

Rationalising Factors Influencing the Effective Utilisation of Big Data in Malaysian Fintech Companies

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Abstract

In Malaysia, Fintech companies are leveraging Big Data technology to serve effectively the targeted markets. As the financial industry continues to develop, there is a great potential for the further growth and use of Big Data in Fintech in Malaysia. This is an exploratory study which is set to identify factors that influence the use of Big Data in the Fintech sector. Using a systematic selection process, publications related to Big Data adoption were identified and reviewed. The results show that the technological, organisational and environmental factors have a clear impact on Big Data adoption. The paper also presents the challenges reflected on in the current research on Big Data adoption and recommends future research directions. A research model focused on utilisation of Big Data technology is proposed and presented, driven by the literature review.

Keywords: Big Data, Challenges and Benefits, Fintech, Malaysia, TOE framework

1. Introduction

Financial services are being transformed by digital innovation, slowly but clearly. The world has seen the emergence of new financial technology innovations like mobile money, crowdfunding, robo-advice, insurance technology (insurtech), and cryptocurrency. Fintech has already improved retail users' access to and convenience with financial services during the past decade (Feyen et al., 2021). Fintech, or financial technology, is typically seen as a driving force behind disruptive innovation in the area of finance, seeking to reshape the financial services while also capturing customers' demands (Lee et al., 2018).

According to Chen and Zhang (2014), Big Data is a term used for datasets that come in a huge volume and complexity that conventional data processing application software are incapable to deal with them. Large volumes of data can now be processed and analysed by organisations at unprecedented speeds. Businesses are now able to use data-driven insights to optimise their operations and spur growth, which has revolutionised the way they make choices. Davenport et al. (2012) pointed out that businesses that invest in Big Data can be distinguished from standard data analysis environments in three ways:

1. They focus on data flows rather than looking at data to assess past events.
2. Instead of data analysts, they are relying more on data scientists and product and process developers.
3. They are integrating Big Data Analytics into core business, operations and production functions, rather than treating it as a data silo.

Big data has been at the core of businesses like Google, eBay, LinkedIn, and Facebook since the beginning (Davenport and Dyché, 2013). The digital transformation has been expedited by the COVID-19 pandemic, and this is evident in the closure of bank branches across the world due to the shift to digital banking (Macknight, 2021). In particular, it will become ever more crucial that digital connectivity eventually replace physical contacts between consumers and suppliers (Feyen et al., 2021). Press (2016) highlighted ten Big Data technologies: NoSQL databases, Predictive analytics, search and knowledge discovery, in-memory data fabric, distributed file stores, integration of data, data virtualization, stream analytics, data preparation, and data quality.

1.1. Fintech and Big Data in Malaysia

Fintech is an emerging industry in Malaysia; at the time of writing, the Malaysian Fintech sector grew by 27 per cent in 2021/22 to 294 fintech companies (Fintech News Malaysia, 2022). According to Fintech News Malaysia (2022), the payments sector continues to dominate the industry with 60 companies, followed by lending (55), e-wallets (43), and insurtech (31).

Over the years, the Malaysian government has introduced and implemented a number of initiatives to help businesses digitise, promote digital literacy and improve performance. For example, the establishment of the Malaysian Digital Economy

Corporation (MDEC), an agency under the Ministry of Communications and Digital, aims to support digital businesses by providing co-working space, mentoring sessions, networking and partnership opportunities. Moreover, the Department of Statistics Malaysia (DOSM) is moving towards big data analytics, holding large volumes of data and managing its own portal, called STATSBDAs portal (<https://statsbda.dosm.gov.my/>).

However, there is no overarching policy on handling open government data. In 1994, the Malaysian Administrative Modernisation and Management Planning Unit (MAMPU) launched the public sector open data portal at <https://data.gov.my/> which is intended to be a one-stop-shop for all government data, but improvements need to be made in terms of standardisation of reporting and machine readability, as other government ministries and agencies have strong decentralised powers to decide what data is made open (World Bank, 2017).

1.2. Research Focus

As Fintech continues to grow, there is a need to understand how different elements, such as Big Data, can be used in order to have effective operations; however, there is not enough research conducted on Big Data in Fintech companies as most reports are made by popular press which lacks of theoretical insight (Mikalef et al., 2020). As a result, there is a limited understanding of how organisations can leverage Big Data technologies and align them with their business strategy (Kwon et al., 2014; Mikalef et al., 2020; Sivarajah et al., 2017). In order to derive meaningful theoretical insights and practical implications, it is important to understand the barriers to and readiness for technology adoption, and whether the benefits outweigh the costs and risks of adopting new technologies. The purpose of the study is thus to determine the factors having considerable impact on Big Data utilisation in Fintech companies. Consequently, this paper seeks to answer two relevant questions:

1. How can Fintech companies benefit from using Big Data?
2. What factors influence and hinder the use of Big Data?

2. Methodology

The approach employed in this study involves an exhaustive library search and literature review on Malaysia Fintech companies. The library search consists of online content, ranging from government reports, magazines, newspaper to journal articles.

The following keywords were used to identify relevant articles from the Google Scholar and Scopus database: Big Data, Challenges, Factors, Malaysia. The authors limit the library search to the literature that was published between 2012 and 2023. The authors also pay attention to the:

- Types of publication (e.g. newspaper articles, industry reports, academic literature).
- Industry type (e.g. manufacturing, services)

- Research methods employed in the empirical studies (e.g. case study, qualitative, quantitative, and conceptual).

These steps are necessary to develop an understanding of how Malaysian organisations use Big Data, and to identify how this differs when practised in different sectors.

3. Literature Review

3.1. The Use of Big Data Malaysian Fintech: An Overview

Malaysian regulators and policymakers are actively supporting the Fintech industry by creating an enabling regulatory environment and through public-private partnerships. The announcement of Malaysia's first digital banks in 2022 is a good case in point. The central bank of Malaysia (Bank Negara Malaysia) granted five digital banking licences to predominantly Malaysian-owned entities at the end of April 2022. It is expected that these new entrants to the market will bring a wave of innovation to the banking sector and contribute to the improvement of financial inclusion (Fintech News Malaysia, 2022). All five digital banking licensees are consortia that include at least one technology company (Mohsin et al., 2022). The Covid-19 pandemic increases demand for Big Data Analytics as demand for data and cloud services soars (Yapp, 2020).

Fintech is increasingly becoming a vital part of Malaysia's financial sector. Malaysia's traditional banks are still dominant in deposit, lending and raising capital, but these banks are also embracing new technology, either in competition or in partnership with new technology start-ups (International Monetary Fund, 2020). The rise of cashless payments has led to a demand for skilled digital workers, especially in banks, which have a strong interest in creating in-house tech teams that include Big Data, user interface and analytics experts to digitise both product offerings and internal processes (Marketing Interactive, 2019). For instance, Malaysia's AmBank Group has set its sights on open source *DevOps* and data science in order to meet the growing needs of its customers and improve the overall banking experience (Yapp, 2020). More recently, Mastercard has established a Data and Services (D&S) hub in Kuala Lumpur to support its clients across the Asia Pacific region (Fintech News Malaysia, 2023).

A study conducted by Wong et al., (2015) on a sample size of 132 Malaysian large-scale enterprises revealed that the companies are relatively ready for Big Data implementation. About 82% of the companies surveyed had a decent level of capabilities and competencies to gain the benefit of Big Data analysis; however, this only indicates the attitude towards using Big Data and further investments in technology and skills are required to tap into Big Data economy.

To sum up, Big Data usage in Malaysia is increasing but it is not widely used yet. Malaysian Fintech companies mostly rely on consultancy or outsource the Big Data functions, although the situation is slowly changing especially in the banking sector.

Next section explores the perceived benefits and risks of using Big Data technology and the associated challenges.

3.3. Perceived Benefits of Using Big Data

The key assumption behind the use of Big Data is that companies can gain competitive advantage by improving organisational performance and strengthening organisational capability. Yadegaridehkordi et al. (2018) found that perceived benefits is one of the most important drivers of Big Data adoption and organisational performance. More specifically, Yadegaridehkordi et al. (2018) collected data from 234 industrial managers who work in Malaysian manufacturing companies and the findings showed that, technological drivers – perceived benefits, complexity, technology resources, Big Data quality and consolidation - are the most influential for Big Data adoption and business performance. Similarly, Ali et al. (2021) found that that Big Data has a significant impact on social performance and environmental performance of Malaysia's Islamic banks.

One of the benefits of Big Data and business analytics is that it can help improve decision making. Abdullah et al. (2022) examined the role and impact of Big Data on strategic management accounting practices in a Malaysian manufacturing company. Referred as Choco1, the case study shows that Big Data enabled Choco1 to identify, assess and reduce product costs, work on product design according to customer feedback, reduce waste, and determine profit margins and pricing. Big Data provided Choco1 with costing and pricing information on which to forge its strategies. This information included the pricing of similar products on the market, the price that customers are willing to pay, customer reviews and expectations of the product, and information on raw materials from potential suppliers.

Big Data Analytics also helps logistics companies improve productivity and overall business competitiveness by enabling warehouse operators to make effective decisions, track and correct errors, forecast future demand, monitor and optimise inventory levels (Wahab et al., 2021). In a study of examining the impacts of Big Data on supply chain performance in Malaysia, Xiang et al. (2021) concluded that several factors have a significant relationship with supply chain performance in the logistics industry, these are: improved forecasting, supply chain system integration, human capital, and risk and security governance. Big Data Analytics is useful to efficient delivery services in a country like Malaysia, with a population of around 35 million people spread over a vast geographical area. Adopting Big Data Analytics enables company like Cainiao Smart Logistics Network to simplify and streamline warehouse processes, including procurement, storage, customs clearance and goods delivery (Wahab et al., 2021).

Another benefit of using Big Data is that it can help companies in managing risk, such as fraud detection and credit risk assessment. Banks can more accurately determine the creditworthiness of new loan applicants or assess the credit risk of existing customers by evaluating data such as credit scores, payment histories, education levels, employment information and utility payment histories (Siew and Farouk,

2023). Big Data Analytics can be instrumental in the identification of fraud and the prompt notification of insurers of suspicious claims. Takaful (Islamic insurance) operators could more effectively deter, detect, record and report fraud using Big Data Analytics tools (Hemed et al., 2021).

Big Data is being used in the retail industry to gain a better understanding of buying behaviour, to capture fluctuations in buying behaviour in real time and to make strategic decisions for the business on this basis. A personalised online shopping interface typically led to positive customer satisfaction and repurchase intention (Chan et al., 2021). Many e-commerce platforms use Big Data to personalise the shopping experience for customers, provide recommendations based on search history, and dynamic pricing (Abdullah et al., 2021; Chan et al., 2021; Sek, 2019). Additionally, social media data also collected as a reference to see the pattern of posting about buying and selling among users on social media platforms (Shayaa et al., 2018). As the largest ecommerce platforms in Southeast Asia *Shopee* is a Big Data driven business which uses data to improve the user experience, to help shoppers find the right products, and to automate the business processes of internal teams to improve the efficiency of their work and reduce costs (Sek, 2019). Repurchase intention and overall customer satisfactions are driven by the information search, recommendation system, dynamic pricing and personalisation (Chan et al., 2021).

3.4. Perceived Risk of Using Big Data

There are numerous security and privacy issues related to infrastructure, processes and protection mechanisms for organisations already involved in Big Data initiatives or planning to jump on the Big Data bandwagon (Salleh and Janczewski, 2019). Mitigating the risk of cyber-attacks has become a challenging task to ensure the integrity of Big Data environments, as the number of cyber-attacks around the world is on the rise. In order to avoid data breaches, it is also essential to secure large volumes of heterogeneous data by applying appropriate and cost-effective data anonymisation and encryption techniques to ensure that sensitive information is not personally identifiable (Anawar et al., 2022).

Data security in financial services has always been a priority, especially now that the industry is undergoing a massive digital transformation as a result of changes in consumer behaviour, intensified competition and technological advances (Mohsin et al., 2022; Salleh and Janczewski, 2019; Siew and Farouk, 2023). The adoption of new technologies to support better capabilities and scalability is driving the trend towards a new, all-digital customer experience. However, the risks and costs of digital transformation are increasing due to the combined challenges of cybersecurity threats and a more stringent regulatory environment (Salleh and Janczewski, 2019). Financial services organisations need a technological solution that can optimise and automate data-centric protection across their hybrid IT environments.

3.5. Challenges In Adopting Big Data

The adoption of Big Data in decision making is a lengthy and complex process that may result in project failure or in worst case scenario, business failure. In a case study of a Malaysian commercial bank *BankX* which is the outcome of multiple mergers for the years, Siew and Farouk (2023) reported that the first problem *BankX* faced when adopting Big Data is system migration and data integration because each bank had its own system and if data is transferred from one legacy system to another without proper conversion, it may not be recognised or interpreted correctly, resulting in data errors. Other reasons cited by *BankX* for delays in implementing Big Data included working with multiple divisions or departments, sitting on committees, and the lengthy process of obtaining approvals from the Central Bank of Malaysia (Siew and Farouk, 2023). This naturally leads to another major barrier to Big Data adoption: organisational factor.

Top management support is one of the crucial factors that determine successful implementation of Big Data (Salleh and Janczewski, 2019; Wahab et al., 2021). The tone of the top management indicates the level of commitment to implement new project or adopt new technology. Big Data Analytics capabilities are strengthened by the presence of a specific tone (certainty) at the top in the formal letters and social media posts (Said et al., 2023). Additionally, personnel expect top management to support them by giving them the resources needed to implement Big Data adoption and secure Big Data (Salleh and Janczewski, 2019).

Another key factor that determines the decision to adopt Big Data Analytics in Malaysian organisations is knowledge workers (Salleh and Janczewski, 2019; Sharon, 2019; Wahab et al., 2021). Abidin et al. (2017) reported that Malaysian IT officers lack the necessary skills as data scientist, and the authors outlined seven skillsets that are deemed mandatory for IT officers: analysis, data visualisation, data modelling, decision making, ethics, communication, and basic database knowledge. Data scientists are expected to collect data in an ethical manner, perform appropriate analysis, and deliver successful results (Anawar et al., 2022). Organisations, in turn, need to ensure that all the necessary roles are in place for Big Data projects, while specifying the skills required for the increasingly diverse roles (e.g. data engineer, AI specialist and product manager).

In identifying determinants of Big Data Analytics adoption in Malaysian healthcare industry, Ghaleb et al. (2021) observed that organisations are less likely to adopt big data if the adoption rate of Big Data within the same industry is low, or if there is little or no competitive pressure to adopt Big Data Analytics. The finding of Ghaleb et al. (2021) represents another key challenge to Big Data adoption: environmental factor.

To a great extent, the Big Data Analytics adoption behaviour significantly depends on the type of industry. For instance, the complex work processes in banking, with lengthy governance and approval procedures, limits its agility compared to start-ups (Siew and Farouk, 2023). Other environmental factors, namely government support

Rationalising Factors Influencing the Effective Utilisation of Big Data in Malaysian Fintech Companies

(Wahab et al., 2021) and regulations (Chuah and Thurusamry; Salleh and Janczewski, 2019), also affect the decision to adopt Big Data in Malaysian organisations.

Table 1 below summarises the factors that influence the use of Big Data in the context of Malaysia. Salleh and Janczewski (2019) presented a case study of a banking institution, whereas both Wahab et al. (2021) and Yadegaridehkordi et al. (2023) collected survey data from logistics companies and hotels respectively. Although the studies used different methodologies, three common themes emerged: technological, organisational, and environmental factors.

Table 1: Key factors that influence the use of Big Data in Malaysian organisations

Factors	Salleh and Janczewski (2019)	Wahab et al. (2021)	Yadegaridehkordi et al. (2020)
Technology	1) Data security 2) Capability of legacy security measures	1) Relative advantage	1) Complexity 2) Compatibility 3) Relative advantages 4) Cost of adoption
Organization	3) Managerial information security awareness 4) Top management support 5) Education, training and awareness 6) Personnel skills and experience 7) Employees perception	2) Technological infrastructure 3) Absorptive capability	5) Management support 6) Organizational resources 7) Organization size
Environment	8) Regulatory compliance 9) Reputation of BDS vendors 10) Environmental uncertainties	4) Industry competition 5) Government support	8) External pressure 9) external support 10) security and privacy concerns

4. Proposed Research Framework

Based on the literature review, three main themes emerge from previous studies: technological, organisational, and environmental factors. A number of scholarly works have used TOE (Technology, Organisation, and Environment) framework. According to DePietro et al. (1990), the TOE framework suggests that a firm's decision to adopt and implement technological innovations is influenced by technological, organisational and environmental contexts.

Following previous studies that have used the TOE framework, this study proposes a conceptual model based on the TOE framework and makes 12 research propositions on the basis of it.

Table 2 below summarises TOE and their sub-themes that influenced the utilisation of Big Data in Malaysian organisations. These empirical studies have different research focus, different industry type, and different organisation size. While Salleh and Janczewski (2019) is a case study of a bank, Anawar et al. (2022) use a focus group comprised of experienced telecommunication providers. Wahab et al. (2021), Falahat

Rationalising Factors Influencing the Effective Utilisation of Big Data in Malaysian Fintech Companies

et al. (2023), and Yadegaridehkordi et al., (2020) are quantitative studies in which data were collected from the warehousing, SMEs, and hotel sectors respectively.

Table 2: The use of TOE framework in analyzing Big Data adoption by previous studies

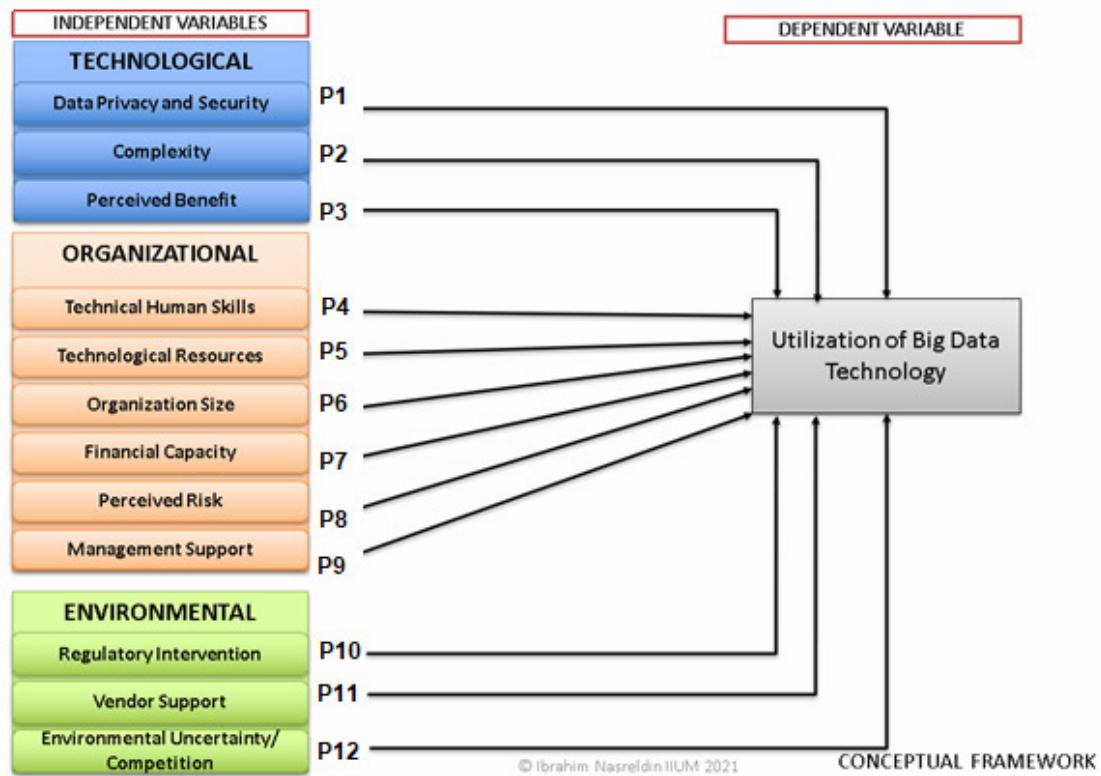
Dimension	Sub-themes	Salleh and Janczewski (2019)	Anawar et al. (2022)	Falahat et al., 2023	Wahab et al., (2021)	Yadegari dehkordi et al., (2020)
<i>Technology</i>	Data Privacy and Security	✓	✓	✓	-	✓
	Complexity	✓	✓	✓	-	✓
	Perceived Benefit	✓	✓	✓	✓	✓
	Technical Human skills	✓	✓	✓	✓	✓
	Technological Resources	✓	✓	✓	✓	✓
<i>Organization</i>	Organization Size	-	-	-	-	✓
	Financial Capacity	✓	-	✓	-	✓
	Perceived Risk	✓	✓	✓	-	✓
	Management Support	✓	✓	✓	✓	✓
	Regulatory Intervention	✓	✓	✓	-	✓
<i>Environment</i>	Vendor support	✓	✓	-	-	✓
	Environmental Uncertainty/ Competition	✓	✓	✓	✓	✓

(Note: the “✓” refers to the presence of the factors)

Although these studies have different emphasis and management support is not explicitly listed in their TOE framework, all mentioned that management support is crucial for Big Data adoption.

Apart from the study by Yadegaridehkordi et al. (2020), none of these studies mentioned organisational size as an influential factor. The size of the firm has usually been seen as influencing the acceptance and use of new technologies because of limited resources, but smaller firms may have the advantage of simplified structures and faster decisions (Falahat et al., 2023). Therefore, firm’s size is considered as an independent variable in this study as presented in the proposed research model below.

Figure 1: Proposed Research Model



4.1. Dependent Variable

4.1.1 Utilization of Big Data Technology

There have been many Malaysian studies on the adoption of technology in different sectors such as banking (Ali et al., 2021; Salleh and Janczewski, 2019; Siew and Farouk, 2023), manufacturing (Abdullah et al. 2022; Yadegaridehkordi et al., 2018), and e-commerce (Chan et al., 2021; Shayaa et al. 2018). This study considers twelve independent variables as determinants of the utilisation of Big Data Technology (BDT), which are discussed below.

4.2. Independent Variable

4.2.1. Data Privacy and Security

Increasingly, cyber-attacks appear in the form of theft or compromised data, and have the potential for physical damage to critical infrastructure of Big Data (Tao et al., 2019). For example, hackers use malware to encrypt, delete or manipulate data, intellectual property or personal information in a ransomware attack. Potential financial gain, whether through blackmail, ransoming or intellectual property theft, is often a motivating factor for hackers. Data privacy is one of the biggest concerns for telecommunication operators (Anawar et al., 2022) and banks (Salleh and Janczewski, 2019) for adopting Big Data. The challenge requires telecommunication operators and banks to protect data privacy while meeting business needs and profits. Therefore, based on the above arguments, the following proposition is formulated:

P1: Data Privacy & Security positively influence the effectiveness of BDT utilisation.

4.2.2. Complexity

The complexity of the technology is one of the biggest barriers to adoption. Technology is more likely to be adopted when it can be easily integrated into business operations. In a study on the use of Big Data in Malaysian hotel industry, Yadegaridehkordi et al. (2020) found that complexity has a negative impact on top management support. This is because the complexity of Big Data Analytics can compel the managers to doubt the investment in Big Data due to a lack of resources and skills. The following proposition is thus formulated:

P2: Complexity of Big Data Technology negatively influences the effectiveness of BDT utilisation.

4.2.3. Perceived Benefits

Executives expect a return on investment from any new technology implementation. This can be in the form of tangible or intangible results, such as productivity or improved financial performance. The key concern is whether the perceived benefits will outweigh the costs and the perceived risks. Based on this, the following proposition is formulated.

P3: Perceived Benefits of Big Data Technology positively influence the effectiveness of BDT utilisation.

4.2.4. Technical Human Skills

Technical expertise is critical to the successful utilisation of Big Data Technology. However, studies have shown that there is a shortage of necessary skills required to work with Big Data among IT officers (Abidin et al., 2017) and telecommunication providers (Anawar et al., 2022). Therefore, based on the earlier studies, the following is proposed:

P4: Technical human skills positively influence the effectiveness of BDT utilisation.

4.2.5. Technological Resources

Organisations with technology resource capability are likely to embrace Big Data Technology more quickly than others. This is in line with Resource-Based View that BDT is an innovative IT capability and a strategic resource for competitive advantage (Kwon et al., 2014). The following proposition is thus reached.

P5: Technological resource competency positively influences the effectiveness of BDT utilisation.

4.2.6. Organization Size

Organisation size is defined by number of employees. The availability of resources is typically in proportion to the size of the organisation (Baig et al., 2019). Larger firms tend to have more resources than smaller ones, and are therefore better placed to adopt

new technologies. However, small and medium-sized enterprises (SMEs) would be able to react quickly to the introduction of Big Data Analytics, as their high level of flexibility and less hierarchical system would enable them to make decisions and implement strategies faster than larger companies (Falahat et al., 2023). Therefore, on the basis of the arguments above, the proposition is as follows:

P6: Organizational size positively influences the effectiveness of BDT utilisation.

4.2.7. Financial Capacity

Access to finance is one of the most cited factors in previous studies (Wahab et al., 2021; Yadegaridehkordi et al., 2020). The cost of developing or utilising Big Data technology and the need to hire Big Data professionals are obstacles for SMEs due to limited resources (Falahat et al., 2023). The following proposition is made in light of these considerations.

P7: Financial Capacity positively influences the effectiveness of BDT utilisation.

4.2.8. Perceived Risk

Perceived risk is one of the critical factors that most executives take into account when making a financial decision. The utilisation of Big Data is often associated with high costs, uncertainties, complexity and risks (Baig et al., 2019). The cost of new technology adoption increases as the level of complexity and risk increases. Therefore, the following proposition is derived to.

P8: Perceived risk negatively influence the effectiveness of BDT utilisation.

4.2.9. Management Support

Management support is frequently cited as a crucial success factor to utilisation of BDT in earlier empirical research (Falahat et al., 2023; Wahab et al., 2021; Yadegaridehkordi et al., 2020). Management support is needed to encompass organisational policies, rules, dealing with data storage issues, technological and financial capabilities (Baig et al., 2019). If management is reluctant to change or set a strict limit on budget, then the whole organisation may have difficulty to optimise Big Data due to resource constraints, which will delay the adoption process. Management support is equally important for smaller firms. As smaller companies tend to have a more straightforward management structure, support from top management is particularly important in SMEs (Falahat et al., 2023). Thus, the following proposition is formulated.

P9: Management support positively influences the effectiveness of BDT utilisation.

4.2.10. Regulatory Intervention

Government plays a vital role in enabling or hindering new technology adoption. Policies and initiatives that encourage new technology adoption are often considered as a positive sign by all stakeholders (Falahat et al., 2023), whereas laws and

regulation that are designed protect privacy restricts the accessibility of data and hinders the use of Big Data to a certain degree (Baig et al., 2019). The following proposition is therefore formulated on the basis of the above argument:

P10: Regulatory intervention positively influences the effectiveness of BDT utilisation.

4.2.11. Vendor Support

For organisations looking to adopt Big Data, vendor support such as training and technical support is considered as a prominent factor by telecommunication providers (Anawar et al., 2022) and IT professionals working in the banking sector (Salleh and Janczewski, 2019). Therefore, on the basis of the above argument, the proposition is as follows:

P11: Vendor support positively influence the effectiveness of BDT utilisation.

4.2.12. Environmental Uncertainty/ Competition

Competition in this context refers to the competitive nature of the industry where the organisation moves to adopt new technologies, pressured by other companies in the same industry that have already adopted innovative technologies (Baig et al., 2019). The financial industry is changing rapidly with the rise of Fintech. Legacy banks are under pressure to adopt new technologies in order to compete with new entrants who are offering new financial products and services at competitive prices and better customer service (Siew and Farouk, 2023). However, environmental uncertainty can have a negative impact on the decision to adopt new technology due to the volatile nature of the financial industry, and many traditional banks are risk-averse (Samad, 2017), especially in turbulent times like post Covid-19 and the global rise in the cost of living.

P12: Environmental uncertainty/Competition negatively influences the effectiveness of BDT utilisation.

5. Discussion

In practice, data-driven transformation has proven to be a multi-year journey, not without missteps and failures over time, and is a complex process that requires the alignment of business, technology and organisational perspectives and practices (Kwon et al., 2014). It requires an organisational change of mindset, thinking and approach to running a data-driven business (Bean, 2020). The failure rate of Big Data projects in business practice was as high as 87% (VentureBeat, 2019). It is therefore important to have a good understanding regarding the factors that determine the utilisation of Big Data in organisations.

The Technology-Organisation-Environment TOE framework has emerged as the most common model for understanding and analysing the Big Data adoption factors in the reviewed academic studies. These studies have different research objectives and research designs, and each has diverse findings with regard to the significance of each variable. There is a need for researchers to propose, validate and extend the existing

theoretical models in order to fully cover the findings according to research context. In the Malaysian Fintech context, there has been limited theoretical research on the use of Big Data. Therefore, to fill in the research gap, the authors of this study formulate twelve research propositions and suggest a research model based on existing empirical research.

By its very nature, the financial industry is changing rapidly. New start-ups are entering the competitive landscape with new technologies or user-friendly apps that offer many different ways to invest or save money. Unlike SMEs in other industries, the Fintech industry is tech-savvy and thus Fintech companies have more technological resources compared to SMEs in other industries. Small Fintech companies could continue to thrive as they tailor their products and services to a specific market segment (Feyen et al., 2021) with continued improvements within their product and service offerings. Larger players in the financial industry, namely risk-averse banks (Samad, 2017), are slowly entering the Fintech space. Compared to start-ups, banks' agility is limited by complex work processes with lengthy governance and approval procedures (Siew and Farouk, 2023).

6. Conclusion

With the growing importance of Big Data in Fintech, there is a need to assess the influencing factors that determine the use of Big Data technology in Malaysian Fintech companies. This study seeks to address the following research questions: (RQ1) how can Fintech companies benefit from the use of Big Data, and (RQ2) what are the factors that influence and hinder the use of Big Data.

Literature review suggests that Fintech companies may benefit from improved organisational performance (Ali et al. (2021); Wahab et al., 2021; Xiang et al., 2021), better strategic decision-making (Abdullah et al., 2021), increased productivity (Wahab et al., 2021), and better understanding of customer behaviour (Chan et al., 2021).

Regarding research question 2, it can be concluded that among the themes emerging from this study, technological, organisational and environmental factors are the biggest concerns in adopting Big Data in the Malaysian context. The pressures within the financial industry for the adoption of new technologies and the bureaucratic nature of the banking sector have an impact on the use of Big Data in Malaysia (Siew and Farouk, 2023).

Following the analysis of previous studies on Big Data adoption in Malaysian organisations, the authors of this study developed a research model that can be applied in the context of Fintech companies in Malaysia. The proposed research model provides direction for future research. The follow-up research could focus on the challenges identified in our findings. The challenges identified in the study are interrelated in the context of the TOE. In addition, the literature search can be extended to compare the Malaysian context with other countries. The follow-up

research is needed to validate and reshape the proposed theoretical model. Mixed method approaches would provide a solid ground for future studies.

7. References

1. Abdullah, N. H. N.; Sanusi, S. and Savitri, E. (2022), “The Role and Implications of Big Data on Strategic Management Accounting Practices: A Case Study in a Malaysian Manufacturing Company”, *Management and Accounting Review*, Vol. 21, No. 1, pp. 41-60. <https://doi.org/10.24191/MAR.V21i01-03>
2. Abidin, W.Z.; Ismail, N.A.; Maarop, N. and Alias, R.A. (2017), “Skill Sets towards Becoming Effective Data Scientists”, in: Uden, L., Lu, W., Ting, IH. (eds) *Knowledge Management in Organizations KMO 2017. Communications in Computer and Information Science*, Vol. 731. Cham: Springer. https://doi.org/10.1007/978-3-319-62698-7_9
3. Ali, Q.; Yaacob, H.; Parveen, S. and Zaini, Z. (2021), “Big Data and predictive analytics to optimise social and environmental performance of Islamic banks”, *Environment Systems and Decisions*, Vol. 41, No. 4, pp. 616–632. <https://doi.org/10.1007/s10669-021-09823-1>
4. Anawar, S., Othman, N. F., Selamat, S. R., Ayop, Z., Harum, N., and Abdul Rahim, F. (2022), “Security and Privacy Challenges of Big Data Adoption: A Qualitative Study in Telecommunication Industry”, *International Journal of Interactive Mobile Technologies*, Vol. 16, No. 19, pp. 81–97. <https://doi.org/10.3991/ijim.v16i19.32093>
5. Baig, M. I.; Shuib, L. and Yadegaridehkordi, E. (2019), “Big Data adoption: State of the art and research challenges”, *Information Processing and Management*, Vol. 56. 102095. <https://doi.org/10.1016/j.ipm.2019.102095>
6. Bean, J. (2020), “The ‘Failure’ Of Big Data”, *Forbes*, available from: <https://www.forbes.com/sites/andybean/2020/10/20/the-failure-of-big-data/> [Accessed on 3 June 2022].
7. Chan, S. H. S.; Dastane, O.; Johari, Z. and Roslee, M. (2021), “Enhancing Online Repurchase Intention via Application of Big Data Analytics in E-Commerce”, In M. Almunawar, M. N.; Ali M. A. and Lim, S. A. (Eds.), *Handbook of Research on Innovation and Development of E-Commerce and E-Business in ASEAN*, pp. 395-434. IGI Global. <https://doi.org/10.4018/978-1-7998-4984-1.ch021>
8. Chen, C. L.P. and Zhang, C.-Y. (2014), “Data-intensive applications, challenges, techniques and technologies: A survey on Big Data”, *Information Sciences*, Vol. 275, pp. 314–347. <https://doi.org/10.1016/j.ins.2014.01.015>
9. Chuah, M. H. and Thurusamry, R. (2021), “Challenges of Big Data adoption in Malaysia SMEs based on Lessig’s modalities: A systematic review”, *Cogent Business & Management*, Vol. 8, No. 1, Article No. 1968191, <https://doi.org/10.1080/23311975.2021.1968191>

10. Davenport, T., Barth, P., and Bean, R. (2012), "How Big Data is Different", *MIT Sloan Management Review*, Vol. 54, No. 1, pp. 22-24.
11. DePietro, R., Wiarda, E. and Fleischer, M. (1990) 'The context for change: organization, technology and environment', in Tornatzky, L.G. and Fleischer, M. (Eds.): *The Processes of Technological Innovation*, Lexington, MA: Lexington Books, pp.151–175.
12. Falahat, M.; Cheah, P.K.; Jayabalan, J.; Lee, C.M.J. and Kai, S.B. (2023), "Big Data Analytics Capability Ecosystem Model for SMEs", *Sustainability*, Vol. 15, No. 1, Article No. 360. <https://doi.org/10.3390/su15010360>
13. Feyen, E., Frost, J., Gambacorta, L., Natarajan, H. and Saal, M. (2021), *Fintech and the digital transformation of financial services: implications for market structure and public policy*. Available from: <https://www.bis.org/publ/bppdf/bispap117.htm> [Accessed on 16 January 2022].
14. Fintech News Malaysia (2022), *Fintech Report 2022: Malaysia Charts a New Path for Fintech Growth*, available from: <https://fintechnews.my/31945/malaysia/fintech-report-malaysia-2022/> [Accessed on 22 May 2023].
15. Fintech News Malaysia (2023), *Mastercard Launches Data Hub in Malaysia, Creating New Job Opportunities*, available from: <https://fintechnews.my/31945/malaysia/fintech-report-malaysia-2022/> [Accessed on 22 May 2023].
16. Ghaleb, E.A.A.; Dominic, P.D.D.; Fati, S.M.; Muneer, A. and Ali, R.F. (2021), "The Assessment of Big Data Adoption Readiness with a Technology–Organization–Environment Framework: A Perspective towards Healthcare Employees", *Sustainability*, Vol. 13, No. 15, Article No. 8379. <https://doi.org/10.3390/su13158379>
17. Hemed, H. A.; Alamoudi, A. A. A.; Al Qassim, A. A. A. and Qasem, B. M. S. (2021), "The Potential Use of FinTech Developments in Takaful", *International Journal of Management and Applied Research*, Vol. 8, No. 2, pp. 109-121. <https://doi.org/10.18646/2056.82.21-007>
18. Herrmann, H. and Masawi, B. (2022), "Three and a half decades of artificial intelligence in banking, financial services, and insurance: A systematic evolutionary review", *Strategic Change*, Vol. 31, No. 6, pp. 549-569. <https://doi.org/10.1002/jsc.2525>
19. International Monetary Fund (IMF) (2020), *Malaysia: A Flourishing Fintech Ecosystem*. available from <https://www.imf.org/en/News/Articles/2020/02/27/na022820-malaysia-a-flourishing-fintech-ecosystem> [Accessed on 5 March 2021]
20. Kwon, O., Lee, N., and Shin, B (2014), "Data quality management, data usage experience and acquisition intention of Big Data analytics", *International Journal of Information Management*, Vol. 34, No. 3, pp. 387-394. <https://doi.org/10.1016/j.ijinfomgt.2014.02.002>

21. Lee, M. R., Yen, D. C., and Hurlburt, G. F. (2018), "Financial Technologies and Applications", *IT Professional*, Vol. 20, No. 2, pp. 27-33. <https://doi.org/10.1109/MITP.2018.021921648>
22. Macknight, J. (2021), "Is this the beginning of the end for bank branches?", *TheBanker*, 13 July, available from: <https://www.thebanker.com/Editor-s-Blog/Is-this-the-beginning-of-the-end-for-bank-branches> [Accessed on 8 March 2022].
23. Marketing Interactive (2019), *Big Data and analytics among skills in demand for MY's banking industry*, available from: <https://www.marketing-interactive.com/big-data-and-analytics-among-skills-in-demand-for-mys-banking-industry-says-hays> [Accessed on 8 March 2021].
24. Mohsin, M. I. A.; Ahmad, R. and Chan, W. M. (2022), "Exploring Digitalization of Malaysian Banking and Fintech Companies' Services from the Customer's Perspective", *International Journal of Management and Applied Research*, Vol. 9, No. 2, pp. 140-160. <https://doi.org/10.18646/2056.92.22-007>
25. Mikalef, P., Krogstie, J., Pappas, I. O., and Pavlou, P. (2020), "Exploring the relationship between Big Data Analytics capability and competitive performance: The mediating roles of dynamic and operational capabilities", *Information & Management*, Vol. 57, No. 2, 103169. <https://doi.org/10.1016/j.im.2019.05.004>
26. Press, G. (2016), "Top 10 Hot Big Data Technologies", *Forbes*, available from <https://www.forbes.com/sites/gilpress/2016/03/14/top-10-hot-big-data-technologies/?sh=435d20fa65d7> [16 May 2022].
27. Salleh, K. A. and L Janczewski, L. (2019), "Security considerations in Big Data solutions adoption: Lessons from a case study on a banking institution", *Procedia Computer Science*, Vol. 164, pp. 168–176. <https://doi.org/10.1016/j.procs.2019.12.169>
28. Samad, A. (2017), "Are Bank Profits Determined by Bank-Specific Factors or Bank External Factors? Evidence from Malaysian Banks", *Journal of International Business and Economics*, Vol. 5, No. 1, pp. 1-10. <https://doi.org/10.15640/jibe.v5n1a1>
29. Said, F.; Zainal, D. and Jalil, A. A. (2023), "Big Data Analytics capabilities (BDAC) and sustainability reporting on Facebook: Does tone at the top matter?", *Cogent Business & Management*, Vol. 10, No. 1, 2186745, <https://doi.org/10.1080/23311975.2023.2186745>
30. Sek, V. (2019), "Behind The Screens: Meet The Woman Who Built Shopee's Data Science Team From Scratch", *Vulcan Post*, Available from: <https://vulcanpost.com/659475/shopee-singapore-data-scientist/> [Accessed on 22 May 2022].
31. Shayaa, S. Ainin, S.; Jaafar, N. I.; Zakaria, S. B.; Phoong, S. W.; Yeong, W. C.; Al-Garadi, M. A.; Muhammad, A. and Piprani, A. Z. (2018), "Linking consumer confidence index and social media sentiment analysis", *Cogent Business & Management*, Vol. 5, No. 1, 1509424, <https://doi.org/10.1080/23311975.2018.1509424>

32. Siew, E. G., and Farouk, F. M. (2023), "Big Data Analytics implementation issues: A case study of a large bank in Malaysia", *Journal of Information Technology Teaching Cases*, Pre-Print. <https://doi.org/10.1177/20438869231176836>
33. Sivarajah, U., Kamal, M., Irani, Z., and Weerakkody, V. (2017), "Critical analysis of Big Data challenges and analytical methods", *Journal Of Business Research*, Vol. 70, pp. 263-286. <https://doi.org/10.1016/j.jbusres.2016.08.001>
34. Tao, H.; Bhuiyan, M. Z. A.; Rahman, M. A.; Wang, G.; Wang, T.; Ahmed, M. M. and Li, J. (2019), "Economic perspective analysis of protecting Big Data security and privacy", *Future Generation Computer Systems*, Vol. 98, pp. 660-671, <https://doi.org/10.1016/j.future.2019.03.042>
35. VentureBeat (2019), "Why do 87% of data science projects never make it into production?", *VentureBeat*, Available from: <https://venturebeat.com/ai/why-do-87-of-data-science-projects-never-make-it-into-production/> [Accessed on 9 Dec 2022].
36. Wahab, S. N.; Hamzah, M. I. ; Sayuti, N. M.; Lee, W. C. and Tan, S. T. (2021), "Big Data Analytics adoption: an empirical study in the Malaysian warehousing sector", *International Journal of Logistics Systems and Management*, Vol. 40, No. 1, pp. 121-144. <https://doi.org/10.1504/IJLSM.2021.117703>
37. Wong, K. L., Chuah, M. H. and Ong, S. F. (2015), "Are Malaysian companies ready for the Big Data economy? A business intelligence model approach", *International Conference on Accounting Studies (ICAS) 17-20 August 2015, Johor Bahru, Malaysia*, available from: <http://repo.uum.edu.my/id/eprint/17560/> [Accessed on 9 Dec 2022].
38. World Bank (2017), *Malaysia Open Data Readiness Assessment*. Washington DC: World Bank.
39. Xiang, L.Y., Hwang, H.J., Kim, H.K., Mahmood, M., Dawi, N.M. (2021), "The Use of Big Data Analytics to Improve the Supply Chain Performance in Logistics Industry", in: Kim, H. and Lee, R. (eds), "Software Engineering in IoT, Big Data, Cloud and Mobile Computing", *Studies in Computational Intelligence*, Vol. 930. Cham: Springer, pp. 17-31. https://doi.org/10.1007/978-3-030-64773-5_2
40. Yadegaridehkordi, E.; Hourmand, M.; Nilashi, M.; Shuib, L.; Ahani, A. Ibrahim, O. (2018), "Influence of Big Data adoption on manufacturing companies' performance: An integrated DEMATEL-ANFIS approach", *Technological Forecasting and Social Change*, Vol. 137, pp. 199-210, <https://doi.org/10.1016/j.techfore.2018.07.043>
41. Yadegaridehkordi, E.; Nilashi, M.; Shuib, L.; Bin Md Nasir, M. H. N.; Shahla Asadi, Samad, S. and Awang, N. F. (2020), "The impact of Big Data on firm performance in hotel industry", *Electronic Commerce Research and Applications*, Vol. 40, 100921, <https://doi.org/10.1016/j.elelap.2019.100921>.