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A Foresight Study on Adoption of Blockchain Technology among Logistics Industry

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Abstract: Blockchain technology is relatively new in Malaysia. Although it has a significant potential influencing organizational strategies for implementation in respective operations, it has not yet been thoroughly investigated. Utilizing blockchain technology can enhance the performance of logistics, including concerns of traceability and transparency. However, there are concerns exist, regarding the lack of knowledge and limited past research on adoption blockchain technology in Malaysia. Consequently, the purpose of this study was to explore the issues and challenges on adoption of blockchain technology in the logistics business and to investigate the future of blockchain technology in Malaysia. In this study, both qualitative and quantitative methods was used. STEEPV analysis utilized as a foresight methodology. A survey questionnaire was used to identify the primary issues and drivers, as well as the impact-uncertainty analysis that corresponds to the adoption of blockchain technology. The respondents involved employees in the transportation and warehousing industry in Johor with a total of 117 respondents responded to the questionnaire. After achieving success in the development of impact uncertainty analysis, the third objective of scenario building based on impact uncertainty analysis is to pick the top two highest impact and uncertainty drivers for scenario building. Protecting data manipulation and societal resistance had the greatest effect on uncertainty, according to the findings of this study. This research has important implications for the implementation of Blockchain Technology in the logistics industry by future scholars and organizations.

Keywords: Blockchain, Logistics, Challenges, Adoption, Malaysia

1. Introduction

Adopting Blockchain Technology has several benefits. Blockchain technology can record physical events in warehouses as digital information and manage orders and payments (Geetika *et al*., 2019). When delivering a truckload of merchandise across the country, shippers, carriers, brokers, and other logistics specialists must navigate thousands of options and circumstances while precisely documenting each step with exact paperwork. There is no one source of truth to trace all transactions and constituents in the shipping process from origin to destination, making it difficult to manage. In logistics and supply

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chain, where activities are scattered and complicated, blockchain can optimize processes (Perboli *et al*., 2018)

Blockchain has changed how firms function in the IR 4 (Rajput and Singh, 2019). For a supply chain to be viable, logistical products must be delivered on time, in acceptable shape, and at a reasonable price (Flint, 2004). Combining blockchain technology with other applications can improve supply chain sustainability (Huo *et al*., 2019). Many industrial firms are considering implementing Blockchain Technology in their logistic sector but are worried about its performance. Blockchain technology will disrupt supply chain or logistics operations, resulting in a new blockchain-based system (Kshetri, 2018). It increases transparency and traceability, allowing these industries to quickly fix problems. However, the logistics business has several challenges in adapting Blockchain Technology. First, insufficient awareness of blockchain technology, its evolving nature, and resistance to transferring an existing system prevent firms from using blockchain technology in their supply chains (Treiblmaier, 2018; Zelbst *et al*., 2019; Ghode *et al*., 2020)

Second, trust. Emerging technologies offer new perspectives on societal issues like trust. Understanding and trust affect a new technology's adoption rate. Those who want to embrace blockchain technology may be concerned since it entails reevaluating data management and sharing mechanisms. Especially for blockchains, where confidence is key to growth (Shin, 2020). Third, Blockchain's limited scalability. According to Croman (2016), blockchain technology is immature and cannot scale or manage transaction volume. Yli Huumo (2016) believes Blockchain Technology can't handle huge transactions. Bitcoin network conducts roughly seven transactions per second, compared to Visa's many (Croman *et al*., 2016). Consequently, transactions or logistics activity may be delayed. Fourth, immutability is a problem for logistics to implement this new technology. Due to the timestamped nature of Block chain transactions, they cannot be altered after being recorded (Lee and Pilkington, 2017). Smart contract coding ensures supply chain data immutability. Poor code threatens Blockchain's secure system (Cole *et al*., 2019). Creating Blockchain code that meets Supply chain immutability requirements is harder.

Blockchain Technology has the advantage and disadvantages with the number of issues that are yet to be cross which causes uncertainty in the future of adopt blockchain technology in the logistics industry. With the new emerging technology, it’s critical to examine the advantages and disadvantages of this emerging technology. However, there was limited study explore on Blockchain Technology and there is a need from researchers to explore the benefits of Blockchain Technology to improve the logistics process if the company adopting the technology. Therefore, this research aims to study the future trend of blockchain technology by evaluating the drivers and issues faced in logistics industry in Malaysia.

The objectives of the research are to determine the issues, challenges facing by the transportation and warehousing of logistics industry in adoption Blockchain Technology. To determine the key drives of Blockchain Technology adoption among logistics industry. To identify the future scenario of Blockchain Technology among logistics industry

This study aimed to predict the future of blockchain technology in transportation and warehousing industry. The survey was conducted in Johor, Malaysia, because Blockchain technology is immature in Malaysia. This study used a quantitative method. A survey questionnaire was designed to collect primary data intended from 285 respondents for this study. The sample was selected randomly based on Krejcie & Morgan (1970).

2. Research Methodology

2.1 Introduction

This chapter discusses the approach that would be used to carry out these studies in order to meet the research objective. In this research, a both quantitative & qualitative research design will be applied. The primary data would be collected using from the target respondents, simple random sampling procedure would be as a sampling technique. STEEPV analysis will be used as a qualitative research tool, to analyze the impact uncertainty and scenario building. STEEPV analysis was used to identify the key drivers of using blockchain technology in the logistics industry.

2.2 Research Design

Research design can be defined as "a clear proposal that is prepared to answer the research problems" (Zikmund *et al.*, 2013). Two types of research design would be used which is qualitative and quantitative research. Qualitative method would be used in first phase and Quantitative method will be used in second phase. In the first phase, STEEPV analysis would be used to identify the future and classification the issues and drivers. In the second phase, questionnaires survey will be used to justified the objectives and drivers from STEEPV analysis.

2.3 Data Collection

Data collection involves obtaining and measuring information from a variety of sources to reach a study purpose. Primary and secondary data are data collecting types. Researchers collect primary information to resolve an issue (Sekaran & Bougie, 2013). Questionnaires and surveys are main data collection strategies. During primary data collection, questionnaires were sent to management-level logistics workers in Johor to gather relevant information.

Secondary data are sources that already exist or material that has been gathered for research purposes in the past. (Sekaran & Bougie, 2013). The secondary data consists of research reports, newspapers, academic and professional papers, thesis and etc. Obtaining secondary data is more economical and expedient than obtaining original data.

This research used secondary data to gathered and evaluated blockchain sources to determine the issue and drivers of the logistics industry adopting blockchain. Secondary data were used to support the study's findings. STEEPV studied the data to discover the drivers of blockchain adoption in logistics.

2.4 STEEPV Analysis

STEEPV analysis is a systematic approach in foresight which is known as Systemic Foresight Methodology. It helps to predict and provide the overview on what factors determine the trends and the possibility scenario happen in the future. According to Geluyake & Rafsanjani (2014), STEEPV model is possible to analysis and observe drivers such as social, technological, economic, environmental, and political factors and values for a research and education study, as well as develop an awareness of potential Blockchain technology challenges and advantages. This tool was to identify the key drivers in this research. After STEEPV analysis completed, the major drivers will be identified and merge the drivers into one key driver.

2.5 Impact Uncertainty Analysis

The function of impact uncertainty analysis is to identify the greatest impact and highest uncertainty in this study. This study will focus on the 2 highest impact and uncertainty to develop the scenario analysis. Impact-uncertainty analysis is a way to rank the drivers and put them into groups based on their effects and risks. The chart is based on the idea that there are two main parts to a scenario which is impact and uncertainty (Myforesight, 2011). Impact in this study means the extent that each driver

and challenge will influence the adoption of Blockchain technology in future. Uncertainty means the scenario that probably occurred by examine the uncertainty level of each key drivers.

2.6 Scenario Building

Scenario Building aimed to construct a potential effect scenario of using Blockchain Technology among transportation and warehousing industry after gathering relevant data. Scenario building involves generating a scenario based on current trends and events. It covers forecast scenarios. Creating narrative scenarios helps reach future goals. Usually used in impact uncertainty analysis. Uncertainty axes help define future events. Future scenario development will use the top two impact-uncertainty drivers to developed.

3. Literature Review

3.1 Introduction

This chapter aims to provide evidence of selected literature reviews on the adoption of Blockchain Technology in transportation & warehousing of logistics industry and discussion on the STEEPV analysis

3.2 Logistics Industry Background in Malaysia

The logistics industry is becoming increasingly important in the supply chain due to the rise of e-commerce. The economy of Malaysia is being driven by fast developments in logistics and supply chain. As a result, the logistics business has a great deal of space to grow and expand with the rise of e-commerce (The Star Online, 2018). Economically, logistics is crucial because manufacturers need effective logistics in ensure timely delivery of their products or services to their clients. The organization has now realized the importance of the logistics industry and intends to use it as a strategic instrument to enhance and obtain competitive advantages (MIMA, 2008).

Malaysia is one of the world's top 20 trading nations due to its ability to provide services that are more comprehensive, safe, and cost-effective than those of other nations (The Star Online, 2016). In order to be competitive, Malaysia must increase the performance of its logistics sector by incorporating new technologies such as blockchain technology to prepare for the global 4.0 revolution

3.3 Advantage of Blockchain Technology

Blockchain technology offers a wide range of applications and may be used to benefit the industry overall. There was various advantage gain from adopting Blockchain Technology in logistics industry. This study stressed the major advantages for logistics sector which were transparency, traceability and security.

(a) Transparency

To ensure that all users have access to the whole history of transactions, blockchain technology combines the distributed ledger principle with a consensus mechanism. One of the advantages of blockchain technology is the increased transparency it provides for data (Arief, 2020). A supply chain's level of transparency can be improved with blockchain technology, which also makes it possible to perform audits and inspections of data sets in real time. Queiroz and Wamba (2019) stated that the transactions and any useful information are communicated across the network, strengthening transparency while also generating trust, because all network players are notified of all in due time. Because of this, the level of transparency makes the actions and operations of the network more visible, which in turn reduces the necessity for trust. (Abeyratne & Monfared, 2016).

(b) Traceability

Uniquely identified objects and people are key to supply chain traceability. Linking chain and internal items, processes, and places should be a must. Blockchain uses anonymity to make transactions accessible and verifiable for all parties. To gather and record relevant traceability data, procedures and data must always be standardized. Blockchain lack standardization, but distributed data storage provides availability and security. Local data store instances write and read data and distribute it over the network. Distribution and verification add latency due to data and network size. High-quality data must be gathered since accepted data cannot be changed later. In a nutshell, the blockchain technology can build a smarter and more secure supply chain by providing a clear auditable and near-real-time visibility (Asavin, 2019).

(c) Security

Cryptography makes it impossible or extremely difficult to steal or modify evidence of identity. On the blockchain, smart contracts may be used to manage access to an individual's identification data (Mainelli, 2017). Blockchain technology has the potential to meet Information Security's three pillars of confidentiality, integrity, and availability (CIA). It's possible to keep data secure by employing suitable encryption algorithm and key management procedures (Might, 2019). According to the characteristics of blockchain technology, blockchain technology is secure and cannot be hacked since there is no weak point, as is the case with conventional security methods (Kshetri, 2017).

3.4 Challenges to Adopt Blockchain Technology in Logistics Industry

The implementation of Blockchain Technology in the logistics business is causing a number of issues for these organizations because blockchain is a new technology that is only beginning to gain popularity. There are still many unclear aspects of blockchain technology. Hence, blockchain technology must deal with numerous challenges. In STEEPV Analysis discusses drivers, issues, and challenges in adoption of blockchain technology.

3.5 STEEPV analysis

In the form of systematic table, the relevant issues, and drivers toward adoption of blockchain technology were identified in the social, technological, economic, environmental, political and values.

3.6 Merged Issues and Drivers

Table 1 was tabulated after merging with the key term issues and drivers obtained in output of STEEPV (appendix). Key term of issues and drivers with the same theme or closely related theme were combine into a single issue or driver. A total twelve issues have been developed and the questionnaire was developed based on these drivers.

Table 1: Merged issues and drivers

No	Issue	Drivers
1	Access same data and single point truth which protect it from manipulation	Protect data manipulation
2	Decentralized structure which improves traceable data and enhance transparency	Increase transparency
3	Reduce cost by replacing costly intermediaries	Cost effective
4	Transform supply chain function from Business Process Reengineering to security enhancement	Competitive Advantage
5	Secure transaction without human interface	Eliminate human interface

6	Emerging trend which enhances the economic and operation value	Emerging trends
7	New regulatory and complicated law enforcement resulted social resistance	Social acceptance
8	Quick solution and transparency to overcome the environment challenges	Overcome environment challenges
9	Used smart contract which avoid manipulation of system	Smart contract
10	Optimize the flow of information which could add value to overall process and product	Value added
11	Immature technology which needs necessary skills and knowledge for working with blockchains technology	Worker's skill and knowledge
12	Enhance supply chance visibility which boost the accuracy of forecasting	Boost accuracy of forecasting

3.7 Result of Merged Key Drivers

Table 2: Results of Merged Key Drivers

No	Drivers	Detail Explanation on the key drivers
1	Protect data manipulation	One of the major advantages of blockchain technology is to protect data manipulation.
2	Increase transparency	Blockchain technology offer a quick solution that keeps record safe to ensure the transparency of data and trust.
3	Cost effective	Digital currencies used in blockchain technology transaction is cost effective.
4	Competitive Advantage	Reducing manufacturing lead time by using Blockchain technology drive a competitive advantage to the company.
5	Eliminate human interface	Decision made by blockchain artificial intelligence avoid a direct human interference.
6	Emerging trends	Blockchain is an emerging trend which gain acceptance across various industry.
7	Social acceptance	Social acceptance and attitude of worker is one of the biggest challenges to adopt blockchain technology.
8	Overcome environment challenges	Blockchain technology use real-time data to monitor message and address environmental challenges over the Ethereum network.
9	Smart contract	The blockchain technology enables the automatic execution of smart contracts.
10	Value added	The traceability provided by blockchain technology greatly improves economic processes overall.
11	Worker's skill and knowledge	A worker must acquire a deeper and broader range of abilities in order to effectively use blockchain technology.
12	Enhance cybersecurity	Blockchain technology enhanced better cybersecurity and remodelling all the attributes of supply chain processes.

4. Data Analysis and Results

4.1 Introduction

These analyses determine the importance, impact, and uncertainty of STEEPV drivers. SPSS was used to gather demographic data and the mean of issues and drivers. The two highest factors in mean will define most uncertainty and impact on Blockchain Technology adoption. The two highest impact and uncertainty would be used in next chapters to build scenario analysis.

4.2 Survey Return Rate

The number of populations of the warehousing and transportation companies in Johor state is 1,167. The sample size number of total 1,167 warehousing and transportation companies is 285 in Johor. 285 sets of questionnaires have been distributed through email in the format of Google Form. This method was chosen because it was economical and convenient for researchers to collect data. A total of 117 responses were collected from 285 sets of questionnaires that had been distributed. The survey return rate for this study is 41% and the details are summarized in Table 3.

Table 3: Survey return rate

Population	1,167
Sample	285
Questionnaire Distributed	285
Questionnaire Returned	117
Percentage	41%

4.3 Reliability Analysis

The term "reliability" relates to how consistently the measurement is performed. The reliability of a test score indicates how trustworthy that score is. If the obtained data displays the same results after being checked using a variety of procedures and sample groups, then the information can be considered reliable. If your approach is reliable, then the results that you get will be valid (Nicolas, 2021). Based on Table 4, coefficient Cronbach's Alpha achieved the cut-off of 0.7. This showed that consistency of the survey must reach 0.7 & above to get a reliable result.

Table 4: Reliability analysis

Reliability Statistics			
	Actual Study		
	Importance	Impact	Uncertainty
Cronbach's Alpha	0.825	0.845	0.857
N of items	12	12	12
Number of respondents	117	117	117

4.4 Demographic Analysis

(a) Respondents demographics information

Table 5: Respondent demographic

No	Characteristics	Category	Frequency	Percentage
1	Gender	Male	81	69.2
		Female	36	30.8
2	Age	21-30 Years Old	53	45.3
		31-40 Years Old	54	46.2
		41-50 Years Old	9	7.7
		51 Years Old & above	1	0.9
3	Ethnicity	Malay	47	40.2
		Chinese	48	41.0
		Indian	22	18.8
4	Education Level	SPM	1	0.9
		STPM/Diploma	8	6.8
		Bachelor's Degree	92	78.6
		Master's Degree	16	13.7
		Doctorate Degree	-	-
5	Employment Status	Employed for wages	110	94
		Self-Employed	6	5.1
		Retired	1	0.9
6	Years of experience in logistic industry	1-3 Years	18	15.4
		4-6 Years	67	57.3
		7-10 Years	27	23.1
		10 Years & above	5	4.3
7	Your position in the company	CEO/Owner	2	1.7
		Logistic Manager	10	8.5
		Senior Executive	62	53
		Supervisor	11	9.4
		Other	32	27.4
8	Number of Employees	1-50 persons	14	12
		51-100 persons	42	35.9
		101-200 persons	27	23.1
		200 & above	34	29
9	Have you ever heard about Blockchain Technology	Yes	113	96.6
		No	4	3.4
10	Do you think Blockchain Technology suitable for logistic industry to be adopted	Yes	106	90.6
		No	11	9.4

4.5 Descriptive Analysis of Driver

This section discusses the results for each driver based on the three different aspects which were importance, level of impact and level of uncertainty as to identify the top driver with highest impact and level of uncertainty. An approach using impact-uncertainty analysis was constructed to determine the top driver which contributed significant impact and uncertain occurrence in future.

(a) Mean of drivers corresponding with importance

The mean value and level of tendency on importance of each driver was presented in Table 6. The driver that received the highest mean score is increase transparency (4.15), followed by enhance

cybersecurity (4.07). Next value-added with the mean score 4.06. In meantime, the lowest driver is overcome environment challenges.

Table 6: Mean of Drivers on Importance

No	Issues and Drivers	Mean	Level of Tendency
1	Increase transparency	4.15	High
2	Enhance cybersecurity	4.07	High
3	Value added	4.06	High
4	Worker's skill and knowledge	3.99	High
5	Protect data manipulation	3.97	High
6	Competitive Advantage	3.97	High
7	Cost effective	3.85	High
8	Social acceptance	3.85	High
9	Emerging trends	3.79	Moderate
10	Eliminate human interface	3.73	Moderate
11	Smart contract	3.40	Moderate
12	Overcome environment challenges	2.75	Moderate

(b) Mean of drivers in corresponding with level of impact

The mean value and level of tendency on impact of each driver was presented in Table 7. The driver that received the highest mean score is protect data manipulation (3.99), followed by increase transparency (3.97). Next competitive advantage and social resistance with the mean score 3.97. In meantime, the lowest driver is overcome environment challenges with the mean score 2.72 on level of impact.

Table 7: Mean of Drivers on Impact

No	Issues and Drivers	Mean	Level of Tendency
1	Protect data manipulation	3.99	High
2	Increase transparency	3.97	High
3	Competitive Advantage	3.97	High
4	Social acceptance	3.97	High
5	Worker's skill and knowledge	3.91	High
6	Enhance cybersecurity	3.91	High
7	Value added	3.87	High
8	Emerging trends	3.79	Moderate
9	Cost effective	3.74	Moderate
10	Eliminate human interface	3.55	Moderate
11	Smart contract	3.42	Moderate
12	Overcome environment challenges	2.72	Moderate

(c) Mean of drivers in corresponding with level of uncertainty

The mean value and level of tendency on uncertainty of each driver was presented in Table 8. The driver that received the highest uncertainty mean score is emerging trends (3.81), followed by cost effective (3.50). Next social resistance with the mean score 3.44. In meantime, the lowest driver is overcome environment challenges with the mean score 2.44 on level of uncertainty.

Table 8: Mean of Drivers on Uncertainty

No	Issues and Drivers	Mean	Level of Tendency
1	Emerging trends	3.81	High
2	Cost effective	3.50	Moderate
3	Social acceptance	3.44	Moderate
4	Eliminate human interface	2.90	Moderate
5	Worker's skill and knowledge	2.79	Moderate
6	Protect data manipulation	2.78	Moderate
7	Competitive Advantage	2.78	Moderate
8	Smart contract	2.76	Moderate
9	Enhance cybersecurity	2.72	Moderate
10	Increase transparency	2.71	Moderate
11	Value added	2.51	Moderate
12	Overcome environment challenges	2.44	Moderate

4.6 Impact Uncertainty Analysis

After obtained the mean value for both the impact and uncertainty, Table 9 depicted formulated in order to give a clear data on the mean in two different aspects before constructing impact-uncertainty analysis. Figure 4.1 shows the impact-uncertainty analysis result. Therefore, the top two key drivers "Protect data manipulation" and "Social resistance" have been selected to generate scenarios building analysis in chapter 5.

Table 9: Impact Uncertainty Analysis

No	Issues and Drivers	Mean	
		Impact	Uncertainty
D1	Protect data manipulation	3.99	2.78
D2	Increase transparency	3.97	2.71
D3	Competitive Advantage	3.97	2.78
D4	Social acceptance	3.97	3.44
D5	Worker's skill and knowledge	3.91	2.79

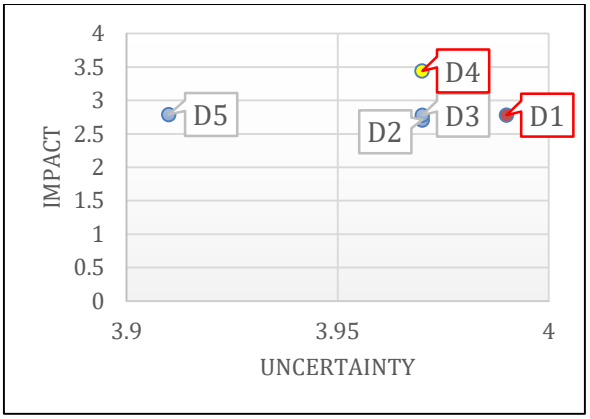

Figure 1: Impact-Uncertainty Analysis

Based on Figure 1, D1 and D4 have been computed in red box as the top two drivers with high mean score in impact and uncertainty analysis. Data manipulation (D1) with the mean score 3.97 on level of impact and 2.78 on level of uncertainty while Social acceptance (D4) with the mean score 3.97 on level of impact and 3.44 on level of uncertainty.

5. Discussion, Recommendation and Conclusion

5.1 Discussion Based on First Research Objective

This study has generated two objectives in the previous chapter which served as a guidance to serve the researcher on what next steps to be achieved throughout the study process. The first objective of this research was to identify the issues and challenges faced by warehousing and transportation logistic industry by using STEEPV analysis. Those issues and challenges categorized by using STEEPV analysis. The application of this approach enables researchers to evaluate the issues and challenges of adopting Blockchain Technology in logistic industry in a simpler way to merge and synchronize relevant collected data. To develop this technology in Malaysia it is having a process of understanding the advantage, issues and challenges because Blockchain Technology is still lack of maturity in Malaysia. Therefore, there are several issues and challenges to examine to convince organizations to adopt this technology. Thus, findings of this research have contributed to future research in context of Malaysia. Most importantly, the issues and challenges would merge to form 12 key drivers to achieve the second objective.

5.2 Discussion Based on Second Research Objective

The second objective is to determine the key drivers in adopting Blockchain Technology in logistics industry in Johor. There were 12 key drivers identified by using STEEPV analysis of adopting Blockchain Technology among logistic industry. The STEEPV factor was important to determine what factors may contribute to the logistic industry process as to correspond with the adoption and diffusion of Blockchain Technology in the future. Hence, the two top drivers selected from the impact-uncertainty analysis would be represented as the comparison of the most impactful and uncertain drivers.

5.3 Discussion Based on the Third Research Objective

The third objective of this study was purposed to study the future trend of Blockchain Technology among Logistic Industry in Malaysia. This objective is essential to identified the trend of future evolution and how it could shape the future trend of Blockchain in the future logistic market. Four different scenarios would be formed to explore the future trends by using the scenario building method with the corresponding drivers from the impact-uncertainty analysis. These scenarios would forecast the four different possibilities that might occur in the next 5 to 10 years. The four distinct possible scenarios have been illustrated in Figure 2.

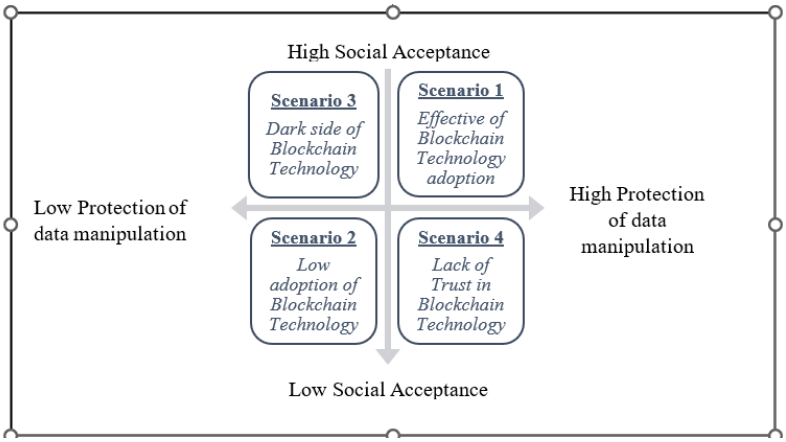

Figure 2: Future Scenario Analysis

(a) Scenario 1 "Effective of Blockchain Technology"

The first scenario occurs when there is a High Social acceptance and High protection of data manipulation in Blockchain Technology. "Effective of Blockchain Technology" refers to process of blockchain technology to be efficient and improve the visibility of logistic process and to shorten lead times and automate paper-based processes to enhance customer experience.

Blockchain improves logistics network transparency by revealing actual transactional data including origin, route, order quantity, stock levels, items received, shipping, and invoicing (Cole *et al*., 2019). Due to Blockchain's immutability and network consensus, changing its contents is difficult, reducing food fraud and dishonesty (Tripoli & Schmidhuber, 2019). Blockchain can verify supply chain operations and maintain sustainable labour standards by fostering trust and collaboration (Batwa & Norrman, 2020). Blockchain lets companies monitor updated supply chain data flows, enhancing logistics (Sander *et al*., 2018). Kshetri (2018) supports blockchain supply chain tracking in terms of delivery method, date, and time. The distribution network partner tracks shipments. Check item consistency and supply chain effect instantly (Chen *et al*., 2017).

Blockchain Technology reduces effort, ensures related and quality material, increases efficiency, lowers prices, and fosters trust to provide high-quality goods in logistics (Kshetri, 2018). With instant data delivery, blockchain applications are expanding in logistics. Given this, using Blockchain Technology to monitor and manage things at their source would be more effective (Francisco and Swanson, 2018).

Blockchain is not commonly used in logistics, although it could result in cost savings. As more businesses use global supply networks, logistics will become increasingly important. Shippers and carriers pay freight brokers to trade their products. Carriers' consumer debt grows. This is infeasible due to network intermediaries (Shobha, 2018). Blockchain technology solves supply chain issues (Zheng *et al*., 2017). Smart contracts eliminate intermediaries. Inventory, data, and conflict resolution are improved with blockchain technology (Wu & Chiu, 2018). Suppliers are able to monitor capacity, price, and delivery dates to make better selections. Transport companies can share route and capacity information using blockchain technology. accelerated delivery times and cost savings (Business Blockchain HQ, 2018). People will be persuaded to utilise Blockchain Technology if data monitoring is effective.

(b) Scenario 2 "Low adoption of Blockchain Technology"

In scenario 2, low adoption of Blockchain Technology will occur when there is low protection manipulation and Low Social Acceptance. This scenario shows that consumers will not adopt Blockchain Technology because of these 2 issues. In spite of the technology's proven advantages, adoption has been slow; this may be due to unexpected reasons that prevent businesses from moving in the direction they would like to.

Economic titans may fight change to safeguard revenue structures (Michelman, 2017). Banks may hesitate to embrace blockchain for financial processes (Zhao *et al*., 2016). Other middlemen may dread being eliminated from the supply chain. Some supply chain members want less blockchain transparency. Supply chain performance suffers when sensitive data is withheld (Fawcett *et al*., 2007). Individual users may find blockchain complicated to understand, adapt, and use. Adopting a new technology can be difficult and time-consuming. Some companies may be early adopters, while others are hesitant. Some may not act because they lack money or find the benefits persuasive.

Moreover, Lack of blockchain education also hinders its adoption. Most people believe blockchain solely applies to money transactions and cryptocurrency. Entrepreneurs don't recognize blockchain has applications in healthcare, logistics, tourism, etc. Consumers must be educated to comprehend and use this technology (Michael, 2018).

Blockchain Technology is immature. Due to its immaturity, Blockchain Technology can't handle massive transaction volumes (Croman *et al*., 2016). Public Blockchain servers, like Bitcoin's network, may process fewer transactions than Visa (Croman *et al*., 2016;). Blockchain was invented a decade ago. Most people don't trust blockchain because it's new and unknown. Before the approach is widely recognised, more work is needed. Though gradual, technology is making ripples in many fields (Michael J, 2018).

(c) Scenario 3 "Darkside of Blockchain Technology"

The scenario regarding the dark side of implementing blockchain technology happens when there is a high social acceptance and low of data protection manipulation. It illustrates the disadvantage of Blockchain Technology in logistic industry and the concern by consumers in understanding the futility and risks gained by implementing blockchain technology.

In recent years, Blockchain has become popular. Blockchain technology investment is expensive. Hyperledger and many Blockchain technologies are free, but they require massive funding. Blockchain Technology isn't cheap to adopt, what with employing developers, maintaining a team of specialists, purchasing a Blockchain solution, and more (Kamble *et al*., 2018). Companies implementing Blockchain Technology must also consider maintenance costs. Commercial Blockchain projects could cost millions. If a company lacks the financial resources to adopt Blockchain, there may be a substantial delay in enhancing the logistical process.

Blockchain's biggest drawback is immutable data. This benefits supply networks, economies, and other systems but immutability in networks requires balanced node distribution. Controlling a blockchain network requires at least 50% of its nodes. Another downside is traceable data. Everybody needs privacy (Gwyneth, 2020). A blockchain user couldn't remove his acts. He can't erase his digital footprint to maintain anonymity.

(d) Scenario 4 "Lack of Trust in Blockchain Technology

In scenario 4, high protection data manipulation and low social acceptance indicate a lack of trust in Blockchain technology. According to Johnson *et al*. (2013), trust promotes collaborative actions by enhancing people's willingness to share information and abilities. Blockchain is still immature, so few people accept it. It will take a while to convert them to technology. Implementing a trustless blockchain in Malaysia will be difficult because people lack trust and participants have no motive to follow the rules. People have a limited knowledege of blockchains; thus they mix them with Bitcoin and other cryptocurrencies (Shin, 2020).

Government agencies must be involved to prevent cryptocurrencies from being used to fund terrorists or launder money. Decentralization makes it harder to identify illegal activity. Unconcerned users may accept it as the cost of freedom. Criminal networks will never be acceptable. Banks and other financial institutions subject to government monitoring will refuse to do business with them, and authorities will counter their operations (Werbach, 2019).

Smart contracts can be used to autonomously monitor the supply chain's chain of control and enforce payments based on contractual requirements (Zheng *et al*., 2020). This can ensure payments are completed on time and contract violations are avoided, fostering confidence and fairness among supply chain participants and enhancing supply chain relationships (Cole *et al*., 2019; Schmidt and Wagner, 2019), but bad regulation means the public doesn't trust the technology.

5.4 Limitation of Study

There are some limitations to this study. First, blockchain is an emerging technology, on which researchers and practitioners are working. In logistic industry, adoption of Blockchain Technology is in premature state. Therefore, it is very difficult to get feedback about adoption of Blockchain

Technology and the questionnaire was only distributed in the Johor Area. Furthermore, this study is limited to identification, prioritization and analysis of influencing factors in adoption of Blockchain Technology in logistic industry. The result obtained in this study might not be applicable in other country as the research was carried out in different demographic background and different perception toward adoption of Blockchain Technology in Malaysia.

5.5 Recommendations for Future Study

The application of Blockchain Technology, the behavior intention and acceptation rate in logistic industry are not completely discovered in Malaysia. This study constructs to identify the future key drivers and trends of adopting Blockchain Technology among logistics industry. Conversely, the emphasis gives an overview of perception of the impact and uncertainty that would completely affect the study results. The social resistance and data protect manipulation has the potential to determine the future trends of Blockchain Technology adoption in Malaysia. Therefore, future study researchers should explore more complex and identify influencing factors on adopting Blockchain Technology in Logistic Industry. In future, the development of blockchain in logistics is really a big challenge for researchers.

(a) Recommendations for logistic industry

A positive and negative impact on the adoption of Blockchain Technology in logistic industry in terms of the technology used the manifestation of four different scenarios from the two main key drivers. Hence, this research has provided some suggestions for the logistic industry to ensure successful of blockchain technology adoption as discussed in the scenario building.

5.6 Conclusion

This research, "A Foresight Study on Adoption of Blockchain Technology among logistic industry in Johor," identified the issues, challenges, and drivers of adopting Blockchain Technology in logistic industry and the future trend of the technology. As the world enters industrial 4.0, Blockchain technology is being adopted internationally and in numerous industries, which indirectly impacts and motivates the logistics industry to adopt a new system for technology development and future growth.

As a foresight study on adopting Blockchain Technology in logistic in Johor, STEEPV analysis, SPSS statistical analysis, impact-uncertainty analysis, and scenario building analysis was used to identify the future key drivers, importance, impact, and uncertainty of Blockchain Technology in warehousing and transportation of logistic industry. The study analyzed Blockchain Technology's challenges, issues, and key drivers. In additio0n, researchers evaluated four potential scenarios to show how Blockchain Technology enhances data protection, eliminates social acceptance, and boosts future development. Blockchain Technology protects data from manipulation and is immutable in logistics, promoting its popularity in Malaysia. Blockchain's transparency, security, and traceability will increase logistics adoption. Blockchain will transform logistics and solve current issues.

Lastly, it can be proven there is a strong link between the factors to create the "effective blockchain technology" and "dark side of blockchain technology" forecast scenarios. Improve logistics. These two key drivers highlighted in this study must co-exist in both, otherwise negative effects might ensue. When a bad situation arises, it's important to use strategic management to reverse it into a scenario with a greater chance of adopting Blockchain Technology in logistics.

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