modules include convolution, pooling, activation function, batch normalization, and discarding method. Using its unique convolutional structure, CNN has achieved remarkable results in the fields of feature learning, object detection, and image denoising. At the same time, various CNN structures have also been successfully applied in the field of seismic exploration, such as separation of first arrivals and classification of waveforms, suppression of multiples and suppression of random noises. Wang et al. (2019) proposed a data augmentation denoising model based on CNN and explored the denoising process of CNN using a visualization method.

3.1.2 The Development Process of Convolutional Neural Network

Zhang et al. (2021) proposed a fully convolutional denoising network (DnCNN) algorithm based on residual learning by analyzing the connection between residual learning and trainable nonlinear reaction diffusion. The DnCNN algorithm is based on the principles of neural networks and statistics, and adopts the concept of residual learning, but only uses a single residual unit to learn residual noise and clean images. Since random noise attenuation in seismic data is like image denoising, the DnCNN

algorithm has the advantage of improving denoising performance without introducing additional parameters

3.2 Research on Interpolation Method Based on Generative Adversarial Network

3.2.1 Generative Adversarial Network Principles

GANs train the generator and the discriminator in an adversarial way. Among them, the generator is used to generate "fake" samples as realistic as possible, and the discriminator is used to distinguish as accurately as possible whether the input is a real sample or a generated "fake" sample. In the specific training process, the generator and the discriminator are alternately trained: first, fix the generator, use the generator to simulate $G(z)$ as a negative sample based on the hidden random vector z , and sample the positive sample x from the real data, and then use the generator to simulate $G(z)$ as a negative sample. The positive and negative samples are input to the discriminator for binary prediction, and finally the parameters of the discriminator are updated using its binary cross entropy loss; then the discriminator is fixed to optimize the generator. For the generator, in order to deceive the discriminator as much as possible, try to make the discriminator as much as possible. The generated "false" samples are judged as positive samples, and the optimization is generally considered to maximize the discrimination probability of the generated samples. The essence of seismic trace interpolation is to insert the correct seismic trace in the original low sampling rate seismic data by using the appropriate seismic data trace interpolation method.

3.2.2 Generative Adversarial Network

The generative adversarial network architecture sets the two parties involved in the game as a generative network and a discriminant network. The purpose of the generative network G is to learn the real data distribution as much as possible, and the purpose of the discriminant network D is to determine whether the input data comes from real data or from generated data. Network-generated data. Therefore, the generative network and the discriminative network are iteratively optimized with each other during the training process.

In 2018, Siahkoohi et al. applied generative adversarial network to missing seismic data. The convolutional neural network and generative adversarial network were combined in the network to better realize the reconstruction of missing seismic data. In 2018, Alwon et al. applied the generative adversarial network to noise reduction of seismic data. The experimental results show that the generative adversarial network achieves the purpose of noise reduction while maintaining the characteristics of seismic data. In 2019, Picetti et al. applied generative adversarial network to seismic facies, and the experimental results show that this method can better improve the quality of seismic facies.

3.2.3 Optimized Generative Adversarial Network

The optimized generative adversarial network architecture can effectively realize the interpolation reconstruction of seismic data. Optimized Generative Adversarial Networks (OGAN) still contain both generative and discriminative networks. The generation network is used to generate high-resolution seismic data from low-resolution seismic data. The purpose of the discriminant network is to discriminate whether the high-resolution seismic data is real or derived from the high-resolution seismic data generated by the generative network. In the training process of the optimized generative adversarial network, the generative network and the discriminant network are iteratively optimized until the optimal generative network model is obtained, and finally the seismic trace interpolation is realized through the optimal generative network model.

4. Conclusion

In recent years, with the rapid development of deep learning, seismic denoising technology and seismic trace interpolation methods based on deep learning methods are also developing at an alarming

rate. Although the current convolutional neural network has become the mainstream, traditional algorithms still have certain value, which can inspire new algorithms for seismic signal denoising and seismic trace interpolation. Based on the existing deep learning methods, the general process of using deep learning methods to process seismic signals is first to obtain a suitable seismic data set, secondly to build a suitable network model for training and testing, and finally to test the performance of the built model. Evaluate. To better prove the effectiveness and practicability of the model based on the deep learning method.

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Predicting Academic Failure of College Students in E-learning Based on Bagging Support Vector Machine

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Abstract: E-learning, which has become the predominant style of instruction in the wake of the COVID-19 pandemic, poses more challenges in managing college students than the traditional mode. By analyzing the large amount of behavioral data created by college students in e-learning systems, it is possible to forecast the academic achievement for them. Students who are at risk of failing a subject can be prevented from failing with early warning. Predicting the test scores of college students can be reduced to a categorization problem. The Support Vector Machine classifier has strong classification ability for small sample sets; However, when the positive sample size is too small, overfitting will occur and impair classification performance. This study discusses about predictive model of the academic failure of college students based on bagging SVM by extracting the data collected in the Chinese University MOOC: learning duration, assignment submission rate, and attendance rate. Raw data was initially preprocessed. The SVM algorithm was then used to do preliminary classification. Then, the appropriate subsamples were chosen, and negative samples were bagged. Finally, optimal subsamples were used to train the optimal SVM classifier model utilizing MATLAB for simulation analysis. Experimental results indicate that this model outperforms previous prediction models based on standard SVM classifiers and machine learning classifiers in forecasting college students' academic failure in e-learning.

Keywords: e-learning, academic failure, support vector machine, prediction model

1. Introduction

E-learning has swiftly evolved as a new kind of education. Not only does technology play a significant role in assisting traditional education, but it has also become a primary means of learning, particularly during the COVID-19 pandemic. Online education has liberated students from traditional time and space limits and provided them with a flexible, unrestricted, and open learning environment in which they can learn anything at any time and in any location. Students are the object of understanding. They can select the proper learning techniques and schedule based on their own needs. The world's first e-learning system dates to 1924, when an educational psychology professor at Ohio State University named Sidney L. Pressey created a rudimentary teaching machine called Automatic Teacher (Petrina, 2019). It is more symbolic than practical because only multiple-choice questions are supported. In the 1990s, the growth of computer technology and multimedia digital technology led to the emergence of numerous e-learning platforms, the most prominent of which is MOOC (Massive Open Online Courses) (Lambert, 2020). On numerous MOOC platforms, huge amounts of behavioural data are created nowadays. This educational data may be meaningfully analysed and mined since it can assist educators improve their teaching methods and course design. Moreover, this massive amount of data offers research opportunities for personalised recommendation, learning behaviour and group portrait analysis, and even academic performance prediction for learners. Online education offers several advantages over traditional face-to-face instruction, but it has disadvantages in terms of student management due to its distance-learning format. Data Mining (DM) (Pujari, 2001) refers to the technique of utilising algorithms to uncover information hidden inside a significant volume of data. Consequently, it is especially important to analyse the students in the various data sets of e-learning platforms using data mining techniques to predict their academic performance, identify the students most likely to fail and provide them with a timely warning to prevent them from ultimately failing. In

addition, it can assist teachers improve their teaching methods and course design by providing them with an accurate prediction of their students' academic performance.

Educational Data Mining (EDM) is the research branch of DM in the subject of education (Jacob et al., 2015). In the past, researchers have utilised Machine Learning (ML) algorithms to forecast students' progress. Researchers have recently adapted EDM to the prediction of academic achievement by analysing the diverse behavioural data provided by students in e-learning systems, as a result of the COVID-19 epidemic and the widespread adoption of online courses. In reality, the prediction of academic failure among college students can be viewed as a dichotomous score categorization problem. However, there are typically fewer types of online learning behavioural data for college students because the average class size is less than 200 students, resulting in a limited dataset. The SVM algorithm offers superior performance than the existing EDM algorithms, such as Decision Tree (DT), Artificial Neural Network (ANN), Naive Bayes (NB), etc., because of its superior capacity to classify tiny samples. The number of students that fail a course is not the majority. When the number of positive samples is insufficient, the support vector machine will result in overfitting, which reduces the accuracy of classification. This study adds bagging SVM to the performance prediction model and provides an academic failure prediction model for college students on an e-learning platform based on bagging SVM to address these issues.

2. Related Work

With the explosive growth of online education, the prediction of college students' academic success has become a prominent topic of study in EDM. Experts are recognizing more and more that the large amount of behavior data stored by college students on the online learning platform has become a great resource for analyzing e-learning activities. As a result, several e-learning models have been proposed to analyze this behavior data and generate predictions accordingly. The most representative learning analysis (LA) model proposed by scholars at home and abroad is the learning analysis process model based on Connectivism Theory, which George Simmons proposed in his book "Connectivism: A Learning Theory for the Digital Age" (Siemens, 2004). He is representative of the field's initial researchers. He divided the process of analysis into numerous components, including learners, intelligent data, introduction, prediction, analysis, and personalization. Most early studies on predicting student academic performance are based on offline courses. Due to the enormous growth of online courses in recent years, experts are increasingly tempted to forecast student academic achievement online. Richmond and Conrad (2012) using the Sternberg Wagner Thinking Style Inventory (TSI) to measure the academic performance of 187 college students in an online class, concluded that thinking styles impact academic achievement. Prior knowledge is the most important predictor of end-of-MOOC success, as determined by Kennedy, et al. (2015), who examined the extent to which students' prior knowledge and involvement predict end-of-MOOC performance. Xu Wei et al. (2021) proposed a performance prediction model that combines scores from past semesters with course learning behavior in a Learning Management System (LMS). Four distinct combinations of relevant behavior data and machine learning methods were utilized in the construction of the model. Zhao et al. (2019) employs DT algorithm to forecast the performance of online learners and to implement learning interventions. Alsharhan et al. (2021) compared the accuracy of three supervised machine learning methods (ANN, DT, and NB) in the prediction of overall performance by analyzing 480 students in SSPSS and found that Naive Bayes algorithm achieved the highest accuracy of 89.85%.

3. Support Vector Machine

A supervised ML algorithm and named Support Vector Machine (SVM) was developed, which based on Statistical Learning Theory as well as Structural Risk Minimization (Cherkassky & Ma, 2004). SVM is most suitable for binary classification problem because of its high robustness in prediction. Besides, SVM has a better performance dealing with small training dataset compared with other classification algorithm. In addition, SVM, with a good generalization, has a better ability when coping with linear, nonlinear and other high-dimensional pattern recognition problems. The basic theory of SVM can be illustrated in Figure 1.

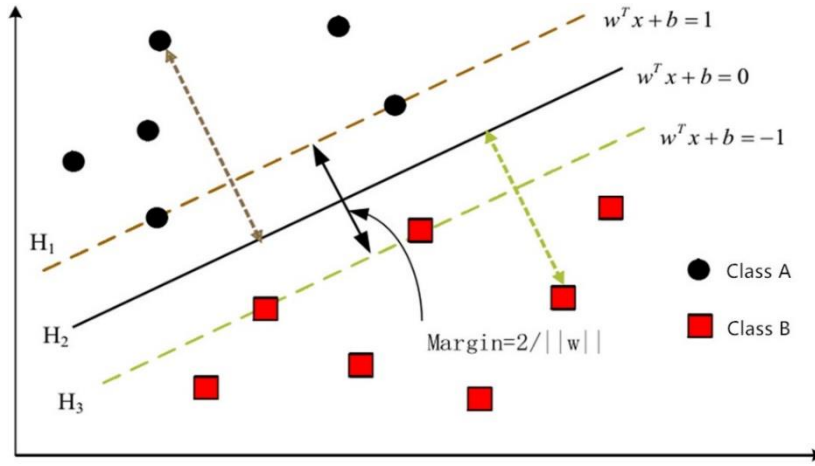


Figure 1. Support Vector Machine Algorithm

The core idea of SVM is to find the hyperplane to separate two kinds of data as far as possible.

Take the example of a 2-dimensional space, for a linearly separable training dataset: $(\vec{x}_i, y_i)_{1 \leq i \leq n}$, $\vec{x} \in R^d$, $d = 2$, $y \in \{-1, +1\}$, then the decision function of SVM can be expressed as follow:

The classification hyperplane is defined as follow :

$$\vec{w} \cdot \vec{x} + b = 0 \quad (1)$$

the constraint condition of the hyperplane is given below :

$$y_i \cdot (\vec{w} \cdot \vec{x} + b) \geq 1, i = 1, 2, \dots, n \quad (2)$$

Then the optimal hyperplane problem is transformed to the solution of the problem:

$$\begin{aligned} \min \quad & \Phi(\vec{w}) = \|\vec{w}\|^2 / 2 = (\vec{w} \cdot \vec{w}) / 2 \\ \text{s. t.} \quad & y_i \cdot (\vec{w} \cdot \vec{x} + b) \geq 1, i = 1, 2, \dots, n \end{aligned} \quad (3)$$

The Lagrange multiplier is used to optimize this problem, and the optimal solution is obtained as follows:

$$\vec{w}^* = \sum_{j=1}^l y_j \alpha_j^* \vec{x}_j \quad (4)$$

$$b^* = - \frac{\max y_{j=1} (\vec{w} \cdot \vec{x}_j) + \min y_{j=1} (\vec{w} \cdot \vec{x}_j)}{2} \quad (5)$$

Where optimal solution $\vec{\alpha}^*$, (\vec{w}^*, b^*) must satisfied the equation (6):

$$\alpha_i^* [y_i (\vec{w} \cdot \vec{x}_i + b^*) - 1] = 0, i = 1, 2, \dots, l \quad (6)$$

Finally, we get the optimal hyperplane function :

$$f(\vec{x}, \vec{\alpha}^*, b^*) = \sum_{j=1}^l y_j \alpha_j^* (\vec{x}_i \cdot \vec{x}_j) + b^* \quad (7)$$

and the decision function of SVM in formula (8) according to the Kuhn–Tucker theorem.

$$f(\vec{x}) = \text{sign} \left\{ (\vec{w}^* \cdot \vec{x}) + b^* \right\} = \text{sign} \left(\sum_{i=1}^l \alpha_i^* y_i (\vec{x}_i \cdot \vec{x}) + b^* \right) \quad (8)$$

As for linear inseparable dataset, in order to find the optimal hyperplane, we can bring SVM a relaxation factor ξ and penalty factor C into the decision function, while for the nonlinear case, we can map the

dataset into low-dimensional space by choosing an appropriate kernel function. Some major kernel functions are shown below:

$$\text{Polynomial kernel: } K(x_i, x) = [(x_i, x) + 1]^q \quad (9)$$

$$\text{Gaussian kernel: } K(x_i, x) = \exp\left\{-\frac{\|x_i - x\|^2}{\sigma^2}\right\} \quad (10)$$

$$\text{Sigmoid kernel: } K(x_i, x) = \tanh(v \cdot (x_i, x) + c) \quad (11)$$

4. Design and Methodology

a. The Design of the Academic Failure Predictive Model

In this paper, support vector machine algorithm was adopted to the predictive model because of its good performance in two-class sample classification, bagging was used in SVM to overcome the drawback of overfitting the classifier occurred when there were not enough positive samples. The major scheme of the academic failure predictive model of college student is shown in Figure 2, and the main steps are described as follows:

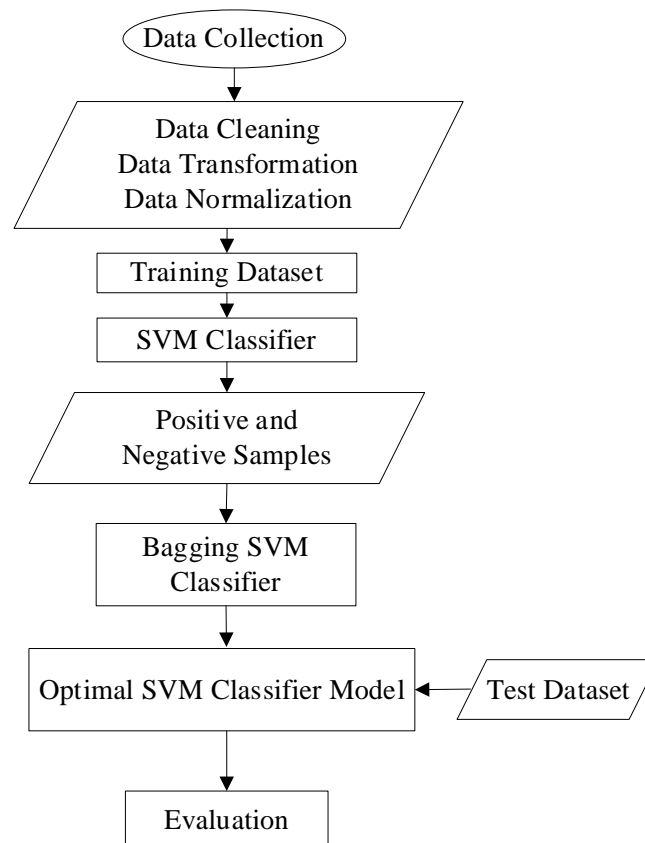


Figure 2. The Academic Failure Predictive Model of College Student Based on Bagging SVM

Step 1: Collect the raw data from the background of e-learning platform.

Step 2: Preprocess the raw data with cleaning, transformation and normalization.

Step 3: Train the processed behavioral data with SVM classifier.

Step 4: Mark positive samples and bagging negative samples.

Step 5: Train the bagging SVM classifier.

Step 6: Get the optimal subsamples and train the optimal SVM with test dataset

Step 7: Evaluate the predictive model

b. Data Collection

In the e-learning system, there are many kinds of student behavioral data, such as login times, the number of posts in the discussion board, announcement view times, comment times in the discussion board, the duration of learning, resources visited, post submission, and attendance rate. Based on Pearson's correlation coefficient, behavioral data with correlation values lower than 0.2 were deleted. Finally, we adopted the duration of learning, assignment submission rate, and attendance rate as the feature data.

The dataset was collected from Chinese University MOOC, Shaanxi Xueqian Normal University, the course is Basis of Computer Application, 2021. The sample size is 118 students.

c. Evaluation

Accuracy, Precision and Recall were used as the evaluation criterion.

$$A = \frac{TP + TN}{TP + FN + FP + TN} \quad (12)$$

$$P = \frac{TP}{TP + FP} \quad (13)$$

$$R = \frac{TP}{TP + FN} \quad (14)$$

Where A represents Accuracy, P represents Precision, and R represents Recall; TP is True Positive, the number of samples that are correctly predicted as positive; TN is True Negative, the number of samples that are correctly predicted as Negative; FP is False Positive, the number of samples that are incorrectly predicted as positive; FN is False Negative, the number of samples that are incorrectly predicted into negative ones

5. Experiment and Result Analysis

Bagging SVM is introduced into student academic failure predictive model to overcome the shortcomings of SVM (Tao et al., 2006).

a. Bagging SVM Theory

The number of failing students in a class is usually a small proportion, so we bag the negative samples (passed students) generated by the classification of SVM into T subsamples, train each subsample with positive samples. The negative subsample with the largest value of normalized distances from the positive sample is the optimal one, then we obtain the optimal SVM classifier model. The core algorithm of bagging SVM is as follows:

Input: positive sample \mathbf{S}^+ , Number of positive samples N^+ , negative samples \mathbf{S}^- , Number of negative samples N^- , Classifier $I(SVM)$, Integer T .

for $i = 1$ to T
{

$$\begin{aligned}
 & \mathbf{S}_i^- = \text{subset}(\mathbf{S}^-), |\mathbf{S}_i^-| = |\mathbf{S}_i^+| \\
 & C_i = I(\mathbf{S}_i^-, \mathbf{S}_i^+) \\
 & \text{Max}_i = \left| \max \left(f(\bar{\mathbf{x}}_p, \bar{\mathbf{x}}_q) \right) \right| \\
 & \bar{\mathbf{x}}_p \in \mathbf{S}^+, \bar{\mathbf{x}}_q \in \mathbf{S}_i^-, p, q = 1, 2, \dots, N^+ \\
 & \text{Sum}_i = \sum_{p=1}^{N^+} \frac{f(\bar{\mathbf{x}}_p)}{\text{Max}_i}, \bar{\mathbf{X}}_p \in \mathbf{S}^+ \\
 & \} \\
 & C^*(\bar{\mathbf{x}}) = C_j(\bar{\mathbf{x}}, \mathbf{S}_i^-, \mathbf{S}^+), j \text{ satisfied } \text{Sum}_j = \max(\text{Sum}_i |_{i=1,2,\dots,T}); \\
 & \text{Output: Classifier } C^*.
 \end{aligned}$$

b. Analysis of Experimental Results

To verify the performance of the proposed student failure predictive model. In step 1, we have 5,552 pieces of raw data from the background of Chinese University MOOC, Shaanxi Xueqian Normal University, the course is *Basis of Computer Application, 2021*. The class size is 118 students. After preprocessing the raw data with cleaning, transformation, and normalization. We finally obtained 4981 pieces of behavioral data.

We used 60% of the processed data as the training data and the remaining 40% as the testing data. We consider the performance as either passed or failed based in the final exam and set the predicted results into two class data and code them as Table 1.

Table 1. *Predictive Result and Coding*

Predictive results	Classification samples	Coding
Failed	Positive sample	0
Passed	Negative sample	1

In step 4, marked the first 30% of the outcome from the preliminary SVM classification as positive samples, and the rest were all considered as negative samples, set *T* to 5.

MATLAB was used to simulate the proposed model. The results are shown in Table 2 compared with other models (Zhao et al., 2021).

Table 2. *Comparison of Experimental Results*

Predictive Model	Accuracy	Precision	Recall
DT	0.826	0.809	0.768
NB	0.838	0.882	0.711
ANN	0.889	0.858	0.883
SVM	0.871	0.887	0.797
Bagging SVM	0.910	0.885	0.886

Experimental data shows that the SVM classifier performs well in a binary classification environment. For the proposed predictive classifier model based on the bagging SVM algorithm, although its precision is not the highest, its accuracy and recall reached 0.911 and 0.886 respectively, which proves that this model outperforms several other machine learning prediction models.

6. Conclusion

Although SVM performs well on the classification of small samples, when the number of positive samples is too small and the number of negative samples is relatively too large, the classification hyperplane will shift, affecting the accuracy of classification. In this paper, we proposed a predictive model of the academic failure of college students based on bagging SVM and behavioural data. Experimental results show the effectiveness of the proposed predictive model. In our future work, we will focus on the academic performance prediction of large samples and multi-classification problems.

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Diagnosis of Gastric Cancer Using Machine Learning Techniques: A Survey

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Abstract: Research on cancer historically focused on the medical and the biological aspects. Data-driven computational work has, in recent years, become a popular approach. Researchers have successfully applied data analysis in the medical field, and new areas of research are being explored in order to further advance clinical and biological studies. The vast quantity of information available in hospitals can be mined to benefit the healthcare industry. For gastric cancer, the five-year survival rate is generally from 5-25%, but for Early Gastric Cancer (EGC) it can be reduced up to 90%. EGC diagnosis is crucial to increase survival and reduce pre-cancerous injuries. Endoscopy is typically used for examining gastric cancer. It is critical to know what issues are being addressed in medicine and how much and what kinds of training data are available. Medical data mining is extremely important as it can develop a range of applications in the booming healthcare sector. Among the cancers, stomach cancer is a deadly disease. It is a complex task for doctors to assess its threat to patients, as it requires years of medical practice and rigorous testing. In healthcare informatics, diagnosis prediction is the process of predicting the future health state of patients based on their history electronic health records (EHR). It is an essential but complex topic in the field of healthcare informatics. This research examines and compares the different types of cancers like heart disease, breast cancer, cervical, and stomach cancer. The primary focus of this paper is to investigate the early detection of stomach cancer, which can help to reduce the mortality rate of patients. Furthermore, the advantages and disadvantages of data mining in the healthcare industry are examined, as possible future paths in this subject. Finally, even though data mining has several applications in the healthcare field, particularly in diagnosing cancer; medical data mining is still in its infancy and requires further research.

Keywords: Data mining (DM), Machine Learning (ML), Stomach Cancer (SC), Early Gastric Cancer (EGC), Database Technology (DT), Gastric Cancer (GC)

1. Introduction

Medical practitioners have not understood many dimensions of the data produced by medical care. The primary purpose of this data produced by medical care professionals is to the efficiency of medical techniques could increase to a higher level (Abdel-Zaher & Eldeib, 2016). Medical care facilities such as hospitals produce a vast amount of redundant and low-quality data containing missing values and attributes. The assessment of redundant data, which is usually large, is a task in itself. With extensive data, the techniques and tools used to tackle this issue are almost impossible to use. It is practically extremely challenging to assess or examine it (Assari et al., 2017), despite significant advancements and advances in healthcare services that provide a more extensive and effective diagnosis in the sphere of cancer (Assari et al., 2017) (Assari et al., 2017) (Mahmood et al., 2020) (Hasan et al., 2019). Several factors are associated with it, affecting this form of cancer. Excessive eating and drinking are some of the most critical factors in cancer diagnosis. Alcoholic beverages and other forms of drinking and consuming a high amount of salty foods are some of the most harmful causes (GC). Smoking also increases the risk of occurrence of (GC) (Bertuccio et al., 2019). There have been 1,688,780 additional cancer cases are found in the United States; there will be 600,920 cancer deaths in 2021. Between 1991 and 2014, about 4,630 new cases were identified, with an average of 1,650 patient fatalities each day (Smith et al., 2021). The fifth leading cause of stomach cancer in hospitals, as reported by the and the second leading cause of death. Approximately 28,000 instances of stomach cancer were reported in 2019 (17,750 are male and 10,250 are female). Cancer has claimed the lives of approximately 10,960

people (6,720 males, 4240 women)(Jamil, 2022).

The following is a list of the key contributions of our work:

- Highlighting the importance of data mining in the healthcare sector.
- Classifying data mining's contributions to the health care industry.
- Putting the services into action by reviewing some examples of work completed in each area.
- Observing the obstacles and prospects in medical data mining.

This paper is divided into seven sections, which include the recent introduction. Section 2 proceeded by the state-of-the art. Section 3 literature review related to different types of cancer. Section 4 nature of cancer & its impact associated with stomach cancer is mentioned. Section 5 includes the phases of how (DM) is used in the healthcare industry. Section 6 some research discussion and their finding is discussed, finally the conclusions.

2. State of Art

This section offers a general overview of data mining, which is linked up with a specific research area, to understand depth knowledge of the (DM) in the healthcare sector and the significance of this paper. This research includes the integration of decision support (DSS), clinical decision support systems (CDSS), and knowledge discovery in databases (KDD), (DM) methodology and approaches, and their ties with the healthcare Industry.

2.1 Knowledge Discovery in Databases (KDD)

Over the years, there has been rapid growth in development, innovation in technology and process computerization in the healthcare sector. Many transactions are executed every day, leading to a massive amount of data being generated and collected. The massive amount of data needs to be transformed into meaningful and usable knowledge for the organization, contributing to more successful decision-making processes. Moreover, this immediate need to extract knowledge from the increasing digital data has contributed to modern technological theories and tools. The field is known as KDD. The initial step in the (KDD) process is to identify the source information that will be extracted can be the data sets variable subsets to vast amounts of data(Silwattananusarn & Tuamsuk, 2012)(Fayyad et al., 1996). Improved data quality is critical for better outcomes, ensuring higher quality in discovered patterns. It is the most critical phase of the KDD process model. The knowledge discovery process model used in this study's entire development is Cross-Industry Standard Process for Data Mining, commonly known as (CRISP-DM). Six critical steps are included in this approach. DM is implemented after the correspondence steps have been completed. The Weka (ML) tool software was used to evaluate and understand the provided data from an organization, to develop it for the (ML) algorithms and their implementation for (DM) tasks.

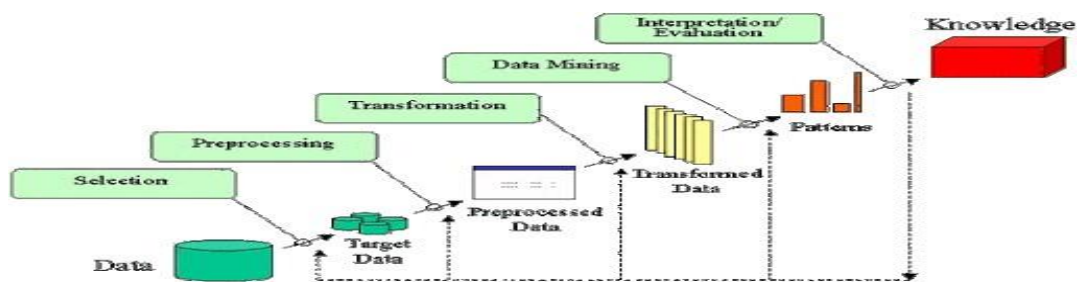


Figure 1. The KDD process phase (Karahoca, 2012)

2.2 Data Mining

In the modern era, massive amounts of data from many businesses are handled regularly in the healthcare sector. Because of the large number of transactions that take place every day, healthcare data has grown at a phenomenal rate over the years. The healthcare sector is producing a large amount of data, but to extract the valuable information from it, (DM) has been used to make the raw data useful[9]. With every technique and technology, there are some pros and cons associated. Healthcare data is not easily accessible. Because medical data is dispersed across many systems, it must be collected and consolidated prior to the DM process. Furthermore, if data privacy is compromised, ethical and legal difficulties may develop if the hospital is not promised(Fayyad et al., 1996). Similar is the case with (DM) techniques as well. DM uses (ML) algorithms to use statistical and computational processes on data to systematically find highly relevant information lucrative information from data in a way that the users can understand. It is responsible for finding patterns and relationships in massive amounts of data collected from multiple resources. It also has different forms to illustrate the data, such as trees, graphs, equations or relationships(Fayyad et al., 1996).

2.3 Decision Support Systems (DSS) & Clinical Decision Support Systems (CDSS)

A decision support system (DSS) is a computer-based system application used to sort out problems at any decision-making stage. This framework can handle and screen all periods of emotional cycle settled on or done by the choice marker. On the other hand, these systems want valuable information that can be accumulated from DM techniques to support the decision-making process. This means, as mentioned above, to examine and explore the data these (DM) techniques are used; its main objective is to find patterns that could be useful for the decision-making process(Fayyad et al., 1996). Decision support systems (DSS) are integrated with healthcare organizations widely recognized as Clinical Decision Support Systems (CDSS). It will help the healthcare professional to make decisions that are more effective. These systems were primarily intended to facilitate medical practitioners' medical decision-making process. First, CDSS would notify health care providers regarding difficulties or inconsistencies that arise during the phase and remind them of specific actions that need to be carried out. In addition, the CDSS system also provides the right direction to healthcare professionals to achieve their goals, the primary purpose for this recommendation or suggestion to provide the best medical care with this would decline the possibility for unfortunate events(Fayyad et al., 1996).

2.4 Data Mining Techniques

The proposed framework initiated for implementing the (DM) project is the CRISP-DM framework. DM processes have many powerful tools to facilitate sound decision-making processes, especially in healthcare, and make healthcare services more effective, especially the services given to the patients. Consequently, in order to have a better understanding of these tools. In the modelling phase, Waikato Environment for Knowledge Analysis (WEKA), an ML tool, is used to examine the data available and gathered from different sources to develop the objective models (Couto, 2019). A cancer predicting support system allows and lets doctors make accurate, and appropriate decisions while reducing the overall cost for the treatment. For conducting the experiments, we used different classifiers. The Decision Table, IBK and LR classifiers were found to be the most predictive variables with the great accuracy of classification. Several models apply to the process of data mining. **Table 1** presents a summary of these models.

Table1. *Drawback and Benefits of Data Mining Techniques*

	Benefit	Drawback
Naïve Bayes	This technique and algorithm is generally used to deal with huge, complex datasets.	Whenever factors are interdependent, accuracy is poor.

Decision Tree	In a situation where we are dealing with condition that are numerous this method helps to visualize the outcome of the situation.	These decisions show an extraordinary level of vulnerability: the important data to settle on a logical choice, reasonable or ideal, are either excessively not many or of such a large number.
IBK	This algorithm only learns from the training datasets at the time of making predictions in real time. It does not need any prior time to learn and hence is faster than other algorithms	As the quality and length of dataset are important factors for accuracy, to store such large datasets, high memory is required.
Random Forest	To take care of the problem of overfitting in decision tree, Random Forest algorithm is used as it makes subsets of data and combines them all in the end reducing its variance and increasing its accuracy.	Large datasets are difficult to use for Random forest models, as it requires large memory. Hence, the type of dataset is an issue for this algorithm.

2.5 Data Mining Approach

There are two most common (DM) tools named WEKA and ORANGE. They are used to find important risk factors associated with the patient prior to surgery. ORANGE is a (DM) and (ML) toolkit, it is used for visual programming for data visualization, and the toolkit is used in Probability Tests such as χ^2 -Test, etc. WEKA is mainly used for algorithm-based analysis. It is also utilized to find the correlation between the variables using the Apriori algorithm(Witten et al., 2017).

3 Literature Review

In(Kirshners et al., 2012)terms of implementing DM techniques in the healthcare industry, it is associated with different cancer domains. Nowadays, the data are enormous in the medical field regarding the symptoms found in patients with various kinds of cancer diseases like heart, cervical, breast, and stomach. Innovative ideas for decision-making benefits in various fields finance, marketing, manufacturing, cultural area, healthcare and so forth are produced by continuously changing inventions. Decision Support Systems (DSS) and Clinical Decision Support Systems (CDSS) in industrialized nations are widely used in medicine and deliver beneficial results. In(Kirshners et al., 2012), the four (ML)algorithms were used to identify patients serving with (GC). Their study aims to identify patterns with the use or some modifications of (ML) algorithms, to determine gastrointestinal disorders symptoms and explore factors by the use of machine algorithms to predict stomach disorders.

The study shows that 95% better performance in the data set is accomplished through an algorithm. Studies(Abdel-Zaher & Eldeib, 2016)(Mahmood et al., 2020)[1][5],show that the hybrid Deep Belief Network and Backpropagation Neural networks have classified the cancer cells with 100% sensitivity and 99.66% general precision. Their study(Kalantari et al., 2018)is likewise affected by the work used to assess clinical data using a mixture of (ML)algorithms. Next, new computational architectures have been introduced to discover issues with the previous architectures used. In this study(Shrivastava & Tomar, 2016), the author's main objective is to address some hybrid approaches, mainly (DM)techniques. In this study(Wu & Zhou, 2017), the author explains that cervical cancer has not been diagnosed early and is the fourth most frequent cancer, also becoming the reason for death among women. Moreover, the author applies techniques to foresee and determine the stomach disease in prior stages. It helps to ease the prediction and decision-making process. The purpose of data mining in clinical decision-making is to discover patterns and correlations in the features of the clinical context

and to predict the result to assist doctors in making choices. Accordingly, this research aims to assess various data-mining methodologies employed in real-time clinical decision-making.

4. Impact of Cancer and Its Nature

Before implementing the application, make some classification, background check, grouping and impact of cancer. It is a disease caused by the growth of such cells, which can be called the unusual growth of cells in the body. It is a type of tumour that its shape can distinguish, size, pattern of growth, kind of tumour, and location(Onasanya & Elshakankiri, 2019)(Slansky & Spellman, 2019)(Slansky & Spellman, 2019). We can categorize tumours into three types: malignant, premalignant, and benign. Benign tumors are tumours that do not pose any health alarm (i.e., it does not cause an invasion, which means there is no movement of cancer cells to noncancerous tissues, and cancer does not expend such other body parts are not affected). The second type, premalignant tumour, is still considered non-cancerous. However, cancer properties have been shown to grow and turn into tumors. This tumor wants close surveillance of the patient. Eventually, malignant tumors are most affecting the body of a human. Malignant tumor, the tumors cells multiply at a breakneck pace and spread over different parts of the body, resulting in metastases in other organs and parts of the body(Islam et al., 2019)[26]. Moreover, many various therapies, including surgery, radiation therapy, and immunotherapy, were used because of the exceptionally complex nature of cancer. Physicians often do patient surgeries to stop tumors from further spreading in the human body. Chemotherapy is a systematic diagnosis for hormone-related tumors by way of therapeutic regimes(Iqbal & Islam, 2019).

4.1 Application of Data Mining Approaches in Cancer Field

The healthcare and medical associated (DM) field can be considered one of the most demanding and helpful applications, discovering knowledge (KDD). The issue arises from its data sets, including its veracity, variety, volume, value, and velocity. In addition, the data set of the medical records is stored in different locations and distributed; therefore, integrating data from various sources is a challenging task for data miners. Moreover, another issue faced by the data-miner is legal, social and political problems because of using extremely sensible data. The data analysts do not know the domain, so cooperation between the expert and the data-miners requires cooperation(Cios et al., 2019). We have different (DM) techniques, mainly used to identify the medical field domain. The most challenging issue faced by persons is as follows. While discussing with different people, the word (DM) has another meaning. However, vast amounts of data for predicting futuristic occurrences are analyzed to explain correctly.

Datamining is playing a vital role present in the health industry as it has proven to improve the efficiency of the health industry. (DM) brings forth several issues that can be related to actual events now. Mainly meaningful information is gained by transforming raw data through (DM) methods(Smith et al., 2021). Some question insufficiency (DM) in acquiescence with all traditional statistical requirements(Kumari & Singh, 2018). For example, the same sample of testing and training is used in many data extraction tools. In traditional mathematics, the sample sets cannot be truly autonomous in this situation. Thus, the tests are skewed (Kumari & Singh, 2018). (DM) may remain an essential medical resource, given this criticism. (DM) can be used to better understand the disorder and generate knowledge that can be explored in many medical fields by finding similarities in large amounts of data (Kumari & Singh, 2018). The statistical accuracy of included models is proof of data mining's significance in the medical and healthcare field.

4.2 Data Heterogeneity

Data sets related to healthcare and medical hold dissimilarity among it is data-type and are often prominent in volume. Clinical data are collected from various sources, like images, patient interviews, physician notes and explanations. The doctor identifies and guesses the best treatment for a patient. All these factors are essential for the (DM) scholars. Physicians use free-of-text data, which is usually in amorphous form and other clinical data and images, which hinder normalization and processing of the

software. Compared with the other science branches, an explicit medical data set is not described well mathematically. There is no formal structure for medical and healthcare data. Hence, the research sequences the information gathering in an organized way(Cios et al., 2019)(Perović, 2015).

4.3 Social and Moral Issues

Since the data which has been being used for the mining of medical and healthcare data is related to humans, it may have issues relative to it, like social issues or even legal and ethical issues might be concerned. Protection of data related to the patient and their respective information that might be considered sensitive information should be handled with care. The range of medical data and knowledge related to humans which is available for (DM)is very vast. Data ownership can easily hinder the attempts to acquire the necessary data. It can prove to be severe issues in the sense of possession of patients' data, including ongoing court investigations and hearings. The privacy of the patient and the security of the data concerns are also unique aspects of medical data for data mining. A patient's confidentiality can be violated, and legal action may be taken against him or her. The patient data is very accessible to the physician and requires no publishing of such data. Data security is a significant issue while transferring data to another server (Perović, 2015).

4.4 Operational Challenges

A cancer predicting support system allows and lets doctors to make accurate and appropriate decisions while reducing the overall cost for the treatment. For conducting the experiments, we used different classifiers(Kumari & Singh, 2018).A reliable model is needed to predict the probability of heart disease with so many risk factors associated with them. It is not a diagnosis in the early stages. This may lead to death. The stage of this disease is crucial for the heart, and the timely diagnosis can save many patients at the right time(Kumari & Singh, 2018). In many medical applications, (ML) algorithms have always played a significant part in classifying squamous cells (cervical cancer cells) for it is timely detection(Shetty & Shah, 2018). Today's era (ML) has become the most reliable and quickly expanding area for clinical record diagnostics. The different (ML) algorithms, data sets, functions, and correctness are referenced. It keeps an eye on the procedure of correlation. Moreover, it is essential to predict cervical cancer depth by different (ML) algorithms (Shetty & Shah, 2018). For the last ten years, the doctors could not tell all the patients to have cancer disease shortly. Most patients do not know how many abnormalities they have in their stomach and when it is. Doctors do not take any decision from the patient's database. They decided based on their experience and skills rather than on the rich data that can be hidden. This practice persuades the mistakes, unwanted prejudices and high clinical costs that influence the quality of services offered to the patient. Combining the patient's database and clinical decision support (CDSS) may lead to intelligent decision-making. (DM)is a great approach to make sound medical decisions and save many lives(Goshayeshi et al., 2017)(Esmailzadeh et al., 2021).

4.5 Limitations of Data Mining

Although (DM) gives valuable information and support to hospital staff, the identification of patterns that may be hidden, the (DM) capabilities are still restricted. Interestingly, from (DM) technique, you cannot find all the hidden patterns. There should be a logical and convenient approach to making an interesting pattern. (DM) for any manual intervention to get the advantage from the knowledge extracted. Data mining, for instance, could help in the diagnosis prescribe the intuition and expertise of the physician(Organization & others, 2017)(Casamayor et al., 2018).

5. Research Discussion

DM is now a top area in the medical research field. The "process of finding hidden patterns from the dataset or in the database," now a prominent area of medical research, is identifying different health issues. By discovering effective cures and remedies, knowledge obtained from information (DM) methods can help treat lethal illnesses. Predictive models created with the help of algorithms for (DM) may accelerate the diagnosis process of various illness cancer diseases like breast, cervical, heart

attacks, stomach cancers etc. Researchers are actively experiments on different clinical datasets, to find the hidden information, which could be helpful in the prediction of disease diagnosis. This study is likewise affected by the work that it is utilized the medical datasets by use of mixed algorithms of (ML)(Kalantari et al., 2018). Next, new computational architectures have been introduced to discover issues with the previous architectures used. In their studies(Abdel-Zaher & Eldeib, 2016), they have shown that hybrid ((ML))models can also enhance sensitivity and standard precision. In the hybrid model of Deep Belief Network and Backpropagation, the cancer cells have been classified by Neural networks with 100% sensitivity and 99.66% general precision(Abdel-Zaher & Eldeib, 2016)(Sartakhti et al., 2012).

Earlier works several hybrid combinations of (ML) such as classification algorithms in which selection algorithms are used and error optimization algorithms to perform the hyper parameter tuning. While developing a predictive model, removing irrelevant information from the dataset is essential. As they not only negatively impact predictive model efficiency but also misguide algorithms (Sartakhti et al., 2012)(Ferlay et al., 2021)(Sung et al., 2021)(Balakrishnan et al., 2017). It is evident from **Table 2** that several works have been done in the past in order to get the (DM) technique and its uses in different types of cancer domain. Several types of research have been done by different authors in the different domains of cancer and apply DM techniques mainly such as KNN, Decision Tree, Naive Bayes, showing the best result associated with their accuracy as compared to various other techniques. Several works have been done on stomach cancer, and various kinds of different (DM) techniques apply to the dataset. Several new (ML) techniques, including Bayesian networks (BN), Support Vector Machines (SVM), Artificial Neural Network (ANN), Decision Trees (DT), and Random Forest (RF). Although machine-learning algorithms have been extensively used to treat stomach cancer and eventually delivered the high classifications. An appropriate level of validation is required in daily medical treatment and practice so that these methods can be taken into account.

Table 2. *Data Mining Techniques & Their Uses in Cancer Domain Chronological Order from 2015*

Type	Data Mining Algorithm	Authors
Breast Cancer	NeuralNetwork(NN),DBN, SVM, K-Nearest Neighbors, Multilayer perceptron, Decision Trees,RF,Logistic Regression, Adaptive boosting, Gradient Boosting, Decision Tree C4.5,Naïve Bayes, Classifications algorithms comparison of LR and RF	(Abdel-Zaher & Eldeib, 2016) (Turgut et al., 2018) (Pritom, et al., 2016) (R. Kannan et al.,2018) (Rajesh Jangade et al., 2018) (KaanUyar et., 2017)
	Random Forest, Decision Tree and Naïve Bayes	(H. Benjamin et al.,2018) (Noreen Akhtar, et al.,2018)
Heart Attack	Neural Network Naïve Bayes classifier and J48 decision tree, Principal Component Analysis, decision tree and SVM (CANFIS) coactive neurofuzzy inference system and GA. Hybrid DM model	(Dey, A et al.,2016) (Parthiban al.,2018) al.,2018)(Shrivastava a et al., 2016) (ZriqatIsraet al., 2016) (Assari R et al.,2017)
	Support Vector Machine technique was discovered to be attractive with a high accuracy in model	
Cervical Cancer	Support Vector Machine (SVM) with Genetic Algorithm (GA) algorithms	(Kalantari et al., 2017) (Wu and Zhou et al.,2017)
	Support Vector Machine with PCA Radial kernel support vector classifier (SVMRadial),Bayesian Optimization, and GB Machines Grid Optimization algorithm and Support Vector Machine (SVM)	(Nishio et al., 2018) (Zhao et al., 2018).
Stomach Cancer	DecsionTree(DT), Genetic Algorithm (GA), Artificial Neural Network (ANN),naive Bayes algorithms Apriori, CN2 Rules,C4.5 and	(LadanGoshayeshi et al., 2017) (Amirgaliyev Y et al., 2019)

Naive Bayes (NB)	(Hilal et al., 2017).
Logistic regression (LR),	(Mahmoodi et al.,2016) (Liu,
C5.0, Decision Tree (DT), multilayer perceptron	M et al.,2018) (Asghar
((ML)P),and tree augmented naive Bayesian network	Mortezaagholi et al., 2019)
Various algorithms such as support vector machine	
(SVM), decision tree (DT), naive Bayesian model,	
&k-nearest neighborhood (KNN), Logistic	
Regression	
Algorithm, Genetics	
Algorithm & MICE Algorithm, K-Nearest	
Neighbour, XGBoost and LightGBM	

Data-mining techniques are a more helpful framework. Although data mining is a valuable tool for guiding complicated situations, present technology limits its effectiveness. However, existing research do not include the association between human decision-making and information technology. Data-mining models in clinical workflows need to be investigated in more detail in future research (Kalantari et al., 2018).

5.1 Research Challenges

There are just two sectors that have made considerable use of this technology: marketing and manufacturing (ML). Increasingly, it is being used in the healthcare industry. Due to an increase in a recent study into the complications of ML, difficulties such as irrelevant qualities, uncertainty, computational difficulty, dynamic nature, and computational time are being examined more extensively. The ML approach has significant limitations when it comes to diagnosing GC. As the last point, the diagnosis of GC is riddled with difficulties. These may be the most difficult challenges to overcome even though it is still too early to develop universal standards for dealing with this difficulty. It is possible to focus on these themes; future scholars will consider the recommendations. Consequently, future academics will be able to investigate this topic further (Jamil et al., 2022). Identifying the essential risk factors, such as nutrition, that lead to GC development is the main gap in the study.

- What kind of interventions are being considered? We need to figure out how to help the things that cause GC (Jamil et al., 2022).

6. Conclusion

Medical evidence suggests that using (DM) and (ML) algorithms in the healthcare sector offer a reliable and efficient way of diagnosing deadly diseases like cancer. This study offered an overview of the research that has been done in the area of early cancer diagnosis using data mining methodologies. This paper mainly focused on examining and predicting four types of cancers: breast cancer, heart attack, cervical cancer, and stomach cancer. It compares the different (DM) techniques in the prediction of different types of cancers such as traditional statistical models (logistic regression, random forest, PCA, and grid optimization) and (ML) models (e.g. decision trees, ANNs, DBN, Back-propagation, K-NN, Naive Bayes, SVM, J48, C.5.0, Genetic algorithm).

The comparison showed that Classification algorithms performed better than Clustering algorithms. In Classification algorithms, SVM, Naive Bayesian and C5.0 showed better performance. The survey of several algorithms used in the area of diagnosis of stomach cancer showed that Classification algorithms performed better than all the other algorithms in terms of efficiency and accuracy. Data mining is a new information technology that profoundly impacts people's lives, communication, and education. The technology's goal is to make clinical decisions easier for doctors and increase patient safety. An increasing number of models have been used in the clinical domain to enhance patient safety and decision-making. Organizations and specialists in health care may use this survey to generate new ideas for how to get the most value out of their existing database systems.

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Exploration Perspective on Mobile Money Vulnerabilities in the Mobile Money Banking Ecosystem and How to Mitigate Them

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Abstract: The GSM platform's USSD structure has been shown to have deployment flaws in areas of the security threat posed to any application deployed on it. This provides a clear reason for industry players and users to consider such threats and how to improve and mitigate them. The threat considered for the study was raised as a result of a thorough investigation of all mobile money platforms used by telecoms in Ghana, specifically Airtel/Tigo, Vodaphone, and MTN. Lack of authentication, limited length of the PIN to numeric keys, and quick password resetting are the security challenges associated with the USSD mobile money service. The research solution created a mobile money application with an alphanumeric PIN increased to six from the current four, none reset password, and two-factor authentication (2FA). The outcome demonstrated and reduced the risk associated with mobile money services. It also increased users' trust in mobile banking. Finally, mitigate the current security threat posed by mobile money services.

Keywords: alphanumeric PIN, mobile money, two-factor authentication, password, unstructured supplementary service data, security threats

1. Introduction

The mobile money financial system is operational by the telecom which provides a wide range of financial services (Luna et al., 2019), such as merchant micropayments, person-to-person financial transfers, utility bill payments, checking bank accounts, and long-distance remittances (Baabdullah et al., 2019; Phuong et al., 2020; Tomic & Todorović, 2018). Mobile money banking solutions in Ghana has been around since 2009, today contribute significantly to the level of cash flows that exceed the country's total traditional financial transactions. The number of registered mobile money customers as of the end of 2021 stood at 48.3 million, with 17.9 million active mobile money accounts and a total mobile money transaction flow stood at 164.80 billion dollars (BOG, 2021).

The telcos' mode of operation as mobile money banking is through, unstructured supplementary services data (USSD) technology. It depends on the use of code incorporated in the shortcode, with the set of menus to be selected from, which is hosted with the asterisks (*) and ends with a hashtag (#). The USSD services application is termed to be more security inclined than the short message service (SMS) in its operations (Lakshmi et al., 2017; Nakibuuka et al., 2019; Weld et al., 2018). The USSD is a real-time session-based between mobile services and the operators' application servers, it does not store its operation occasion between users before forwarding. That makes the USSD technology much faster than SMS as an operation for mobile money banking, this is achieved as the USSD system depends on the signal available of the device and not the traffic that is engaged on those mobile services. This makes it efficient, reliable, and traffic-free transactions. However, the USSD service with mobile money is not without security threats, which is the focus of the study. The security threat of mobile money is very broad, the focus considered is on the operation of mobile money banking services in Ghana.

2. Literature

This section considers the network platform from the perspective of mobile money applications.

2.1 Security Threat to GSM Networks

This section considers the specific security challenges related to networks more directly to the wireless networks. There are two network systems used in mobile banking networks, this can be considered as those from the operator's side and users or client-side within both the wired and wireless networks.

Wireless networks are made up of four these are based on “the standards set by the Institute of Electrical and Electronics Engineers (IEEE) (Nasrallah et al., 2018). These standards work based on the speed attributed to the networks, "802.11, 802.11a, 802.11b, and 802.11g." (Carvalho et al., 2021). Both standards “802.11 and 802.11b operate within the same frequency of 2.4GHz with a maximum bandwidth of 2Mbps and 11 Mbps respectively” (Ilnitska, 2019). Certainly 802.11 and 802.11b, are the slowest in the network data transmission. Whereas 802.11g and 802.11a operate within the frequency of 2.4GHz and 5GHz respectively. However, it must be stated that the actual operational speeds are limited by the kind of user’s devices hock to the network. These have resulted in security weakness which includes, lack of secure boundaries, threats from vulnerable networks, scalability, and unavailability of centralized managed infrastructure. Figure 1 shows a pictorial of the challenges related to mobile networks.

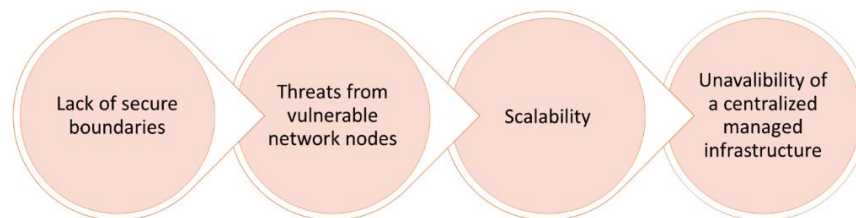


Figure 1. Security Challenges Related to Mobile Network

2.1.1 Lack of Secure Boundaries

Physical security concerns are increasingly prevalent in phone networks. It lacks strictly delineated secure limits which can be contrasted to the typical cable network’s obvious protective barrier. With the intrinsic structure of flexibility for users to move within the channel, wireless infrastructures are vulnerable to various vulnerabilities. In any of this networking, there is a higher risk of impersonating and "denial-of-service" (DoS). An attacker does not need a direct connection to explore the vulnerable network this comes on the backdrop that the network is not secured as it may have been precluded since there are many vulnerabilities in the mobile networks (Albladi & Weir, 2020; Nagaraj et al., 2019; Patnaik et al., 2021; Simbana et al., 2018).

2.1.2 Threats from Vulnerable Network Nodes

Networks remain flexible to accept and get connected to, it has never had any prescribed measure to deny any potential intrusion attempts to whom it gets connected due to the heterogeneity of various networks. Even though the attacked node might continuously manoeuvre its attacking behaviour, it is mostly extremely challenging to detect especially in such a huge network environment (King et al., 2020; Zhou et al., 2018). The lack of established dependable parameters in mobile nodes, and multiple network exploitation influence such vulnerabilities (Condoluci & Mahmoodi, 2018). Such network vulnerabilities focus mostly on a system that links the networks and attempts to destroy them through unethical infiltrated networks (Dewal et al., 2018; Khattak et al., 2019; Nagara et al., 2019).

2.1.3 Scalability

Due to the obvious dynamic topology in the wireless environment, it is difficult to anticipate the number of endpoints, the system will be connected to in the network, as a result, packet filtering and access

control services must be fully attachable to a constantly evolving spectrum for other network setups (Bianco et al., 2017; Guidotti et al., 2020).

2.1.4 Unavailability of Centralized Managed Infrastructure

Though wireless systems are highly flexible, set up over the years there are no single centralised networks controlling the mechanism that can identify intrusions and monitor inbound and outbound traffic. Unusual occurrences such as network damage, missing data, and communication delays, are becoming regular common within mobile networks. This has resulted in a situation in which network users have a lack of trust for other members of the network ecology.

2.2 Mobile Money Service and Associated Threat in Ghana

The telecoms mode of operation as the mobile money banking service is through unstructured supplementary services data (USSD) technology. This service is simple and does not require an Internet connection between end-users. This also depends on the code incorporated in the shortcode, with the set of menus to be selected from, which is hosted with the asterisks (*) and ends with a hashtag (#).

The mobile money operators must register their clients; mobile money registration requires the user's identification acceptable by law, thus; voters' identification, Ghana card, and passport. The users could use their existing SIM number for mobile money registration or opt for a new number. They also require some money deposited into the account during the registration period. Most telecoms have a bank as their subsidiary agent, where funds accrued are deposited since they are not allowed by law to keep financial transactions.

The mobile money user uses their phone as a Mobile Station (MS) to the telecoms to send a shortcode to the Base Station Transceiver (BST), this then forward the message to the Message Switch Centre (MSC), the message is then forwarded through a protocol, the short message peer to peer -SMPP (Bhattacharjee et al., 2021; Donald & Favour, 2021; Lalitha et al., 2020). The Gateway interprets the USSD shortcode sent through the mobile station and then forwards it to the workable USSD application server. The response is then sent to the user through the Mobile Application Part (MAP) using Signal System Number 7(SS7).

From Figure 2 a client keyed the registered USSD code (*384*26678#) to initiate communication with a USSD application that runs on a mobile network thus, home location registry-HLR and visitor location registry-VLR, mobile switching centre- MSC and others. The 3GPP TS 22.090 specifies a particular man-machine-interface (MMI) string that a user's mobile phone dials to activate USSD utilities.

According to Kelly and Sellappan (2019), threats in mobile banking could be attributed to the kind of software being used for that service. Numerous factors could be implored to make security strong and friendly in mobile money services to seal the trust of users in the financial transaction (Agbezouts et al., 2021; Ali et al., 2020; Danquah & Kester, 2019; Lakshmi et al., 2017; Pinem, 2020). The specific threats associated with mobile money found in the exploration stage are, non-masking of PIN, authentication, length of PIN, and password reset.

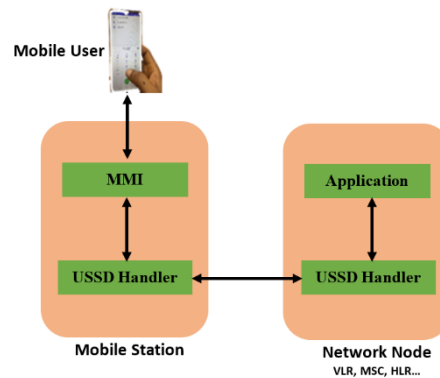


Figure 2. USSD Signalling Pathways in a Network Architecture

2.2.1 Non-Masking of PIN

The user's PIN is meant to secure and protect the system on which that password is been used. There are several attributes to making a password secure, however, how it has been used also could lead to the vulnerability of the PIN. Anyone close to a mobile money user at a particular moment can shoulder surfing to see the PIN of the user, without any social engineering or hacking to get such valuable information from the mobile money user (Delahaye, 2019). Figure 3 is a typical user PIN being entered, the users' PIN which is meant to be secret has been exposed to their immediate environment.

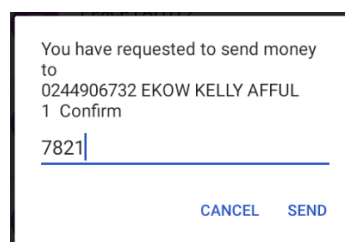


Figure 3. Unmasked User's PIN

2.2.2 Lack of Authentication

This is a security measure adopted to ensure the protection of the user on the system in which they are been served or used. It ensures that it is the person who claims to be the owner of the information they claim to be. This is lacking in the current mobile money services provided now in Ghana. There are some authentication tools available which are appropriate for USSD applications, such as; single, two-factor and multi-factor authentication (Nath & Mondal, 2016).

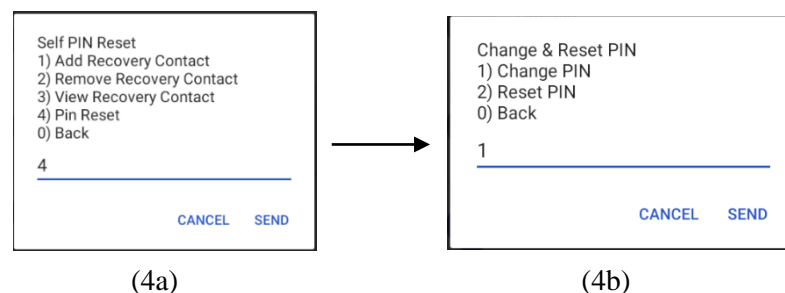


Figure 4. (4a) Request to Change PIN and (4b) Change of PIN

In the process where the user is requesting to change their PIN, the request is initiated as shown in Figure 4a, the user requests a change of PIN to their account which is allowed in Figure 4b, without any

authentication. The user gets any transaction into their account they are notified. It therefore important for the user to get a notification in terms of two-factor authentication when they're such major changes to the change of PIN have taken place.

2.2.3 Limited Length of PIN

The number of characters used as PIN authentication general determines the strength of that PIN. Mobile money services as operated in Ghana, by the telecoms PINs are limited to four (4) characters. This makes it easier for anyone mindful of getting access to another user (Delahaye, 2019). Figure 5 shows the typical length of PIN used by mobile money users.

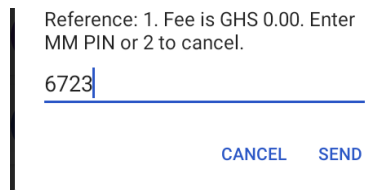


Figure 5. Setup Length of PIN

2.2.4 Password Reset

When one failed to get their password right on the three conservative times the system blocks the user's account. However, when a user fails the attempt to login on the second attempt and waits for five (5) to ten (10) minutes, the password count is reset to the default. This means the user can try two times again and wait for another three periods to try again. If the user did not try continuously three times, their account will not get blocked, but the system simply reset the password. The password reset loophole in the system should be resolved. The research outcome of Makanyeza (2017) and Sampaio et al. (2017) provide evidence that users believe that whatever it takes to make the system secure they are all for it. Even though it will come with some inconvenience to the user, the primary focus is the security of their data and money they are ready to adapt to that effect.

3. Methodology

The research explored the USSD mobile money application used in Ghana, and the outcome of that exploration reveals the following threat, non-masking of PIN, length of PIN, password reset, and lack of authentication. These challenges were shared with experts in the mobile money industry, they also affirmed the threat. The literature review was done to see the scale of the challenge to the mobile money service. According to the literature, some efforts have been made to mitigate the threat. However, there has been little practical implementation to reduce the threat. As a result, a software application was developed with associated tools created to deal with the threats.

3.1 Application Tools

The operational tools used for development began with the developers creating a local host server to reveal the codes to the internet and simulation platforms with AfricaTalk. The Apache HTTP Server was chosen as the internal server host for the study. the study also used ngrok, which helps to tunnel the webserver's service (Apache). For the webserver and ngrok to not be delayed in the type of service it is providing, it was supported with a Callback or webhook, which serves as stationery to where the webserver and external host can easily and continuously fetch its data for use as and when it is required.

4. The Proposed Solution to Mobile Money Threat with Simulated Outcomes

The research developed a mobile money application with the related explored security threats solutions provided. The application works exactly like the existing mobile money application. However, in this current application, the research improved on the associated threats that are known with mobile money services. The setting up of the mobile money application menu depends on the institution from which the services have been sourced. The following are some application menu selections from the current study. This was set primarily to ensure that the application simulates the real application of the mobile menu service accurately.

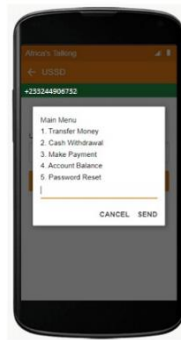


Figure 6. Application Menu

The menu allows the user to select a specific transaction that they want to undertake. The prefix numbers are what the user will have to select to follow the steps after that. In Figure 6, the user is limited to carrying the following transaction, thus, transferring money, cash withdrawal, making payment, checking account balance, and password reset. The research now looks at the specific solution proposed to reduce the threat associated with mobile money. The proposed solutions included increasing the length of users' PIN with alphanumeric, two-factor authentication, and non-reset of passwords.

4.1 Increased Length of PIN with Alphanumeric

The study revealed that the length of user PIN could be increased. The current size of the PIN stack was set to four for convenience and user-friendliness, with little thought given to the threat such a length could pose to financial transactions involving mobile money banking.

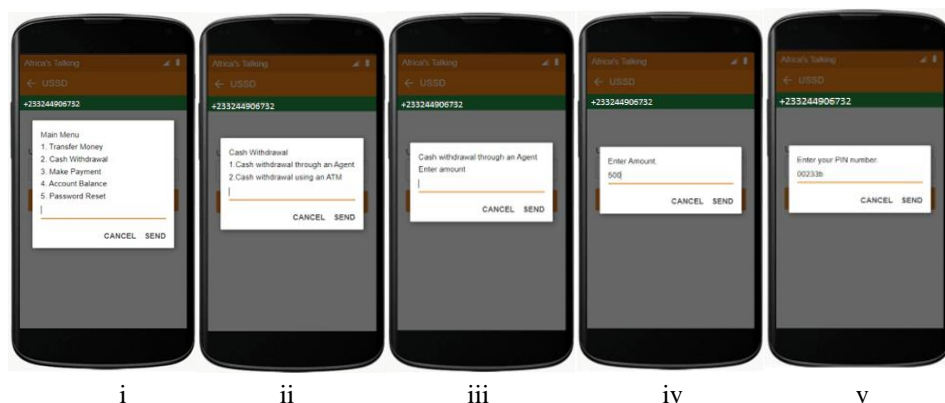


Figure 7. Alphanumeric with Increased length of PIN

This resulted in users not making any conscious effort to create PINs that were difficult to guess. In any case, given the length of available keys, users simply used any patterns that were as convenient to them, such as the last four digits of their current phone number or their year of birth. As a result, the research implementation to increase the length of the PIN key was successful as shown in Figure 7. This was increased to six characters on the basis that if a user loses or misplaces their phone, they will have a

much greater window of opportunity to report to the appropriate telecom operator to protect their account. The latter will then block access to the phone to be used by the default new owner. As a result, it is a win-win solution for telecoms and users. Figure 7, starting from (i to v) the user initiates the process of cash withdrawal, which included the user entering their PIN. In this, instance, the proposed new PIN was used with an alphanumeric PIN for the cash withdrawal transaction process.

4.2 Two-Factor Authentication (2FA)

The application's outcome is to ensure that the USSD mobile money application is secured by enforcing 2FA. Which allows the application to send a one-time password (OTP) to the user's given number or email, depending on which service they opted for. In this study, the researchers were limited to using users' emails rather than phone numbers. This was because performing such extra checks necessitates implementing other services including getting an API from the telcos. Since the study could not get access to the telecom's platforms, the study was limited to adopting the OTP notification using email services.

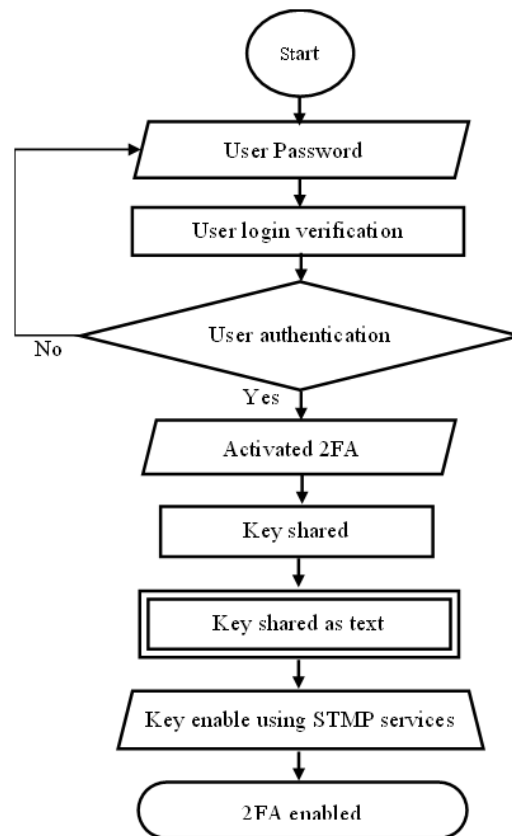


Figure 8. 2FA Process Initiated

In a real-time service, when the user requests a change of PIN or failed login, the system will activate the 2FA. First, for a failed login, the application sends an email to the user with the security code in the form of an OTP, here the user then enters this OTP then activates the user's account to the application. Secondly, for the change of PIN in other for the system to be sure it is dealing with the right owner of the service at that moment, the 2FA is activated, which then allows the user to change their PIN.

The OTP sent to the user for transaction validation is entered, and if it matches what was sent to the user within a specific time frame, the user is now permitted to proceed with the transaction process. When a user enters the OTP data incorrectly, the application denies the user the current services requested. Figure 8 demonstrates the logic process as initiated by the system from the user based on the

kind of transaction requested. Figure 9, shows the application interface for the OTP, this is supposed to be done within two minutes.

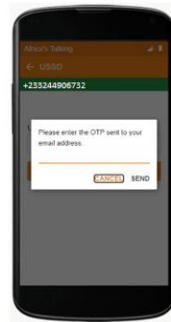


Figure 9. An OTP User Interface

4.3 Non-Reset of Password

In the study application solution, the system simply does not allow password reset. This means that if a user enters a password and is not accepted, their chances of entry are limited to two (2) from three (3) based on the number of attempts set for the application. This means that if the user attempts to enter the next incorrect password, their chances of success decrease even further. The system outcome of the password non-reset is shown in Figure 10.

Bank	Account	Name	Phone	Balance	Pin	Retry Chances	Actions
Madina	ACC023423424	Sedem Quame Amekpewu	0546744163	GHS 1500.00	*****	2	<button>Restore</button> <button>Delete</button>
Accra	ACC023423427	Kelly Aftull	0244906732	GHS 18500.00	*****	3	<button>Restore</button> <button>Delete</button>

Figure 10. Non-Reset of Password

5. Utility Payment using Mobile Money Application Developed

The application allows users to make some utility payments. This payment ranges from water bills to electricity and TV services payments. This is incorporated to give a clear picture of what the application could also do. The scenario given allows a user to make payment for an Electricity Company of Ghana (ECG). Figure 11, demonstrate the process of utility payment starting from i to vi, the user could use to carry out such utility transactions with their alphanumeric PIN and OTP.



Figure 11. Application Interfaces for Utility Payment

6. Discussion and Conclusion

The conclusion was based on the software development created for this study. The advancement was based on the exploration and the period of literature review. These were focused on PIN masking, two-factor authentication (2FA), PIN length, PIN combination of alphabet and numeric keys, and password counter reset. The results show that, aside from PIN masking, all of the other security threats associated mobile money were met in the development of the USSD mobile application for the study. The reason for not meeting the masking of PIN was that the USSD platform was limited to masking calls and functionality.

In the current mobile money application by the telcos, the standard PIN length was four numeric characters. The indication was that the length of the PIN was too simple to get around within an hour with a simple computerised system (Delahaye, 2019). According to the findings, it is possible to lengthen the PIN using the USSD application. However, this was never encouraged in the type of USSD application used by Ghana's telecoms industry players. Another security risk is the use of only numeric numbers as the base for the USSD mobile money PIN rather than alphanumeric. The use of numeric was more convenient for users, however exposing users to a much security risk. The implementation of an alphanumeric and increased length of PIN to six was to address that threat associated with the limited numeric PIN of four. The solution is determined to be the next phase of security for mobile money services in Ghana. Another security threat is reset of passwords, the solution provide was non-reset of password. The significance of non-reset password is to protect the user's handset and all its contents, including their mobile money details, it also gives the user enough time to report to appropriate authorities for assistance when they have issues with the security of their PIN. Also, the implementation of 2FA enhances the security of mobile money services for users by protecting them in the event that their handsets fall into the hands of a fraudulent persons'.

According to the research findings, the development of the USSD platform still requires some consideration with stakeholders. The use of USSD platform as a mobile money service in financial transactions is a game-changer, but the challenge of security oversight must also be addressed as a matter of urgency. There are some functions that USSD platform does not permit developers to perform, thus, PIN masking. There is still clear evidence of a lack of collaboration between software developers and industry players in the areas of advancing the use of USSD mobile money with telecommunications companies.

In a nutshell, the research outcome will help the industry players to strengthen the current security challenges they faced with and improve the relationship and trust between users and telcos.

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A Comparative Study on Deep Learning based Models for Text Classification

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Abstract: Text classification is one of the most fundamental and important tasks in natural language processing. Due to advances in deep learning (DL) techniques, their application in text classification have been overwhelming. Among all these, four fundamental techniques have become the focus of our study. The four techniques are: (1) Deep Belief Neural (DBN), (2) Convolutional Neural Network (CNN), (3) Multilayer Perceptrons (MLPs) and (4) Recurrent Neural Network (RNN). DBN is known to have exceptional learning capabilities for extracting highly distinct characteristics and is suitable for general usage. CNN is presumably stronger at retrieving the location of many connected characteristics. The main strength of MLP is that it can be applied in a wide range of fields to find solutions. Finally, RNN provides another advantage since it is capable of modelling long-term relationships sequentially. This paper presents a systematic comparative study on these four techniques with some experimental supports. The goal of this study is to offer basic suggestions on which DL models are suitable for text classification tasks.

Keywords: deep learning, text classification, CNN, RNN

1. Introduction

Text classification is a crucial NLP task with numerous applications, including document categorization, ranking, information retrieval, spam email detection, and web search and emotion analysis (Kindbom, 2019). In order to extract high-level abstraction from data through hierarchical processes, DL, which was first introduced from artificial neural networks (ANN), has become a major trend and hot issue for machine learning research around the world in recent years. DL has the benefit of defining a model of unstructured data, and most people are acquainted with the media that such data contains, such as photos, sound, video, and text. For a number of natural language comprehension tasks, including subject categorization, sentiment analysis, question answering, and language translation, DL has demonstrated highly promising outcomes. DL has a deep architecture that makes it capable of handling far more difficult AI challenges.

DL models often use hierarchical structures in order to merge their layers. Through straightforward linear or nonlinear connections, a lower layer's output may be thought of as a higher layer's input. These models have the ability to transform the data's low-level word vector characteristics into high-level abstract feature vectors. DL techniques are more effective than other machine learning techniques in feature representations, according to the characteristics. DL techniques rely on datasets, while traditional machine learning approaches often rely on the user's experience. Hence, models constructed through deep learning techniques have reduced the requirement for human input while significantly enhancing computer vision performance.

(Sarker, 2021) examines four fundamental and largely applicable DNN architectures—CNN, DBN, MLPs, and RNN. The models built on these architectures are frequently employed to handle challenging machine learning problems. Additionally, each of these DL models has a subvariant with unique attributes and traits that are appropriate for various application types. CNNs typically use deep design that outperforms other deep architectures in domains with large quantities of training datasets, and subsequently have shown unexpected success in digit classification tasks. DBNs, on the other hand, are a generative probabilistic design with one visible layer and a few deep architecture's hidden layers

(Khodayar et al., 2018). MLP has been shown to be a useful tool for prediction, function approximation and classification. RNNs are an extension of the standard feedforward NN, which can handle a variable length sequential input, and have shown promising outcomes in a diversity of machine learning applications over the last five years. Gating techniques have also been improved to minimise cavities in major two-achieved Recurrent Neural Network models kinds including the long short-term memory (LSTM). in the it another way, we may say that DBNs are common-aims, RNNs are sequential structures, and CNNs are made specifically for hierarchical systems.

Recently, DL models have been used in the various fields of natural language processing, including text categorization and language modelling. DL models have shown notable achievements in the field of text classification. The comparative review by Zulqarnain et al. (2020) reveals the following important observations and claims that can help in choosing the best models for text classification:

1. CNN is seen to be the best choice for challenging NLP classification problems like text categorization.
2. Although sentiment analysis classification is normally determined by key phrase, CNN has recently demonstrated to have outperformed the others on classification and sequence language modelling tasks through using a gated mechanism LSTM.
3. RNN can be used for selecting the order in which sequential modelling activities like language modelling and the desired flexibility in modelling context dependencies sequentially.
4. DBN is able to perform similar NLP tasks such as text classification and has the potential to acquire additional compound functions to display data and discover multiplex characteristics with hidden layers. The higher layer representation tends to get more sophisticated when each unit of the hidden layer learns a statistical link between the units in the bottom layer.

The comparative study presented in this paper focuses on CNNs, DBNs, MLP and one extremely useful variants of RNNs, LSTM, working diligently on categorization jobs. In this study, our research experiments support two essential findings: (1) For text classification tasks, information from CNNs and RNNs is complementary. Depending on how essential it is to comprehend the complete sequence semantically, different architectures perform better. However, several shortcomings of ordinary RNNs, such the gradient vanishing and exploding difficulties, are solved by RNN varieties like LSTM. It presents two challenges for traditional RNN training. When employing the hyperbolic tanh activation function, it will not be able to handle very lengthy sequences, and when using the rectified linear unit (ReLU), it is quite unstable. (2) Learning rate changes performance relatively smooth, while changes to the hidden size and batch size represent large fluctuations in the outcomes.

2. Related Work

Text categorization and language modelling models are used in several domains of natural language processing, where various DL models have been applied. To our knowledge, there have been not many comprehensive comparisons of CNN, DBN, MLP and RNN on DL models

The CNN only takes into account the activations of the most informative n-grams when determining similarity. A neural network with several hidden layers was used for time series forecasting in order to capture long-term dependencies. The ability of DBN to extract highly recognisable characteristics from high-dimensional real features has improved (Dargan et al., 2020). To create language models, use the RNN (Liu & Lane, 2017). For the sake of conservation, a new higher order RNN for temperature time series prediction was presented (Laubscher, 2019). (Rajan, 2021; Yin et al., 2017) examine the utility of CNN and standard RNN (i.e., no gating methods) in relation categorization. Both studies demonstrate that CNN outperforms RNN and that CNN and RNN give complementary information, although the RNN computes a weighted mixture of all words in the phrase, the CNN produces the most informative n-grams for the relation and only takes into account their activations.

(Umer et al., 2021) examine the performance of Deep Neural Networks (DNN), Convolutional Neural Networks (CNN), and Recurrent Neural Networks (RNN) on eight datasets and offered a synopsis of various DL-based sentiment analysis articles. They prepared inputs for classification methods using both word embedding and term frequency-inverse document frequency (TF-IDF), and found that the RNN-based model employing word embedding outperformed the other approaches.

Finally, in experiential evaluation, Chung et al. (2015) found that between GRU and LSTM, there is no apparent winner. They achieve equal results in many classification tasks, and fine-tuning hyperparameters like layer and batch size is usually more crucial than choosing the model architecture.

3 Models Description

This section provides a brief description of DBN, CNN, GRUs, and LSTM

3.1 Deep Belief Network

Deep Belief Networks (DBNs) are probabilistic generative models composed of numerous layers of Restricted Boltzmann Machines (RBMs), each with a visible and hidden layer (Polania & Barner, 2017). Using greedy layer-wise techniques, DBN may be taught to extract a deep hierarchical representation of the input data. After an RBM layer has been trained, the previous hidden layer's representations are used as inputs for the following hidden layer. Figure (1) shows a schematic illustration of a DBN.

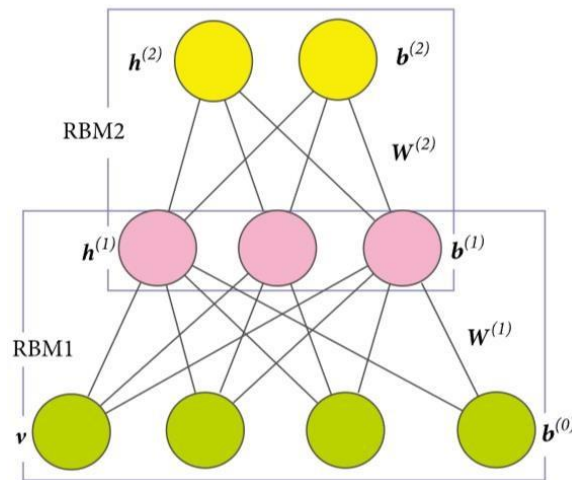


Figure 1. Deep Belief Network

A layer of visible units and two levels of hidden units make up a 2-layer "deep belief network" that is constructed using two RBMs. Where $h^{(1)}$ and $h^{(2)}$ are the hidden layer state vectors, v is the visible layer state vector, $w^{(1)}$ and $w^{(2)}$ are the symmetrical weights matrices $b^{(1)}$ and $b^{(2)}$ are the hidden layer bias vectors, and $b^{(0)}$ is the visible layer bias vector.

3.2 Convolution Neural Network (CNN)

In recent years, CNN has significantly transformed our lives and grown to be a highly popular tool. CNN is widely employed in the DL framework. Figure (2) shows the basic architecture of CNN.

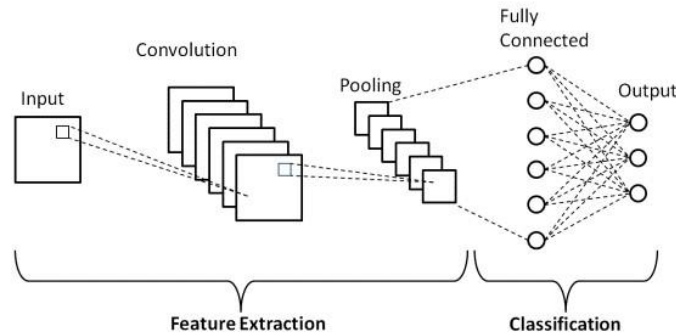


Figure 2. Basic architecture of CNN

(i) *Input Layer*

This sequence has "n" entries. Each element is represented as a d-dimensional dense vector; hence, the input x is represented as a dimensions d×n feature map.

(ii) *Convolutional Layers*

This layer is the most significant layer and the major component of convolutional neural networks, and is always the first layer that is used to extract the various features from the inputs. This layer consists of a collection of learnable filters or kernels, which provide two-dimensional activation when layered along the depth dimension, resulting in the output volume (Yin et al., 2017).

It represents learning through sliding w-grams. For an n-entry input sequence: x_1, x_2, \dots, x_n , let vector $c_i \in \mathbb{R}^{wd}$ be the combined embedding of w entries $x_{i-\hat{w}+1} \dots x_i$ where w is the filter width and $0 < i < s + \hat{w}$. Embedding for x_i , $i < 1$ or $i > n$, are zero filled. We provide the model clarification. $p_i \in \mathbb{R}^d$ for the w-gram $x_{i-\hat{w}+1} \dots x_i$ used associative weights for convolution $\hat{W} \in \mathbb{R}^{d \times wd}$ (Yin et al., 2017; Zulqarnain et al., 2020).

$$P_i = \tanh(\hat{W} \cdot c_i + b) \dots \dots \dots (1)$$

where bias $b \in \mathbb{R}^d$

(iii) *Max -Pooling*

Convolutional and pooling layers alternate in the primary CNNs model. with the goal of extracting higher-level features and reducing the spatial dimension of the activation maps (without sacrificing information), in addition to lowering computational complexity and addressing overfitting problems. Moreover, the max-pooling layer works on data, compressing and smoothing it out. Max-layer picks the receptive field's maximum value and makes data insensitive to tiny translational changes (Zulqarnain et al., 2020).

(iv) *Fully Connected Layer*

The fully-connected layer, whether convolutional or not, is usually the final layer of a neural network. An input vector is transformed into a new output vector by this layer. In order to do this, the incoming input values are subjected to a linear combination and maybe an activation function. The final fully connected layer, which creates a vector of size N, where N is the number of classes in our classification problem, classifies the input before it is sent to the network. The likelihood that the input corresponds to a particular class is represented by each member of the vector.

3.3 Multilayer Perceptron (MLP)

MLPs, commonly referred to as multilayer feedforward neural networks, may be among the most appealing neural network architectures. With the help of examples of data with known outputs, the network builds a model for MLPs using a supervised technique. The examples given, which are presumed to include all the details required for this relationship, are the only sources from which an MLP may infer this connection (Nawab et al., 2022).

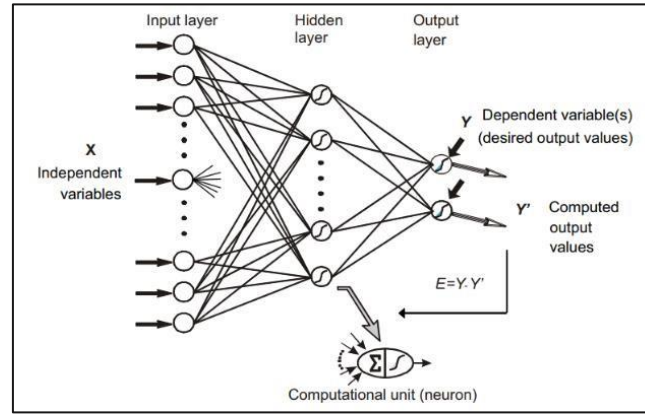


Figure 3. Three-layered Feed-forward Neural Network with One Input Layer, One (or more) Hidden Layer(s), and One Output Layer: X, Independent Variables; Y, Dependent Variables; and Y0, Values Computed from the Model

MLP model consists of a finite number of consecutive layers in its most basic version. Each layer is made up of a specific number of units (often called neurons). Each layer's unit is linked to the unit of the next (and hence prior) layer. In the computational process, these connections are represented as weights (connection intensity). The weights play a vital role in the signal's propagation across the network. They store the neural network's understanding of the problem-solution relationship. Figure (3) shows the information is passed from one layer to the next (thus the term feedforward). The inputs make up the first layer, which is referred to as the input layer. The model's number of independent variables determines the number of neurons in the input layer. Then there are hidden layers, which are intermediary levels. The resulting output is obtained in the last layer (output layer) which the number of neurons in it is equal to the number of dependent variables.

3.4 Long Short-term Memory

The Long Short-Term Memory (LSTM) unit was introduced by (Hochreiter & Schmidhuber, 1997). It is a form of recurrent neural network (RNN) that can learn long-term dependencies.

$$i_t = \sigma(x_t U^i + h_{t-1} W^i + b_i) \quad (2) f_t$$

$$= \sigma(x_t U^f + h_{t-1} W^f + b_f) \quad (3)$$

$$o_t = \sigma(x_t U^o + h_{t-1} W^o + b_o) \quad (4)$$

$$q_t = \tanh(x_t U^q + h_{t-1} W^q + b_q) \quad (5)$$

$$p_t = f_t * p_{t-1} + i_t * q_t \quad (6)$$

$$h_t = o_t * \tanh(p_t) \quad (7)$$

An LSTM is made up of three gates: an input gate (i_t), a forget gate (f_t), and an output gate (o_t). All gates are built using a sigmoid function over the ensemble of inputs x_t and the previous hidden state h_{t-1} . By applying a tanh nonlinearity to the ensemble of input x_t and the prior hidden state h_{t-1} , it first provides a temporary result q_t before producing the hidden state at step t . Input gate i_t and forget gate f_t then combine this temporary result q_t with history p_{t-1} to create an updated history p_t . Finally, output gate o_t is applied over this updated history p_t to create the final hidden state h_t (Yin et al., 2017).

4. Experiments

4.1 Datasets

4.1.1 20 Newsgroups (20NG)

Taken in raw form from the UCI data repository and must be utilised (Dogan & Uysal, 2019). This dataset comprises 20 big classes and is evenly distributed. The 20,000 messages in this dataset were pulled from 20 newsgroups. In this research, 14100 messages are used for training, 2450 sentences are used for validation (val), and 3450 sentences are used for testing.

4.1.2 Sentiment Text Classification (SentiTC)

Stanford Sentiment Treebank's dataset (SST) [text classification SURVEY.pdf]. This dataset's sentiments prediction aims to divide the text into two categories: (positive and negative) of the movie reviews. There are 9,613 binary-labeled texts in this dataset, which are divided into 6,910 training texts, 883 development texts, and 1,820 testing texts. Labelled phrases that occur as sub-parts of training sentences are treated as autonomous training samples. (Yang et al., 2017).

4.1.3 Reuters-21578 (R-21578)

Is one of the most extensively used text classification data sets, it has been employed in a number of previous experimental research projects (Zulqarnain et al., 2020). The UCI data repository was used to retrieve this dataset. 15 classes with skewed sizes were taken from the Reuters-21578 dataset.

4.1.4 Textual Entailment (TE)

On Stanford Natural Language Inference (SNLI) (Tsuchiya, 2018). This dataset contains 550,152, 10,000, and 10,000 sentence pairings for training, development, and testing, respectively. One of the three labels—neutral, entailment, or contradiction—is used to explain each pair. After deleting the unlabeled pairs, we obtain 549,370 pairs for training, 9,840 pairs for validation (val), and 9,830 pairs for testing (Zulqarnain et al., 2020).

4.1.5 Answer Selection (AS)

A collection of question-answer pairs that have been compiled and annotated for open-domain quality assurance research may be found on WikiQA (Yang et al., 2015). The subtask is used, which assumes a query has at least one legitimate response. The associated dataset has 20,360 question candidate pairs in the train, 1,130 in the development phase, and 2,352 in the testing phase (Yin et al., 2017). In the testing phase, we follow the conventional arrangement and only take into account questions that have the right answers. Finding the correct answer or answers from among the candidates seems to be the objective.

4.1.6 CNAE-9

On Sem-Eval 2012 tasks 7 (Hendrickx et al., 2019). It comprises 1080 open text business papers that are describe of Brazilian firms and are divided into 9 subgroups; just letters were kept and the texts' prepositions was deleted. The CNAE-9 dataset is divided into 756 training files and 324 testing files, with no validation set.

4.2 Experimental Setup

The tests feature the following design to fairly examine the encoding capabilities of various traditional DNNs. In this experiment, six various types of datasets are used. Utilizing the sklearn, numpy, and pandas packages, data pre-processing and manipulation have been carried out in Python 3.6. TensorFlow is a free and open-source application framework for numeral calculations utilising data flows graphs. The following design was used for the experiment in this investigation. (1) always start train out from scratch, with no prior knowledge, such as word embeddings. (2) Always train with a simple configuration that does not include complicated tactics like batch normalisation. (3) Make sure that all results are based on the best hyperparameters by finding the perfect ones for each task and modelling it independently. (4) Examine the fundamental architecture and use of each model: A convolution layer and a max-pooling layer make up CNN, whereas LSTM models the input from left to right and always uses the latest hidden state as the output representation. In order to ensure that each word's representation may encode the word's context on both sides, as the CNN does, we also report bidirectional RNNs for POS tagging. Hidden size, mini-batch size, learning rate, maximum phrase length, and filter size are tuned hyperparameters (for CNN only) (Yin et al., 2017). The description of each experimental parameter is explained in Table 1.

Table 1. Results of CNN, DBN, MLP and LSTM in Text Classification

		Lr	Batchsize	Hidden	sentLen	Filtersize
20NG (acc)		0.01	55	100	60	3
CNN		0.02	30	110	60	-
		0.1	30	80	60	-
DBN		0.1	60	90	60	-
MLP						
LSTM						
SentiTC	CNN	0.2	32	20	60	3
		0.2	45	20	60	-
DBN		0.2	45	20	60	-
		0.1	50	30	60	-
MLP						
LSTM						
R-21578		0.01	80	90	60	5
CNN		0.01	50	80	60	-
		0.01	50	80	60	-
DBN		0.1	60	110	60	-
MLP						
LSTM						
TE		0.1	64	32	50	3
CNN		0.1	50	64	50	-
		0.1	50	80	65	-
DBN		0.1	32	50	50	-
MLP						
LSTM						
AS	CNN	0.01	55	55	45	3

	DBN	0.1	40	80	40	-
	MLP	0.1	40	50	40	-
	LSTM	0.1	130	100	50	-
CNAE-9	CNN	0.12	30	40	20	5
	DBN	0.10	45	60	20	-
	MLP	0.12	40	60	20	-
		0.1	30	40	20	-
LSTM						

4.3 Results and Analysis

In this section, the study experimental is carried out on numerous datasets with appropriate hyperparameters for all tasks of text categorization and models. In terms of accuracy (acc) the performance of all current DL algorithms is compared. Every model has done well on all text classification datasets, according to the implementation environment and experimentation, although the LSTM model outperforms other basic DL methods like DBN and CNN and MLP on SentiC, as shown in Figure (4), while CNN outperforms DBN, MLP, and MLP in AS datasets. LSTM outperforms DBN, MLP, and CNN on 20NG datasets, and also performs best on R-21578 datasets.

With regard to long-range context dependencies and text classification tasks, we discovered that RNN models of the LSTM type are superior and well matched. However, in our experiments, RNNs outperformed CNNs and DBNs, particularly in 20NG, R-21578, and SentiC, because RNNs predict and finally produce the relation output after processing the entire sentence. CNNs are thought to be better at extracting local and position-invariable features and have shown good performance on the Answer Selection dataset (AS) (Yin et al., 2017).

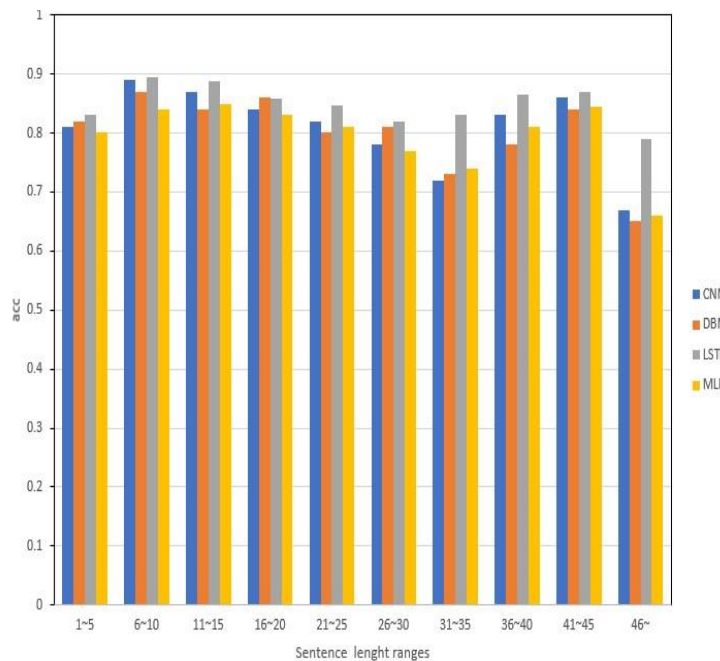


Figure 4. Distributions of accuracy and different sentence lengths ranges

4.3.1 Qualitative Analysis

In this study, we present an experiment where the LSTM predicts correctly or wrongly while the CNN prediction base is acceptable. Long-term sentence dependencies are an area in which LSTM thrives, as we found and showed in the experiment. Examining sentence length vs. correctness can also help. Figure 4 depicts the accuracy in terms of length range. When the sentence length range is short, " e.g.,

<14," we found that LSTM and CNN are equivalent. However, when the sentence length range is larger, LSTM gains an edge over CNN. Longer sentences usually include semantically inverted paragraphs, according to error analysis. This type of paragraph typically provides a local, reliable gauge for one polarity of sentiment, but an accurate classification depends on having a firm understanding of the full paragraph. Therefore, which DL model performs better in text classification tasks depends on how frequently the concept of global/long-range semantics is used. This is also demonstrated in 20NG, R21578, where LSTM performs better than CNN, but CNN takes the lead in AS because text entailment depends on the phrase's completeness.

4.3.2 Sensitivity to Hyperparameters

Then, the performance of all DL models is assessed, including CNN, DBN, MLP, and LSTM, to see how effectively they respond to changes in hyper-parameter values. The performance of CNN, DBN, MLP, and LSTM is compared in Figure 5 for varied learning rates, hidden layer densities, and batch sizes. Regarding changes in learning rate, all DNN models are comparatively smooth. On the other hand, batch size and disguised size cause large oscillations. But on the other hand, we found that in SentiTC, CNN curves frequently perform worse in the sentiment match task than the AS dataset, falling below the lines of DBN, MLP, and LSTM.

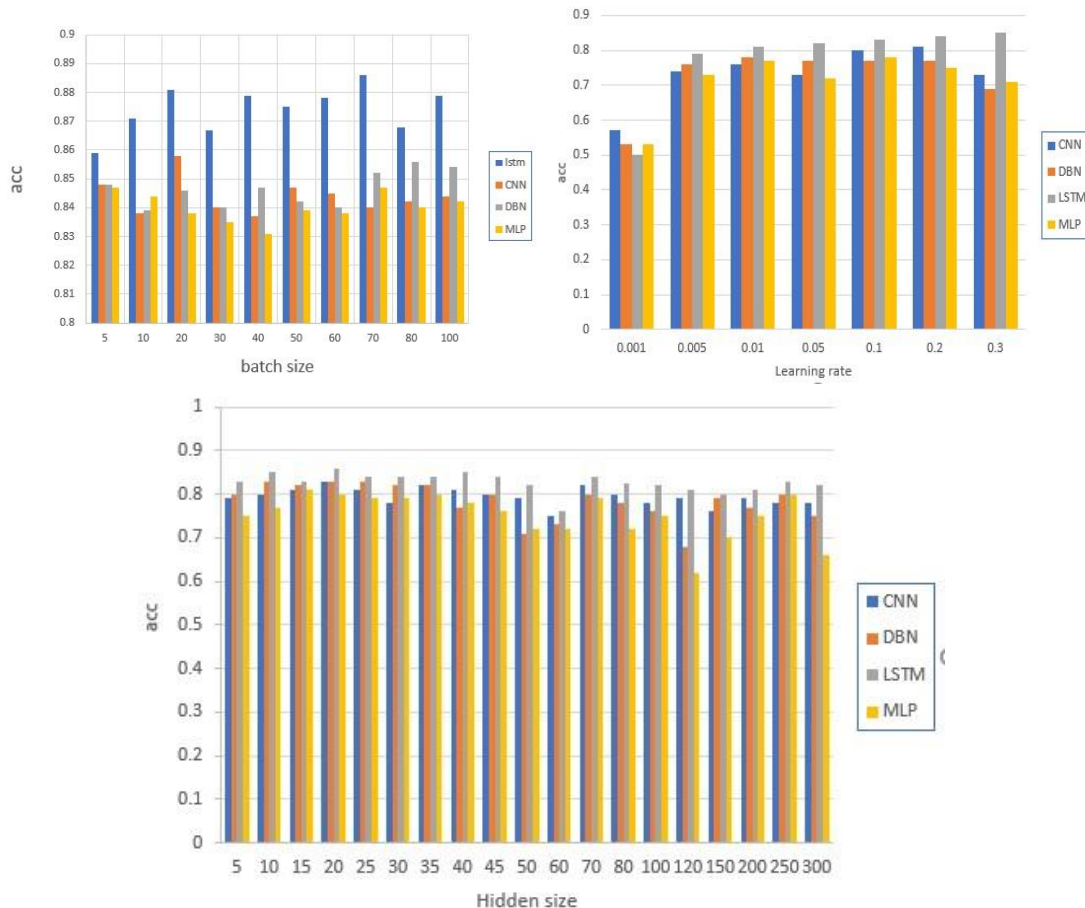


Figure 5. “Accuracy for sentiment classification for HNT as a function of three hyperparameters: learning rate (right), batch size (left), and hidden size (bottom),”

5. Conclusion

This paper discusses the capability of existing DL methods in handling text classification issues. Specifically, it presents a comparative study that analysed and assessed the DBN, CNN, MLP, and

LSTM, which are the four most widely used deep neural networks for text classification. This study is also carried out with some experimental supports where we observe that LSTM performs better than conventional RNNs at sequential learning tasks and avoid gradient disappearance and explosion issues at the time of long-term dependency learning. The hidden size and batch size can also have a substantial impact on a DNN model's performance. The four models, DBNs, CNNs, LSTM, and MLP, therefore, appear to perform best when these two parameters are optimized. We anticipate that as hardware resources and computer technologies progress quickly, deep neural networks will become more popular and have more uses.

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Predicting Post Covid-19 Pandemic Online Grocery Shopping (OGS) Intention in Klang Valley of Malaysia

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Abstract: The purpose of the research is to explore the consumer's intention towards online grocery shopping in Klang Valley when the COVID-19 pandemic is over. Target of 171 valid responses to the questionnaire were gathered from individuals above 21 years old living in Klang Valley who is partially or wholly doing their grocery shopping via online platforms. The questionnaire is designed based on the theoretical framework that integrates technology acceptance model and theory of planned behavior with the added element of trust. Respondents were sampled via non-probability method and data collection was through online platform. Data collected was tested with normality, reliability and validity before correlation and regression analysis were performed. The survey result confirmed the continuity of OGS after the COVID-19 pandemic and the analysis result show that the theoretical framework has the explanatory ability and robustness in predicting the intention, where the attitude element has the strongest degree of influence towards the intention and perceived usefulness is driving the attitude element. The findings of this study can be a useful insight to the industry players and policy makers to prepare and make necessary adjustment to their business model and strategy, government policy and the way of working in the post pandemic era.

Keywords: COVID-19 pandemic, online grocery shopping, intention, technology, behavior, attitude, trust, perceived usefulness

1. Introduction

Online shopping seemed not to be a mainstay option among Malaysian households to purchase their grocery few years ago, things change when COVID-19 outbreak hit Malaysia during 2020, many Malaysians have turned to online grocery shopping (OGS) platform to buy their grocery due to movement control orders (MCOs) as well as the fears of the infectious virus. One of the local OGS platforms MyGroser has seen sales in online grocery surge over 1000% during first half of year 2020 (TheStar, 2020). Other than the urge to stay at home to stay safe, people are enjoying the convenience and hassle-free shopping experience. Although COVID-19 pandemic is yet to be ended, the governments from all over the world including Malaysia, together with the World Health Organization (WHO) have been advising people to embrace the new normal to keep the economy running so that people are able to earn their living while protecting themselves and others. However, people are still concerning about the deadly virus and avoiding themselves to go to these public places unnecessarily, until and unless WHO declare COVID-19 outbreak is no longer a pandemic where there will be an effective vaccine or medicine to treat the disease like normal flu. There is no certainty when will that be, but the time will and eventually come; and before this happen, we need to start asking this question: will OGS behavior continue when the pandemic is over?

There are many research and studies being conducted in the past to examine behavioral intention on the context of adopting the OGS. However, the observation is that the context of these past studies was set for the pre-pandemic time point to evaluate the adoption of OGS or to examine how did the pandemic shift the OGS intention. On the other hand, the past studies were not targeting respondents from W.P Kuala Lumpur and Selangor in Malaysia. W.P Kuala Lumpur and Selangor combined has the highest population in Malaysia that just reaching 8.3 million population in second quarter of 2021 (Statista, 2022). They are also the top GDP per capita states in Malaysia respectively recorded RM121,100 a year in W.P Kuala Lumpur and RM52,073 a year in Selangor during 2020 (DOSM, 2021). Finally, they have

the highest average household spending in Malaysia where W.P Kuala Lumpur recorded RM6,913 a year while Selangor recorded RM5,830 a year in 2019 (DOSM, 2020). Therefore, the targeted area scoped in this paper is Klang Valley, which covers the major cities of W.P Kuala Lumpur and Selangor.

In terms of applicable theories, technology acceptance theory (Davis, 1985) and theory of planned behavior (Arjen, 1985) are the most common models used in the past studies. Technology acceptance theory (TAM) has been one of the most important models of technology acceptance, with two core components influencing an individual's intention to use new technology: perceived ease of use and perceived usefulness (Charness & Boot, 2016). Meanwhile, the theory of planned behavior (TPB) originated from the theory of reasoned action (TRA) was intended to explain all behaviors over which people could impose self-control and predict the individual's intention to perform the behavior in a specific context, which the primary factors influencing the individual's intention in this model are attitude, subjective norm, and perceived behavioral control. However, although they are the proven fundamental theories that frequently used in predicting individual's intention, their core components are neither evergreen nor adequate to explain all kind of situation or context. Benbasat and Barki pointed out that many independent researchers expand TAM to adapt the constantly changing IT environment (Benbasat & Barki, 2007). On the other hand, TPB does not consider individual's emotion and experience in the development of intentions (Sniehotta, 2009). The setting of this paper is OGS intention of existing users when pandemic is over, in which the decision making of the existing OGS users will be affected by their experiences in using the OGS platform, for instance the conditions of the grocery when delivered, schedule of the delivery, customer service, availability of the products as well as the cyber security feature for transaction and personal data, all of these are the factors building trust of the consumers towards OGS. Therefore, consumer trust is an important element for a transaction to happen, especially in an online environment (Gustavsson & Johansson, 2006). The trust element is the missing puzzle in both TAM and TPB for the context of this study, hence this research integrated the theories with the trust element as shown in Figure 1 to optimize the test and improve the theories.

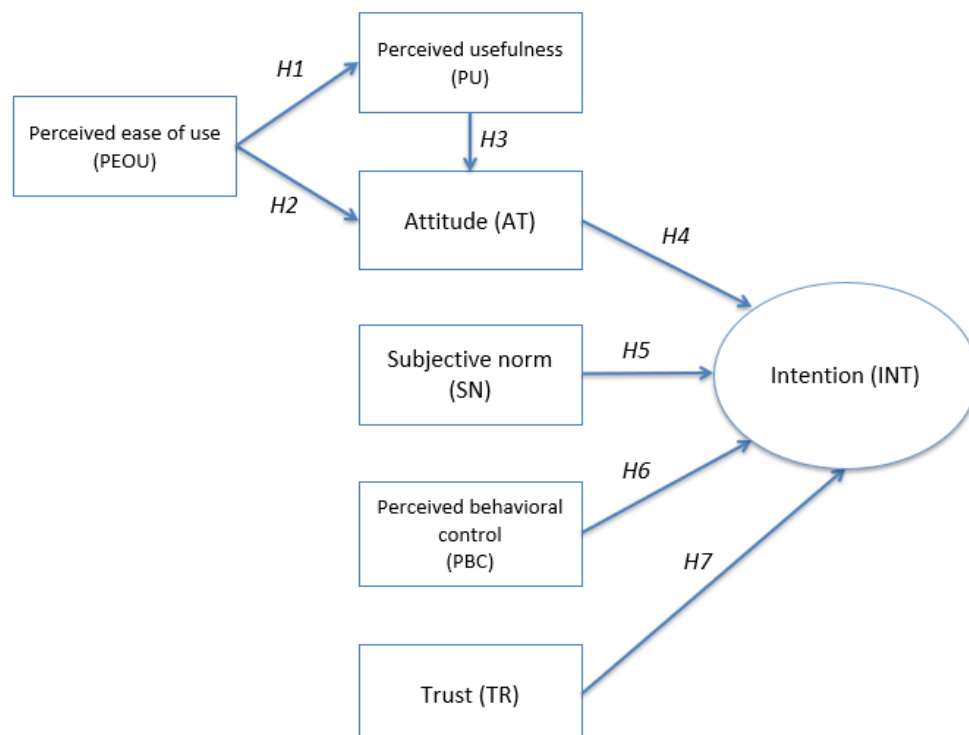


Figure 1. Integrated Theoretical Framework

The purpose of this paper is to predict the intention of existing online grocery shoppers for the age of 21 years old and above in Klang Valley towards OGS when the pandemic is over. The study assesses the relationships between the core components in the integrated theoretical framework and determines

which is the most important predictor to the OGS intention when the pandemic is over, hence the following hypotheses were developed for the testing based on Figure 1:

- H1: Perceived ease of use (PEOU) will have positive effect on the individual's perceived usefulness (PU) towards using OGS platforms when pandemic is over.
- H2: Perceived ease of use (PEOU) will have positive effect on the individual's attitude (AT) towards using OGS platforms when pandemic is over.
- H3: Perceived usefulness (PU) will have positive effect on the individual's attitude (AT) towards using OGS platforms when pandemic is over.
- H4: Attitude (AT) will have positive effect on the individual's intention (INT) towards using OGS platforms when pandemic is over.
- H5: Subjective norm (SN) will have positive effect on the individual's intention (INT) towards using OGS platforms when pandemic is over.
- H6: Perceived behavioral control (PBC) will have positive effect on the individual's intention (INT) towards using OGS platforms when pandemic is over.
- H7: Trust (TR) will have positive effect on the individual's intention (INT) towards using OGS platforms when pandemic is over.

The paper is meant to predict the continuity and direction of the OGS trend in Klang Valley when the pandemic is over. It is the paper to examine the OGS trend in Klang Valley, Malaysia and it is interesting because they are the major cities that has the highest population (Statista, 2022), highest GDP per capita (DOSM, 2021) as well as highest average household spending in Malaysia (DOSM, 2020). Besides that, the theoretical framework with additional element of trust used in the paper is aimed to improve the adequacy of the integrated theories of TAM and TPB and make it more practical for research. However, the findings for this paper are only applicable at the time proximity to the study, because the collected data and information may change over time due to the development in the aspect relevant to this area of but not limited to technology, government policy, economy, politics etc. Besides that, the "intention" does not necessarily convert into action, as the fluid variables such as moods, feelings and experiences could instantly affect consumer's behavior and decision at any given point in time.

2. Methodology

The research is quantitative in nature that explores the intention of the study as well as examines the causal relationship between the independent variables (IVs) and the dependent variable (DV) of the integrated theoretical framework. For data collection, survey was conducted through online platform – Google Forms instead of face-to-face survey due to health and safety reason amid of COVID-19 pandemic. The major entity of this study is individuals with the minimum age of 21 years old who live in Klang Valley of Malaysia and currently using (partly or wholly) OGS platforms to do their grocery shopping. Other than targeting the participants from Klang Valley, the survey also specified the age group from 21 years and above due to the age restriction of purchasing certain grocery items like alcoholic beverages, as well as the credit card holder minimum age of 21 years old set by Bank Negara Malaysia because the commonly used payment method in OGS is credit card. This is to simplify and narrow down the participants' relevancy to the study. The sampling methodology is based on non-probability sampling, where it involves non-random selection depending on convenience or other criteria which allowing the data to be easily collected for the study (Shona McCombes, 2022). However, as total population is unknown, the sample size was determined by the following formula that helped to derive minimum sample size required for accuracy of testing.

$$N = Z^2 (P)(1-P)/C^2$$

Where Z is the Z-score, P is the standard deviation and C is the margin of error (confidence interval). We assume 95% of confidence level of Z-score (1.96), standard deviation of 0.5 and 0.075 in margin of error. The computation indicates 171 as the minimum sample size required.

$$N = (1.96)^2 \times (0.5) (1-0.5) / (0.075)^2 = 170.74$$

The survey was split into two sections: demographic and Likert scale questions. The demographic section gathered the information like age, gender, marital status, income level etc.; then participants were being asked if they are currently using OGS platforms to do their grocery shopping and which are the usual OGS platforms they are using. On the latter section, participants were given a series of statement or scenarios relating to the variables of the theoretical framework in Figure 1, they were required to respond by choosing from 5 Likert scale: (1) Strongly disagree; (2) Disagree; (3) Neutral; (4) Agree; and (5) Strongly agree. The score from the scale responses were collected to compute and test with the hypotheses. The survey invite link was sent to friends, family, and neighbours to participate via Whatsapp and email and being promoted through social communication platforms like Facebook.

The data collected was used for descriptive, correlation and regression analysis. And before these analyses were conducted, the reliability and validity test were performed on the data to ensure consistency of the measure as well as the accuracy to solidify the quality of the research. The statistical analyses were performed using Statistical Package for Social Sciences software version 28 (SPSS-28).

Prior to launching the survey, the instrument of the measurement was shared with academicians and useful feedback was provided to improve the questionnaire and implementation of the survey. The survey was then pre-tested with a small sample size of 41 respondents who were handpicked from the authors' friends and family as well as the fellow MBA classmates. This piloting of the instrument was helpful to facilitate the process of content validation, reliability, and acceptability of the instrument. According to Hu (2014), pre-testing of the survey instrument is a common practice to rehearse if the questions are clear to the participants and fit for the purpose of the study. While conducting the survey, the authors considered all necessary ethical consideration to ensure that the respondents' rights were protected. The design of the instrument and its question was focused on the subject matter. During the study, the authors ensured that the anonymity of the respondents was maintained. The instrument provided full disclosure of the intent and the authors' affiliation with the University and the respondents were made aware on their option to voluntarily accept or decline participation in the study.

3. Results and Discussion

The demographic of the 171 respondents has been tabulated, with majority of them living in Selangor as compared to Wilayah Persekutuan Kuala Lumpur which is in reflection of the actual population of these two states (Statista, 2022). Besides that, more than 80% of the respondents are from monthly household income more than MYR5,000, which means the sample is constitute mainly M40 and T20 population that is reflective of the mean income level of Selangor (MYR10,827) and Wilayah Persekutuan Kuala Lumpur (MYR13,257) as according to Department of Statistics Malaysia based on the 2019 household income survey report. On the other hand, the sample is predominantly using mobile application to perform the OGS, with only 7.6% using the website, which is not a surprising data as Malaysia more than 80% of smartphone penetration rate as share of population since 2017 and continue and expect to grow further (Statista, 2022).

The descriptive statistic and normality test was performed based on the responses collected. For continuous data, test of the normality is a crucial step to decide the measures of central tendency, dispersion, and statistical methods for data analysis. When the data is normally distributed, parametric tests are deployed otherwise nonparametric methods are used to compare the data groups (Mishra et al., 2019). The skewness and kurtosis of normality test was performed in SPSS-28 for all variables. The skewness of all the variable is ranging from -1.021 to -.271 while kurtosis range from .162 to 1.794, the results indicate that all the distributions are slightly left-skewed with negative excess kurtosis (Kurt -

3). According to George and Mallery (2010), the range of skewness and kurtosis between -2 and +2 are considered acceptable to support that the data is normally distributed.

On the reliability analysis, which is about finding out the consistency of a measure and ensures the quality of the data, Cronbach's Alpha was being used in the study. Table 1 shows the value of Cronbach's Alpha testing in SPSS-28 for all variables with the scores ranging from .721 to .932. According to Cortina (1993), any Cronbach's Alpha value at above 0.70 is considered acceptable for reliability analysis.

Table 1. *Reliability Statistics*

Variables	Cronbach's Alpha	Number of Items
PEOU	.721	4
PU	.829	4
AT	.845	4
SN	.898	4
PBC	.754	4
TR	.730	4
INT	.932	4

Construct validity was employed through exploratory factor analysis (EFA) to test on the dataset of this study. EFA is normally used to measure both observed and latent variables at the interval level (Johnny & Fontaine, 2005), Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) and Bartlett's Test of Sphericity are among the common EFA methods available in SPSS-28. KMO basically examines the strength of the partial correlation on how the variables relate to each other. KMO values closer to 1.0 are considered ideal while less than 0.5 are unacceptable for factor analysis (Stephanie, 2016). The result in Table 2 shows that the KMO value is .878, which suggest a strong degree among the variables overlap with each other, hence they can be used reasonably for factor analysis. On the other hand, the Bartlett's Test of Sphericity is used to compare the correlation matrix with identity matrix in a null hypothesis; an identity matrix means that the variables are unrelated hence not suitable for factor analysis (Stephanie, 2014). A significant statistical test of less than 0.01 or 0.05 would suggests that the null hypothesis is not an identity matrix and reject the null hypothesis; and that is the result shown in Table 2 for this study which indicates that the variables are related and ideal for factor analysis.

Table 2. *KMO and Bartlett's Test*

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.878
Bartlett's Test of Sphericity	Approx. Chi-Square	630.491
	df	21
	Sig.	<.001

The correlation (R) and regression (R²) analysis tell us about the relationships between the IVs and DV and the degree of strength of their relationships. Figure 2 summarizes the results of the correlation and regression analysis while Table 3 to Table 5 show the detailed outputs of correlation and regression analysis performed in SPSS-28. The result indicates that variables are having positive coefficient (R) with each other with significant level <.001 at 2-tailed. According to Evans (1996) as he categorized the level of strength for R in Table 6, the R value for each of the alternate hypothesis is ranging from moderate to strong. Similar output is also demonstrated in the causal relationship for each alternate hypothesis. The result of the simple regression analysis suggested that PU has the highest R² (.584) and adjusted R² (.581) against AT, which means the 58% of the variation in AT is explained by PU. Subsequently AT has the R² of .420 and adjusted R² of .417 against INT that indicates AT explains 42% of the INT variation.

By using SPSS-28 stepwise methodology, the statistic tool helped to interpret the causal relationship of multiple IVs with the DV in the multiple linear regression (MLR) analysis. Based on the integrated theoretical framework, the analysis was broken down into two parts. First part is for PU and PEOU where AT is the mediator between the IVs (PEOU and PU) and DV (INT). Second part is for IVs: AT, TR, PBC, and SN where INT is the ultimate DV. PEOU and PU do not require multiple linear regression test because it is a one-to-one relationship which has already explained in the simple linear regression test. The results of the MLR suggested that no variables were removed in the testing, and the causal relationship is stronger every time an additional variable added to the equation. Figure 2 shows that both PU and PEOU together can explain higher variation in AT with $R^2=.618$ and adjusted $R^2=.613$. And the result also shows that all AT, TR, PBC, and SN together can explain higher variation in INT with $R^2=.543$ and adjusted $R^2=.532$. Each of the model are having significant level of <0.05 .

Based on results of the enhanced statistical analyses, it is evident that the relationship between the variables outlined in each of the alternate hypothesis is positive correlated with the degree of strength ranging from moderate to strong, and each of the IV can explain the variation of its DV at a significant extent. Therefore, the study rejects all the null hypotheses and support the explanatory power provided by the integrated theoretical framework.

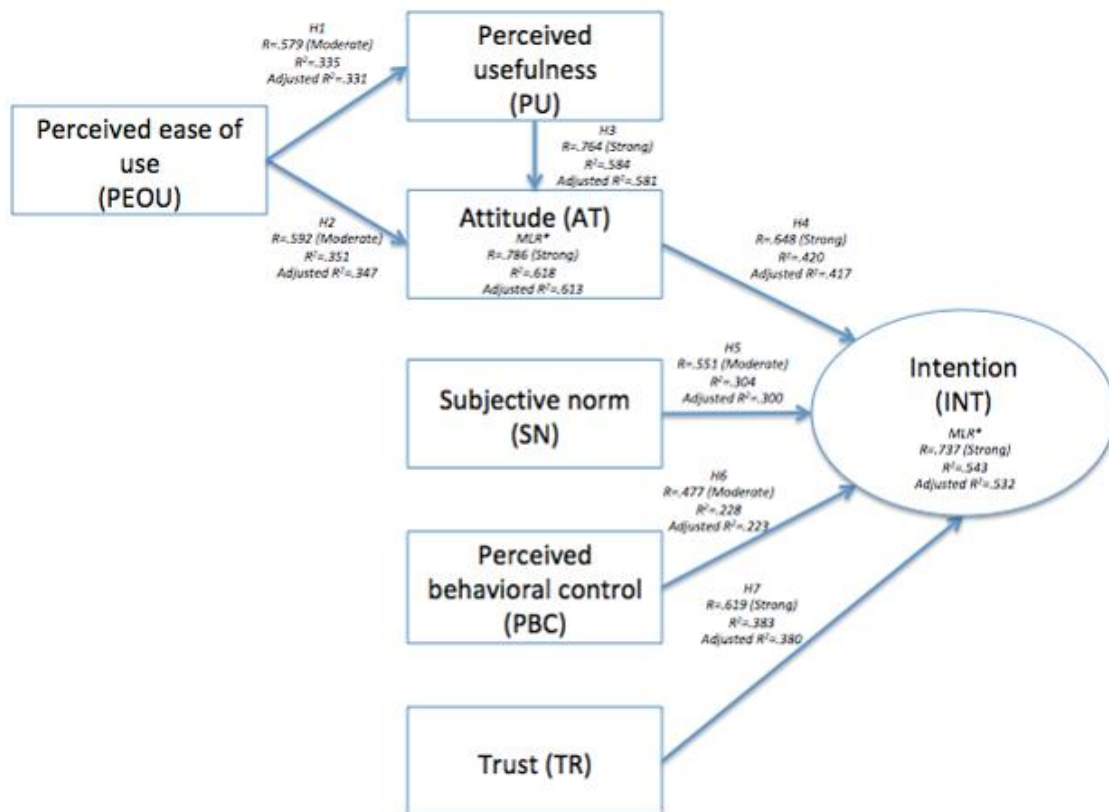


Figure 2. Integrated Theoretical Framework with Statistical Results

Table 3. Simple Linear Regression Coefficients Output

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
H1	(Constant)	1.418	.294		4.819	<.001
	PEOU	.648	.070	.579	9.221	<.001
H2	(Constant)	1.294	.298		4.351	<.001
	PEOU	.679	.071	.592	9.558	<.001
H3	(Constant)	.903	.211		4.281	<.001

	PU	.782	.051	.764	15.389	<.001
H4	(Constant)	.340	.334		1.018	.310
	AT	.888	.080	.648	11.066	<.001
H5	(Constant)	2.081	.228		9.110	<.001
	SN	.543	.063	.551	8.591	<.001
H6	(Constant)	.485	.500		.970	.334
	PBC	.790	.112	.477	7.062	<.001
H7	(Constant)	1.200	.277		4.334	<.001
	TR	.754	.074	.619	10.246	<.001

Table 4: Multiple Linear Regression Coefficients Output (IVs: PU, PEOU; Mediator: AT)

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.903	.211		4.281	<.001
PU	.782	.051	.764	15.389	<.001
(Constant)	.375	.244		1.537	.126
PU	.648	.060	.633	10.824	<.001
PEOU	.259	.067	.226	3.865	<.001

Table 5. Multiple Linear Regression Coefficients Output (IVs: AT, TR, PBC, SN; DV: INT)

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.340	.334		1.018	.310
AT	.888	.080	.648	11.066	<.001
(Constant)	-.027	.320		-.085	.933
AT	.589	.095	.430	6.187	<.001
TR	.431	.085	.354	5.091	<.001
(Constant)	-.727	.416		-1.746	.083
AT	.488	.102	.356	4.795	<.001
TR	.410	.084	.337	4.906	<.001
PBC	.269	.105	.162	2.565	.011
(Constant)	-.823	.407		-2.020	.045
AT	.286	.119	.209	2.416	.017
TR	.370	.083	.304	4.476	<.001
PBC	.336	.104	.203	3.221	.002
SN	.219	.071	.222	3.096	.002

Table 6. R Value Level of Strength

R (Correlation Coefficient)	Level of Strength
0.00 – 0.19	Very weak
0.20 – 0.39	Weak
0.40 – 0.59	Moderate
0.60 – 0.79	Strong
0.80 – 1.00	Very strong

The findings in the study can be the insights to academia, industry players and government. To academia, the study has proved the explanatory ability of the integrated theoretical framework, it provides the thought for future research for instance conduct the similar study in other location. To industry players like OGS service providers and grocery retailer, the survey results is a music to their ears where 82.5% of the respondents say they will continue to use OGS after the COVID-19 pandemic is over. Industry players should work together and tailor the strategies based on the findings in this study to sustain and grow the use OGS. As the findings suggest that attitude has the strongest relationship with the intention, and perceived usefulness has the most influence towards attitude, business should focus to create the desire to use OGS by raising awareness on how OGS help the customers get the grocery shopping done without the hassle of traffic jam, finding parking and queuing up at the payment counter, the desire will form part of attitude then intention. Besides that, OGS platform needs to be perceived as useful that would help the user to do more in less time. OGS service providers can use big data science and analytic to study the pattern and frequency of the grocery purchases by users, auto fill up their shopping cart and remind them that it is time to replenish their grocery stock, and what the users need to do is just few click for payment to complete the shopping, as if having a personal shopper in the pocket. Finally, government plays a key role in further developing the OGS landscape in Malaysia. The flourish of OGS industry has created many jobs in Malaysia, like delivery riders or drivers, customer service executives, application developer and designer, content manager etc. Therefore, it is crucial that the federal and state governments and agencies collaborate with the industry players in the value chain on policies relating to gig workers, 5G availability, infrastructure, and road safety etc. to cultivate a conducive environment for the industry to grow.

3.1 *Limitation*

The population of the study sample was limited to Klang Valley of Malaysia, which may not be an exact representation of the total population of Malaysia without considering other regions in Peninsular Malaysia, Sabah and Sarawak. Due to the time and resource constraint, the paper aimed for the reasonable sample size from the population in the major cities of Malaysia. Besides, the sampling can be more random and objective but due to the consideration of health amid of COVID-19 pandemic, the study employed non-probability sampling method to collect the survey responses via online Google Form instead of face-to-face, which is deemed appropriate and effective at the time the survey is conducted. Finally, time factor could change the result of the study, due to but not limited to the development in government policy, technology and economy condition in the country.

3.2 *Proposal for Future Research*

The authors propose that the future research to conduct the similar study in any other location in the world, using different sampling approach, employ more focus data collection method, or adopt more advance statistical analysis to further test the explanatory power of the integrated theoretical framework according to their time and resource allowance. Besides that, in depth study can also be performed to amend and optimize the integrated theoretical framework for context other than OGS by modifying the variables, for example replace the trust variable with cost variable in the context of adopting online gaming.

4. Conclusion

As OGS is likely to stay and continue to be the essential service after the COVID-19 pandemic, the key stakeholders must work hand in hand to ensure the industry is sustainable and continue to grow. The OGS service providers should focus on to bring more value to the customers based on the key areas recommended in the findings and cooperate closely with retailers and government at all levels to improve the ecosystem of the industry.

The research has met its purpose in examine the consumer's intention towards OGS in Klang Valley of Malaysia when the COVID-19 pandemic is over. The result of the statistical analyses performed in the study is in support of the predictive power of the integrated theoretical framework and answered the hypotheses outlined in the paper. The findings also provided insights on key focused area, implication,

limitation as well as recommendations to the targeted audience of this study – academia, businesses, and government; in hope to have positive contribution to the future study as well as the consideration in the business strategy, policy and regulatory improvement for the industry.

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Ethoshunt™ as Technology Mediation for Teaching and Learning of Counseling Ethics

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Abstract: Ethics incorporate ethical behaviors and morality rules. However, ethics is non-negotiable. Counselors often encounter situations that require them to cultivate the ability to make sound ethical decisions. There is always a consistent struggle to locate both concepts of human values and social conditions; and there is rarely one right solution to a complex ethical dilemma. Counseling ethics education is one of the channels available to strengthen counselors' ability to meet the ethical-related social demands and global challenges. The knowledge acquisition through teaching and learning process of counseling ethics would improve counselors' efficacious beliefs in dealing with ethical dilemmas and eventually, firm up counseling profession training standards. The existing counseling ethics teaching and learning method is educator-centric and is considered largely outdated. Hence, the transformation of teaching and learning practices of counseling ethics is required to educate counselors as to apply ethical principles to specific situation. In this study, a mobile app called Ethoshunt™ is developed based on gamification ideation to complement the conservative classroom teaching and learning methods. The elements of game mechanics, game dynamics, functionality, and learning flow experience gained through Ethoshunt™ emerged as unique components which enable the students engaged with learning objectives and charted with course learning outcomes, digitally. Ethoshunt™ may bring a new spectrum of talent for educators in developing and exploring technology-mediated learning to supplement existing teaching and learning activities in counseling ethics education. This would further engage and inspire members of the millennial generation in line with the new wave of industrial transformation.

Keywords: Ethoshunt™, technology mediation, counseling ethics, educational gamification

1. Introduction

Over the past century, we have been observing rapid technology change which is transforming our world at an astonishing pace; and these technology advancements have been embraced more during Covid-19 pandemic (Renu, 2021). According to García-García et al. (2020), the new wave transformation has altered the global sociological model and how it contributes to the society's functioning. This new wave of transformations implies the use of various advanced technologies such as Artificial Intelligence (AI), Internet of Things (IoT), and Robotic Process Automation (RPA) embedding the use of internet widely to support technologies (Schumacher et al., 2016). Intelligent machines with acting human are integrated in the new industrialization era to improve economic efficiency, increase labor productivity, reduce manufacturing costs, and increase return on investments (Sima et al., 2020). This includes future proofing technology, design, science, and architecture which entails sustainable and resilient solutions (Ranchordas & Roznai, 2019). In short, future-proofing technology can be used in the future even when the technology changes.

To date, global development has witnessed three major transformations prior to the inception of the 4th Industrial Revolution (Alam et al., 2020). The series of transformations that have taken place over the past centuries are agriculturalization, followed by weaponization and industrialization (Alam et al., 2020). The 4th Industrial Revolution which is also known as the era of intervention and incorporation of technology consists of four fundamental parameters which are: (a) artificial intelligence; (b) digitalization; (b) cyberization; and (c) webization (Alam et al., 2020). Smart sensors, simulation, big

data, cloud computing, IoT, 3D printing, virtual and augmented reality, and drones are examples of key technologies of 4th Industrial Revolution. One of the key technologies of 4th Industrial Revolution is gamification. This contemporary technology can be integrated into multidisciplinary platforms including education sector. In this study, the researchers introduced Ethoshunt™, a prototype developed based on gamification ideation to complement the conservative classroom teaching and learning methods. This prototype was initially developed as a teaching and learning tool for counseling ethics education involving trainee counselors. Later, the innovation was extended to the engineering students.

Today, educators worldwide are encountering challenges to continue providing quality teaching and learning practices. The biggest challenge is to deliver instruction and facilitate learning through hybrid or 100% online modes. This challenge could be due to the expectations of the millennials who look forward to experiencing inspiring, engaging, and fun learning process. Hence, in line with the advancement of technology and new wave transformation, it is essential to integrate new technology mediated tools incorporating game elements to extend learning while promoting cognitive and emotional development of the learners. The application of game elements such as game mechanics, game dynamics, game components, and game aesthetics with the support of virtual learning environment (VLE) is commonly known as gamification and it is proven to be beneficial to human beings.

1.1 Gamification

Shifting towards advantages and contribution, gamification has exceptionally benefited human being and proven significant in various disciplines. Gamification involves non-gaming elements (Zolfaghari et al., 2021) but gamification integrates game-like concepts instead to engage, motivate, and inspire learners (Zakaria et al., 2020a). Example of gamification elements are rewards, goals, leaderboards, and badges (Zakaria et al., 2020a; Zakaria et al., 2020b; Zolfaghari et al., 2021). Researchers have studied on the integration, advantages, and user experience of gamification in various disciplines. Klock et al. (2021) have studied elements of gamification in freight transportation, Canio et al. (2021) found that shopping gamification integrated in a mobile app indirectly influenced shopping engagement, Pasca et al. (2021) have synthesized gamification-related knowledge in the field of tourism, and Bitrián et al. (2020) found that gamified sports app satisfies psychological needs of an individual such as autonomy, competence, and relatedness. On the other hand, Alsawaier (2018) has investigated the effect of gamification of engagement and motivation; and Maturo and Moretti (2018) have studied on the roles of gamification-based health apps to promote medicalization. According to Maturo and Moretti (2018), the utilization of gamified self-tracking transforms tedious tasks into pleasurable activities which eventually improves performance without oppressing the individuals.

Thus, gamification has huge potential in making positive improvements in all aspects of our lives. This includes education and the main objective of employing gamification in education-based environments is to transform traditional teaching and learning methods; and consequent learning outcomes (Legaki et al., 2020; Zakaria et al., 2020a; Zakaria et al., 2020b). Gamification also keeps learners engrossed with the learning objectives and learning outcomes, improves learner's motivation level (Chung et al., 2019; Hsu & Chen, 2018), and inspire continuous learning (Legaki et al., 2020; Zakaria et al., 2020a; Zakaria et al., 2020b). Gamification-based application users would demonstrate positive learning behaviors and the application specifically would reinforce human behaviors. Furthermore, gamification allows learners to learn with energized focus (Garcia-Sanjuan et al., 2018), challenges students with high ability (Tsay et al., 2018), promotes flexible learning environment (Tsay et al., 2018), and maintain positive attitudes toward the program or course of study (Davis et al., 2018).

Similarly, the current study introduced Ethoshunt™, an educational gamification-based mobile app as a technology mediated tool which can be utilized in teaching and learning of counseling ethics education. The researchers conducted literature search and found that integration of gamification in the field of counseling is still at infancy stage. We found limited gamification-related resources in counseling ethics education. Past studies revealed significance of gamification in mental health and well-being (Cheng, 2020; Fleming et al., 2017; Six et al., 2021), emotional health treatment through Cognitive Behavioral Therapy (CBT) (Christie et al., 2019), and multicultural counseling (Mzohd Daud

et al., 2019). Similar to the current study, Suhaimi et al. (2018) has applied gamification in teaching and learning.

The main purpose of this study is to present game elements of Ethoshunt™. The detailed technical components of Ethoshunt™ were published in Zakaria et al. (2020a). Ethoshunt™ was mainly developed to complement the existing counseling ethics education teaching and learning practices. Currently, the counseling ethics educators are utilizing traditional teaching apparatus such as paper pencil, whiteboard, presentation slides, textbooks, e-books, worksheets, charts, and posters. Hence, changes are required specifically in the teaching and learning of counseling ethics education as ethics education is a cut and dry course (Carnes-Holt et al., 2016; Subarimaniyam et al., 2020; Warren et al., 2012; Zakaria et al., 2022).

1.2 Counseling Ethics Education

Ethics is non-negotiable (Grigoropoulos, 2019). Ethics incorporate ethical behaviors and morality rules (Grigoropoulos, 2019). Counselors often encounter situations that require them to cultivate the ability to make sound ethical decisions (Forester-Miller & Davis, 2016). There is rarely one right solution to a complex ethical dilemma (Forester-Miller & Davis, 2016). However, there is consistent struggle to locate both within concepts of social condition and human values; and the question of what comprises counseling ethics education is complex and intriguing (Levitt et al., 2015; Mullen et al., 2014; Zakaria et al., 2013). Furthermore, there is lack of clear and proper solutions to the counseling ethical issues (Hill, 2004; Zakaria, 2013; Zakaria & Warren, 2016; Zakaria et al., 2017). Hence, counseling ethics education is one of the channels available to strengthen counselors' ability to meet the ethical-related social demands and global challenges. The knowledge acquisition through teaching and learning process of counseling ethics would improve counselors' efficacious beliefs in dealing with ethical dilemmas and eventually, firm up counseling profession training standards. The existing counseling ethics teaching and learning method is educator-centric and is considered largely outdated. Hence, the transformation of teaching and learning practices of counseling ethics is required to educate counselors as to apply ethical principles to specific situation. According to Zakaria et al. (2020b), gamification is used in various focus disciplines and guarantees technology advancement in many sectors. They also found that one of the most recurrent target users of gamification are learners and educators. In line with the findings, they have highlighted that one of the probable hubs of gamification could be education sector. Hence, it is worthful to explore Ethoshunt™. The researchers believe that the new educational gamification-based tool could be more engaging and immersive as it integrates experiential-based learning features.

2. Ethoshunt™, A Gamification-based Mobile Application

A prototype called Ethoshunt™ is developed to complement existing teaching and learning of counseling ethics education practices. It is a gamification-based mobile application that was designed to handle three types of interfaces which are Android mobile app, mobile web browser, and desktop web browser. For desktop web browsers, the system architecture has been pilot tested via Safari (Apple; Version 11.0.3) on Mac OS X EI (Apple; Version 10.11.6) and Google Chrome (Version 74.0.3729, official build; Google) on Windows 10 (Microsoft). For mobile web browser and the Android mobile app, the system was tested using Google Chrome (Google; 74.0.3729.157) and (Google; Version 9.0) respectively. Figure 1 depicts a postgraduate student using Ethoshunt™ for her counseling ethics education course and Figure 2 shows the features of the app.



Figure 1. Gamification-based Mobile Application, Ethoshunt™



Figure 2. Features of Ethoshunt™

3. Methodology

The development of Ethoshunt™ involved three steps, taking the mobile application from initial concept to final launch in the classroom. The process from introducing initial concept to final launching focus on the meaningful content of the gamification-based mobile app. This includes introduction to game mechanics, followed by introduction to game dynamics and launch during counseling ethics class. This process is exclusion of the development of system architecture, securing of intellectual property, and market launch of the innovation.

3.1 Stage 1: Introduction to Game Mechanics

Game mechanics is a mechanism that encourage certain behavior or move the simulation forward with the help of rewards. Example of game mechanisms are badges, levels, and points (Blohm & Lelmelster, 2013). Ethoshunt™ functions based on the four steps as shown in Figure 3. First, the instructor sends counseling ethics-related hint to the students. Students are required to check the hints sent by their instructor and in response to the hints, students will need to submit an appropriate answer for evaluation or grading purpose. The hints and answers must be within the scope of counseling ethics education; and can be in the form of audio, image, text, or video. Points will be given to each correct answer.

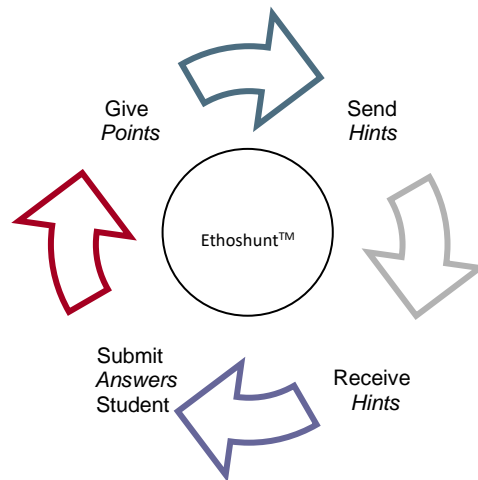


Figure 3. Game Mechanics of Ethoshunt™

3.2 Stage 2: Introduction to Game Dynamics

Game dynamics create desirable game experience and reflects the effect of game mechanics (Blohm & Lelmeester, 2013). Game dynamics also reveals how user of the gamification-based mobile app evolves over some time (Blohm & Lelmeester, 2013). Game dynamic include feedback, time pressure, appointment, and progress. Ethoshunt™ incorporates progress-based game dynamic. The users or students will progress through multiple levels and the final level would indicate highest level of understanding of counseling ethics education. Students who have mastered the course would score higher points and would reach the final stage of Ethos levels (See Figure 4).

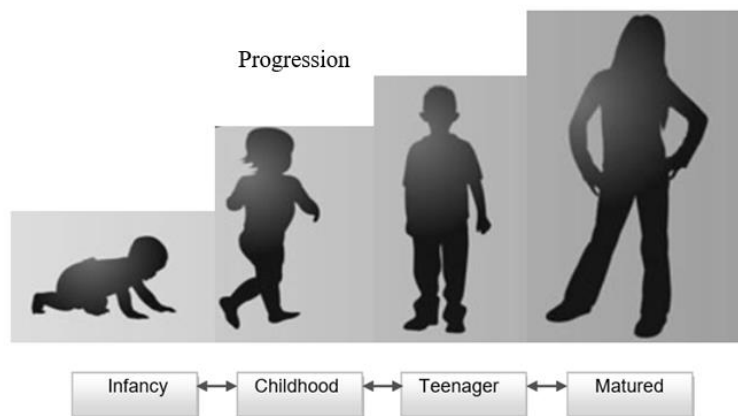


Figure 4. The Ethos Levels

3.3 Stage 3: Launch of Ethoshunt™ in the Classroom

The launch of Ethoshunt™ was held in a classroom. The researchers performed user acceptance testing to test the interface and function of Ethoshunt™. The user acceptance testing involved students who have registered for the counseling ethics education course. The test was performed in sequential order:

Step 1:

Send Hints (Instructor):

What does a counseling ethical decision-making model look like?

Send Hints (Instruction):

Upload an image as your answer to the question. The hints can be related to hidden information in the virtual or real world. Submit your answer by 29th October 2022. Note: The types of hints can be hidden details in the real and virtual world. Details in the real world could be related to physical clues. On the other hand, details in the virtual world could be quotes, stories, images, audios, films, dialogues, and other internet-based particulars.

Step 2:

Receive Hints (Student):

The student receives the hint from instructor through a dedicated Android app. A notification will be displayed on the student's mobile device screen.

Submit Answers (Student):

The student submits an answer (an image as requested by the instructor) via the Android app. The instructor will also receive notification on the mobile device or laptop screen upon receipt of the answer from student.

Step 3:

Give Points (Instructor):

The instructor deposits Ethos points for correct answers. Students will progress through Ethos levels as shown in Figure 4: (a) Infancy; (b) Childhood; (c) Teenager; and (d) Matured. Students who have advanced to matured level (high Ethos points) reflects good understanding and acquisition of knowledge related to counseling ethics. These 'matured' students will have ability and confidence to make mature ethical reasoning.

4. Findings

The outcome of the user acceptance testing of Ethoshunt™ as a technology mediation for counseling ethics education was projected through effectiveness of the app in counseling ethics education. The students advanced from one Ethos level to another Ethos level (from infancy stage to childhood stage, followed by teenager and matured stage) and collected certain number of Ethos points at the end of the user testing. The students experienced a meaningful ethics education learning flow (See Figure 5) consisting of 10 learning keys which was different from the traditional learning process. The 'achievement' key motivated the students to accomplish task given by their instructor and 'appointment' ensured students' responsibilities to check on the hints they received. The application of Ethoshunt™ as technology mediation for teaching and learning of counseling ethics education can be motivating and inspiring. The positive emotions would encourage them to set higher goals which is to achieve matured stage. Next, they work 'collaboratively' with other peers while focusing on 'epic meaning'. Utilization of gamification-based mobile application can cultivate creativity and foster relationship with team members. Epic meaning also helps students to achieve excellent learning outcomes.

Students receive bonuses in the form of Ethos points for all their achievements or correct answers and collect targeted points within a specific duration through 'countdowns'. Countdown refers to the number of points they have to count through until highest level is achieved. 'Discovery' reflects how students navigate through and explore ethics education course and 'synthesis' knowledge gained. For 'loss aversion', the students will continue playing to avoid losing what they have gained. Finally, the students will work through 'infinite play' by being active and engaged in the learning process until they become expert in the course. Perhaps, students can continue playing until they achieve matured level which reflect great understanding of counseling ethics.

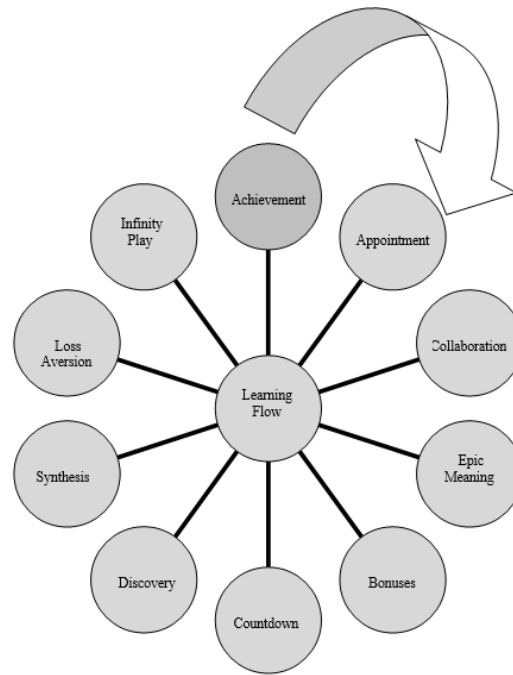


Figure 3. Learning Flow through Integrative Ethoshunt™.

5. Conclusion

As students, discovering new knowledge and synthesizing what they have learned are part of self-development. Navigating throughout the learning process can be extremely challenging and tedious for some students. However, integration of gamification-based and technology mediated tools such as Ethoshunt™ can make teaching and learning practices of counseling ethics education more meaningful. Securing what they have gained would reflect their responsibility level and infinite play would reflect their continuous commitment to become expert in counseling ethics education. The researchers advance that Ethoshunt™ may bring a new spectrum of talent for educators or instructors in developing technology-mediated learning to augment teaching and learning activities. The app drives motivation fosters deep engagement, and collaboration among the students. Ethoshunt™ holds the potential to inspire students while making ethics education learning more enjoyable and fun. The usefulness of Ethoshunt™ offers possibilities to revolutionize existing counseling ethics education teaching and learning process in line with the needs of the 4th Industrial Revolution. This could be the new wave of transformation in the field of counseling ethics education.

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Technology Mediation in Counselor Education using PLATER Software

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Abstract: There is an urgency to introduce potential training development tools in the practicum and internship of counselor education program. It is through practicum and internship that the counselor trainees put theory into practice and close the knowing gap. However, there is limited resources to facilitate learning of counselor education. Hence, the purpose of this study is to introduce PLATER Work Values and Personality Clarification inventory, a software developed and designed to measure work values and personality of potential counselor education program candidates. The work values and learning dimension provide the underpinnings of a successful counselor education practicum and internship experiences. The 'work values' variable structure varies between dichotomous and multidimensionality. The PLATER was factor analyzed and the findings yielded from 605 respondents suggest three factors which are Collaborative Principles, The Learning Readiness Principles, and Sense of Community Principles. Two components of the subscales which are Ethical Meaning and Learning were identified as the major intrinsic values orientation after the factor analysis realignment procedure. Reliability of the scale was also reported. This empirical evidence of the assessment and dimensionality of the scale items may simplify the application of the PLATER as a potential training and development tool in the practicum and internship of the counselor education program.

Keywords: software in counseling, technology mediation, counselor education, work values, personality, learning in counseling, practicum, internship

1. Introduction

Counselor education program both at bachelor and master levels incorporate practicum and internship. It is mandatory for counselors to accumulate required hours to be called as counselors and registered with the Board of Counselors (Malaysia). Hence, the Board of Counselor (Malaysia) and the Council for Accreditation of Counseling and Related Educational Programs (CACREP) highlighted that practicum and internship should be incorporated in an accredited counseling program including entry level (Warren et al., 2012). The practicum and internship components would prepare the trainee counselors towards engaging themselves in an experiential learning process and real on-site counseling work setting.

According to Marinas et al. (2018), it is through practicum and internship that the counselor trainees apply theory into practice and bridge the knowing gap. The optimization of learning in such an environment delineates conditions pertaining to the trainee counselor as well as dynamics of the work atmosphere itself. Such optimization of the practicum and internship working conditions may maximize the counselor trainees' learning of counseling process during their period of training. The process of maximizing learning would contribute to the trainee counselors' self-development leading towards becoming astute counselors. Furthermore, the accumulation of experiential learning experiences would enhance self-efficacy beliefs for future employment opportunities (Wang & Lee, 2019). Efficacious counselors would be able to bounce back to the original state of cognition despite any obstacles, challenges or circumstances (Subarimani et al., 2020). Ethical issues and many other aspects of counseling are reflected as complex and requires careful observations. Thus, preparing trainee counselors to face future ethical dilemma through practicum and internship is necessary to enhance overall counseling profession.

Nevertheless, underlying these conditions are work values and cognitive learning process embedded within the counselor trainees' ideology and thoughts themselves. In real life work setting, Wright (2016) indicated that ethical behaviors and values aligned were found to be the driving force of well-being in almost 80% of the pre-eminent workplaces in the United Kingdom. It reflects that the practicum and internship workplace with similar conditions reported in the United Kingdom may sustain the best performance of the counselor trainees in their own work setting. According to Bashir and Long (2015), individuals who have attended practicum or internship training have tendency to become more socialized in terms of values and performances compared to those who did not gain both the supervised on-site work experiences. The findings can be further supported and clarified through the current study. The purpose of this study is to report reliability and factor analyze PLATER Work Values and Personality Clarification inventory. The researchers also attempted to make an empirical assessment of the dimensionality of the scale items.

2. Literature Review

2.1 Learning Dimension

The ability of counselors to identify and understand emphatic feelings and positive regard over the behavior domain of clients are considered as being therapeutic in the helping relationship (Othman Mohamed, 2015a; Warren et al., 2013). Forming a therapeutic relationship is essentially significant in the holistic process as it paves the way for clients to gain self-acceptance and hope. Counselor trainees are expected to be skillful in the core elements of active attending, listening skills, empathy, and positive regard. Such skills provide the foundations of the advanced capacity towards the application of counseling techniques accordingly within the boundaries of each theoretical counseling approach. The trainee counselors' ability to commit an interactional deliberation and communicate emphatically is also a pragmatic approach towards cooperative and collaboration efforts specifically in an interactive and therapeutic counseling environment (Othman Mohamed, 2015a). It is this pragmatic constructivist approach that facilitates the challenge of the new education phenomenon towards enhancing a meaningful and innovative outcome of the cognitive learning process. Researchers found that meaning making and creativity enhances deep learning (Carnes-Holt et al., 2016; Foo et al., 2017; Warren et al., 2012; Zakaria et al., 2020; Zakaria et al., 2022) in the context of self-enhancement active learning which requires counselor trainees to involve in an active experiential learning process such as the practicum and internship experience in a real work setting.

In this regard, the new revised Bloom's Taxonomy of Learning Process provided by Anderson and Krothwohl (2001) illustrated a systematic paradigm in an individual's learning process through their educators and their self-capacity to stand out in any undertakings. The teaching and learning process in the early stages of an individual development occurs through the process of modeling, in which learning occurs through imitation and observation alone. The cognitive process becomes more prominent as they grow and the changes becomes more subtle during the individual's maturity development (Balich et al., 2015). For trainee counselors, it is the aptitude of implementing what they have learned during the counselor education training program and valuing the development of their cognitive ability that may contribute towards achieving an optimum counseling process outcome (Subarimaniyam et al., 2020; Zakaria et al., 2017).

2.2 Work Values Dimension

The learning process is an element of the values dimension. Values being the core beliefs of a trainee counselor may influence active actions transformed into behaviours. According to Rokeach (1973), values guide judgement, attitudes, and actions. As values are learned, so are acceptance of ethical meaning evolving in the cognitive process of individuals. However, work values are subset of ideas and beliefs which are closely related with occupational job setting. Work values are often incorporated into employees' development and workplace achievement (Mat Ali & Panatik, 2013). Individuals with positive and optimistic work values would project positive work behaviours and consequently, satisfaction, excellent work performance, and high commitment in the work (Bakar et al., 2011).

Furthermore, work values predict how individuals choose their career paths and demonstrate engagement at work (Wong & Yuen, 2012). In this light, the literature dwell upon multiple descriptive dimensions classifying work values as a dichotomy, trichotomy, four or five dimensional, and multi-dimensional perspectives. Herzberg (1966) highlighted the dichotomy of intrinsic and extrinsic nature of work values. Intrinsic values are inherent in an activity whereas extrinsic values connote an outcome activity.

On the other hand, Super and Super (1957) maintained the three-dimensional classifying work which are intrinsic, extrinsic, and extrinsic rewards categorization. In this regard, Aldefer (1972) has replaced the extrinsic rewards with social value. Subsequently, Ros et al. (1999) introduced the four-dimensional categorization accounting power, social, intrinsic, and extrinsic as the work values factors. This categorization is within the conceptual boundaries of the new education transformation. Herein, intrinsic values reflect personal interest, creativity, growth, and autonomy (Mat Ali & Panatik, 2013; Wong & Yuen, 2015). Extrinsic values reflect such matters as reward and security (Mat Ali & Panatik, 2013; Wong & Yuen, 2015). In contrast, social values reflect common contact with people, and power manifests a reflective of prestige, authority, and influence. Ros et al. (1999) ascertained that these work values are expression of the general human values in a work setting.

In this regard, the orientation of intrinsic and extrinsic work values are formative perceptions of work goals. The new education concept which is related with cognitive constructivism is more aligned with these definitive descriptions. Vansteenkiste et al. (2007) reported that workers that are more conscientious are more likely to be motivated and able to adapt to intrinsic values. Furthermore, researchers also identified employees that attached relatively more on extrinsic values were less happy with the life and less satisfied with their jobs (Vansteenkiste et al., 2007).

3. Methodology

A total of 605 was randomly selected from a population of 800 candidates who were administered the PLATER Work Values and Personality Clarification inventory (PLATER) as part of a scholarship screening exercise for entry into the Malaysian universities and universities outside Malaysia. The PLATER inventory was designed and developed in the form of a computer software by Othman Mohamed (2015b). Two inventories are embedded in the software which are The PLATER Work Values Clarification (PLATER WCV) and the PLATER Work Personality Clarification (PLATER WPC). Only the PLATER WCV is of interest in this study.

The 4-point Likert type digital form inventory consists of 72 items which are randomized upon each administration of the software. The Likert scale points ranges from one (1) to four (4): (1) Not very important at all; (2) Not very important; (3) Important; and (4) Very important. The randomization of the 72 items ensures the security of a unique set of individualized inventory unit for each PLATER user. Six work values variable dimensions such as purpose, learning, aptitude, teamwork, ethical meaning, and relationship (PLATER) with each variable dimension containing six sub items in dual pairs were duly constructed. Figure 1 illustrates the PLATER WVC computer dashboard depicting the six subscales and six variable dimensions with their respective item scores.

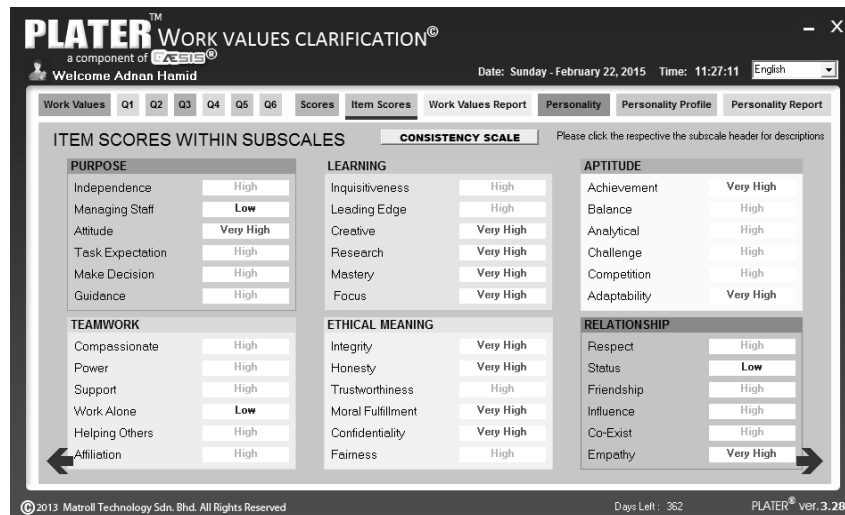


Figure 1. PLATER Work Values Clarification Six Variable Dimensions

4. Findings

4.1 Reliability

The overall reliability of the PLATER WVC inventory indicated a high Cronbach's Alpha, $\alpha = .945$, $n = 605$. This value is consistent with the power analysis requirement, thus reducing Type II error with alpha significance of .5 (Cohen, 1992). Subsequently, a factor analysis was performed to comprehend a more structured model to unlock the potential influence of the six work values dimensions, inclusive of the cognitive process learning and ethical meaning subscales as components of work values.

4.2 Factor Analysis

The descriptive statistics of the PLATER WVC is observable in Table 1. Next, a factor analysis is performed to meet the requirement of a good sampling fit. The factor analysis was pursued upon the appropriate results of the Keiser Meyer Olkin (KMO) and the Bartlett Test achieving a significant high level of .899. A factor analysis can identify the underlying factor structure and analyse any shared variance that is accounted for in the components, thus permitting a more accurate rendition of the factor structure (Costello & Osborne, 2005).

Table 1. Descriptive Statistics of the PLATER Work Values Clarification

	Mean, <i>M</i>	Standard Deviation, <i>SD</i>	<i>n</i>
Purpose	38.6893	4.82536	605
Learning	42.1273	4.80742	605
Aptitude	41.5884	4.31625	605
Team work	34.8248	3.89758	605
Ethical meaning	41.5355	4.33691	605
Relationship	38.6826	5.12995	605

The researchers extracted three factors upon application of the Principle Axis Factoring as shown in Table 2. This procedure revealed the identification of the original six variable dimensions into three common components with the items' commonalities index ranging from .620 to .822 which is considered moderate (Refer to Table 2 and Table 3).

Table 2. Factor Matrix of PLATER Work Values Clarification

	Factor		
	1	2	3
Purpose	.853		.129
Learning	.763	-.275	
Aptitude	.830	-.218	
Teamwork	.750	.314	.116
Ethical Meaning	.773		-.147
Relationship	.867	.250	

Extraction Method: Principal Axis Factoring
a. 3 factors extracted
b. 15 iterations required

Table 3. Moderate Communalities of the PLATER Work Values Variables Dimension

	Initial	Extraction
Purpose	.662	.751
Learning	.558	.660
Aptitude	.637	.738
Teamwork	.549	.674
Ethical Meaning	.556	.620
Relationship	.682	.822

Extraction Method: Principal Axis Factoring

A factor plot rotation permitted a visualized identification of the three factor components (Refer Figure 2).

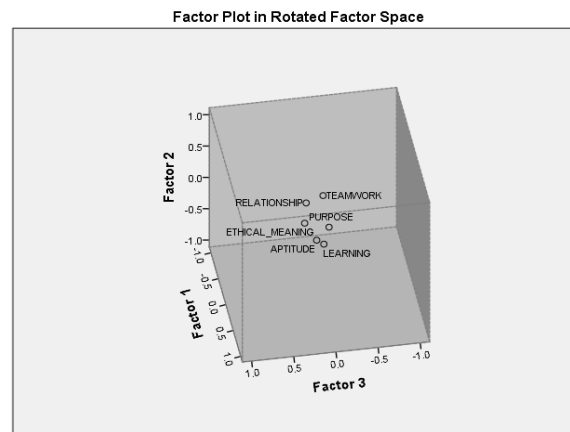


Figure 2. Factor Plot in Rotated Factor Space

Factor One aligned Learning and Aptitude as Learning Readiness Principles. For Factor Two, Ethical Meaning and Purpose were aligned as Sense of Community Principles. Finally, Teamwork is closely aligned with Relationship, permitting Factor Three being defined as Collaborative Principles (Refer to Figure 3). All the three factors' aggregates were realigned accordingly as depicted in Figure 3, taking account of the classification of the new dimensions Learning Readiness Principles, Sense of Community Principles, and Collaborative Principles. This procedure would simplify the interpretation of the results of the PLATER WVC inventory as a training development tool and its implications for the counseling practicum and internship.

Referring to Figure 3, the Intrinsic Values Orientation chart clearly consists of two variable dimensions which are Learning and Ethical Meaning with overlapping coverage of variables: (a) aptitude; (b) purpose; (c) relationship; and (d) teamwork. It must be highlighted that intrinsic and extrinsic work

values are not in a continuum. They are in fact a reflection of the articulation and need upon a desirable individual's need. Individual orientation of need differs, nevertheless embedded values learned over the years in an individual's lifestyle do impact upon judgement, attitudes, and actions (Rokeach, 1973).

Schwartz and Sarkis (1999) emphasized distinct intrinsic values as meaningful work, opportunity for growth; and utilization of ability, skills, and knowledge. These are items in the Learning and Ethical Meaning variable dimensions. The PLATER WVC inventory variable dimension, Learning comprises six subscales embedded in 12 paired items: (a) being creative; (b) ability to conduct research; (c) mastering of specific skills; (d) being focus, and (e) sensitive on leading edge factors are considered as intrinsic values. Also, the variable dimension Ethical Meaning comprises six subscales embedded in 12 paired items: (a) integrity; (b) honesty; (c) trustworthiness; (d) moral fulfilment; (e) confidentiality; and (f) fairness are indicative of intrinsic values.

4.3 Application Implications

The overlapping boundaries of the Intrinsic Values Orientation box into the Aptitude, Purpose, Relationship, and Teamwork is indicative of pertinent intrinsic components in all the three realigned factors (Refer to Figure 3).

INTRINSIC VALUES ORIENTATION		
LEARNING	ETHICAL MEANING	TEAMWORK
APTITUDE	PURPOSE	RELATIONSHIP
FACTOR 1 LEARNING READINESS PRINCIPLES	FACTOR 2 SENSE OF COMMUNITY PRINCIPLES	FACTOR 3 COLLABORATIVE PRINCIPLES

Figure 3. Variable Dimensions of the PLATER Work Values Clarification Alignment with the Three Factors Analysis Components

Aptitude items components such as Achievement, Analytical, and Adaptability could be accounted as intrinsic components. Items components such as Independence and Attitude in the variable dimension Aptitude may also be partial components of intrinsic values. Items components such as Empathy, Being Compassionate, and Helping Others in the variable dimension Relationship may also contribute towards intrinsic values orientation (Refer to Figure 3). In the PLATER WVC inventory, component items such as Challenge and Competition in the variable dimension Aptitude, Power, and Affiliation in the variable dimension Teamwork; Task Expectation in the variable dimension Purpose are assigned as extrinsic values orientations. Williams et al. (2000) cautiously indicated that extrinsic values are related with higher emotional exhaustion.

Past research studies on work values in organizations suggested there is a significant relationship between positive work values and work-related attitudes (Froese & Xiao, 2012). In this regard, there is an openness to change, interest in growth, and creativity in the work setting. It is pertinent to note in view of the Intrinsic Values Orientation realignment of the PLATER WVC inventory, the items, and subscales of the Learning and Ethical Meaning dimensions to reflect the elements of growth and creativity. The cognitive constructivist-based activities may increase competence in content areas (Blaunt et al., 2018; Dillman Taylor et al., 2017). In this light, the identification of the Learning dimensions as intrinsic values may assist in the training and development of the practicum and internship component. According to Dillman Taylor et al. (2017), McAuliffe and Eriksen (2000); and Young and Hundley (2013), cognitive constructivist learning approach postulating a hands-on experiential approach are acknowledged as effective for future practitioners.

Vecchio (1980), Trompenaars (1993); and Huff and Kelly (2004) indicated work values as being important in moulding individuals' specific work expectations and performance role. The subscales in

the PLATER Aptitude dimensions do reflect contents related with analytical, achievement, and adaptability. Furthermore, in the work values Purpose dimension, subscales items independence and attitude are all reflective of work-related expectation and performance.

On the other hand, ethics is one of the components highlighted in the code of conduct of counselors in training as well as real counseling practice (ACA, 2014; CACREP, 2016; Warren et al., 2014). There would be multiple ethical challenges in the real counseling work setting and there is no specific solution for each ethical issues (Zakaria, 2007; 2013; Zakaria & Warren, 2014; 2016). Hence, instilling awareness and being sensitive of ethical meanings are important elements in the training of counselors as a preparation for complexities in counseling work (Zakaria, 2007; 2013; Zakaria & Warren, 2014; 2016). In the PLATER realigned factors, the work values dimension (Ethical Meaning) clearly lies within the Sense of Community Principles underlying its importance within the Intrinsic Values Orientation boundary. Subscale items in the work values Ethical Meaning dimensions reflect contents related with honesty, integrity, trustworthiness, moral fulfilment, confidentiality, and fairness. These are core issues in ethical considerations that ought to be emphasized in a training and development exercise during the practicum and internship of trainee counselors.

5. Conclusion

The overall reliability of the PLATER WVC inventory indicated a high Cronbach's Alpha, $\alpha = .945$. Factor analysis of the PLATER Work Values Clarification inventory identified three factors: (a) Learning Readiness Principles; (b) Sense of Community Principles; and (c) Collaborative Principles. The previous studies on work values have identified structural dimensions varying between the dichotomous and multidimensional dimensions. Under the revised taxonomy of cognitive domain and metacognition as a learning outcome in the knowledge dimension matrix, there is relevance of the self-learning emphasis in counselor practicum and internship exercise. The identification of Intrinsic Values Orientation components shows the potential of the cognitive learning process and work values embedded in the PLATER WVC inventory as a technology-mediated training and development tool for the counseling practicum and internship in the counselor education programme.

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