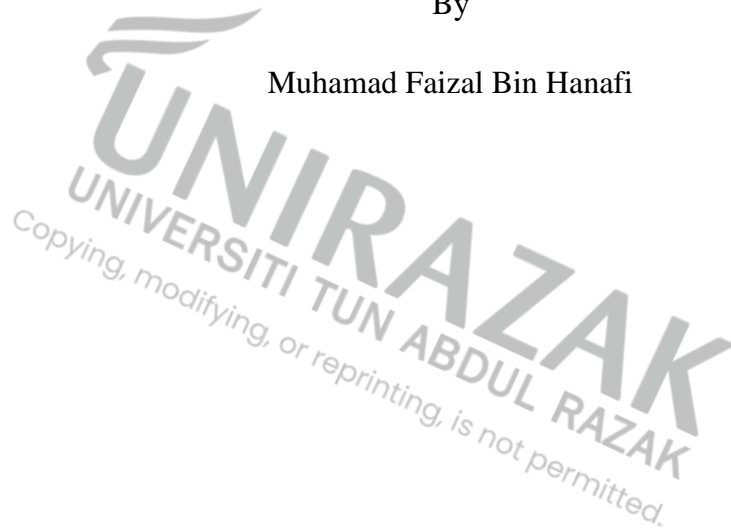Exploring Success Factors for Business Intelligence System (BIS) Implementation

Readiness: A Study on Malaysia Banking Sector

By

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Project Paper Submitted in Partial Fulfilment of the Requirements

for the Degree of Master of Business Administration

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February 2022

DECLARATION

I hereby declare that the case study is based on my original work except for quotations and citations that have been duly acknowledged. I also declare it has not been previously or concurrently submitted for any other degree at Universiti Tun Abdul Razak (UNIRAZAK) or other institution.

Signature   :

Name   :

Date   :

ACKNOWLEDGEMENT

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Abstract of the project paper submitted to the Senate of Universiti Tun Abdul Razak in partial fulfilment of the requirements for the Master of Business Administration.

Exploring Success Factors for Business Intelligence System (BIS) Implementation Readiness: A Study on Malaysia Banking Sector

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Throughout the year, there is the growing utilization and the implementation of Business Intelligence (BI) systems as part of innovation to support decision making process the organization's operation. In Banking industry, there are millions of data generated and transacted on daily basis, therefore implementing the BIS as for better management decisions play crucial roles on for industry's survival and sustainability. Business intelligence systems (BISs) are an important tool for today's challenging business operations, as they have a substantial impact on business performance. However, BIS implementation and readiness may be influenced by a various of internal and external factor. This study is aimed to explore the key success factors that influenced the banking sector in Malaysia to adopt the BI system based on simplified Technology, Organization, and Environment (TOE) framework and test the relationship between the six (6) independent variables: *perception of the comparative advantage, perception of business intelligence system's (BIS) complexity, flexible and appropriate technological infrastructure framework, management support, organizational readiness, competitive pressure* against Business Intelligence System (BIS) implementation readiness. For the study evaluation purpose, quantitative approach uses and designs using a five-point Likert Scale and 161 data collected using questionnaire survey. For data analysis, the demographic and descriptive analysis techniques were adopted for data interpretation purpose using IBM SPSS. Confirmatory Factor Analysis (CFA) and Structural Equation Modelling (SEM) had been developed using IBM AMOS to create better understanding how for overall model representation and to confirm the factor structure that extracted in the exploratory factor analysis. With the presence of multiple variables on the study, the multiple regression model develops as to examine and test the relationship of the success factor of BIS implementation readiness on Malaysian Banking industry. The results shows that three independent variables (perception of the comparative advantage, flexible and appropriate technological infrastructure framework, organizational) have statistically significant relationship towards the BIS implementation readiness. However, three independent variables

(perception of Business Intelligence System's (BIS) complexity, organizational readiness and competitive pressure) does not attain the significant relationship on the dependent variable of the study. Theoretical implication in this present study provides a validation to TOE framework empirically regard to Malaysia banking industry context and practically offer useful as guidelines to organization to assess the readiness to adopt this system whereby the application of guidelines could possibly reduce the risk of failure rate of the system's implementation. The research limitation such as time constraints and unable to conduct initial research design of qualitative method of interview session with targeted respondents of Subject Matter Expert (SME) after completion of quantitative described and discussed on this research. The direction for future research described and its role in assisting the studies in the future such as the recommendation to conduct future research using mixed method as well to conduct it on research on targeted respondent as create effective results. This study is beneficial for the banking sector of Malaysia as the benefits of the business intelligence system (BIS) are provided along with the critical success factors for the purpose of comprehending and managing the challenges arising from the execution of the business intelligence system (BIS) plan.

CHAPTER 1

INTRODUCTION

1.1   Background of Study

Throughout the years the companies have implemented the Information technology systems to support the collection, processing and distribution of the information that results in the growth and development of the business. In this era of hyper-competition and technological advancements Business Intelligence Systems (BIS) has attracted the attention of decision makers and executives due to their ability to provide a complex and competitive information to help the company to make better decisions, improve customer satisfaction, provide accurate reports and also increase the competitive advantage over other competitors (Ain et al., 2019). In today's business environment the survival of an organization depends upon its ability to respond to new business opportunities that could affect their growth in a positive or a negative way.

BIS has been considered as high priority of many companies because it has a remarkable impact on the performance and growth of the company. Implementing BIS plays a vital role in understanding of the business status, measures the performance of the organization and create better opportunities for the organization by improving relationship with the stake holders (Zaied et al. 2018). This system provides readily available data that is that is absorbed by the business users and lead to the growth and improvement of the business performance. As the modern banking sector is adapting progressive changes due to this the need of intelligence system increase dramatically.

Business intelligence (BI) in the banking sector is one of the most important processes with the integration of the new applications nowadays and can be incorporated into multiple fields. The industry of financial services is rapidly progressing and therefore required to incorporate the new strategies (Mesaros et al., 2016). It was noticed that there were some changes identified in the industry due to the various issues and challenges such as deregulations, globalization, competition with the various financial organisations that required

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the companies to think about the integration of the new strategies (Eder & Koch, 2018). There is a need to bring technological innovations so that the companies can reform the policies and integrate the technology and development. According to Susanto et al (2011), technological advancements have introduced business risks and security threats that are a serious concern for business leaders.

In the banking sector, there were records of millions of customer's data generated on the daily basis. This record maintenance of the customer's personal and financial data is the responsibility of the banks so that more customers can avail the services of the banking system. It was observed that there is growing competition in the banking sector that enhances the need for the banks to use the BI strategies (Zafary, F., 2020). Although, the implementation of the BI system is costly and involved complexities that required the adoption of the suitable infrastructure along with the utilisation of the resources for the banks to ensure the implementation for the long periods (Daneshvar Kakhki & Palvia, 2016). In addition, it was found that the BI system is the new technology-driven method used for the data analysis and delivering the information that assists the managers, executives and workers to inform them about the business decisions.

The study highlighted the functions of the BI technologies comprised of reporting, analytics, data mining, dashboard development, processing of the complex events, benchmarking, management of the business performance for the employees, text mining, processing of events and analysis of the obtained data (Horakova & Skalska, 2013). The strategies of BI are employed for the enhancement and facilitation of the appropriate decisions in the business. These strategies include the integration of the applications, technologies and practices for the collection and analysis of the business information. The use of BI in the banking system for the analysis of organisational data was found helpful for the banks to streamline the operational efficiencies for the increase of sales and marketing along with the development of the programs for customer services (Kfouri & Skyrius,2016).

It also helps to mitigate the risks by developing more suitable processes of risk management. The integration of the BI system in the banking sector was found helpful due to

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the analytics software for creating the interactive data visualization at the desktop level by the customers of banks and the other companies associated with the financial services. The significance of utilising the techniques of BI in the banking sector is well known due to more understanding of purchasing behaviours of the customers and supporting the planning and budgeting processes. Additionally, the efficacy of marketing campaigns can be measurable and enhanced by using BI techniques. The predictions of sales are possible along with the financial estimation in the banking sector by bringing innovation in the banking sector due to the applications of BI procedures (Azma & Mostafapour, 2012). Furthermore, the operational performances can be analysed and improved in the banking sector which also enhanced the satisfaction of the customers.

1.2   Problem Statement

For the survival of bank firms in today's competitive business environment the bank managers need to have problem solving capability and should focus on BI system to fulfil the expectation of their customers (Taneja et al.2015). As the financial industry is changing rapidly the issues related to the financial institution also rises that triggered the need of Business Intelligence in those sectors (Owusu et al. 2017). Countries like Malaysia where in modern network banking there is overlaps of the customer base a combination of multi segments is required for the smooth functioning of the banks. A lot of Business Intelligence and Analytics (BIA) tools are found in Banking Sectors as they have to manage a large volume of data in their bank operations, and in the modern banking networks, due to higher market competition, thus there need for the Bank to be more intelligence has increased rapidly, and it is also a tool for the progression of this sector. However, the implementation of Business intelligence system is complex and expensive as it requires a suitable infrastructure and resources for a prolong period of time and also demands a huge amount of resources and quite a few enterprise stakeholders for a number of years. The BI system is still evolving and therefore requires further research to highlight the Critical Success Factors (CSF) that contributes to the success of the implemented BI systems (Yeoh et al. 2010). These critical

success factors are associated with the tasks that are required to be completed for the company's success (Hawking et al., 2010).

There is an increasing number of customers in banks in comparison with the previous years. This allows the banking organisations to measure the big data of the customers that increase the satisfaction of the customers. The lack of handling and management of the customer's data in the banks may increase the problems related to quality assurance and risk management. Dicuonzo et al. (2016) suggested that there must be a deeper understanding regarding the data management and risk management strategies in the banks to handle a large number of customers. The BI techniques can be used for solving the problems regarding the quality assurance of the procedure and risk management related to data privacy. It was observed that there is increasing competition in the banks due to a large number of banks in developed and developing countries. Each bank has different branches which handle a large number of customers.

The personal and professional data of the customers and their privacy must be ensured by the banks to avoid data leakage and stealing of the financial statements. In addition, the change in the business models can bring new challenges for the banking organisations to deal with the stakeholders that involve the managing directors, employees, customers and other partners. Thus, business intelligence is utilised to ensure that information is consistent across the enterprise and to diverse stakeholders within an organisation (Ramakrishnan, 2010). In Malaysia, the banking sector also encountered these challenges due to the rise of customer satisfaction and retention. Security breaching is one of the common issues faced by the banks due to the data leakage related to the personal information of the banks and customers and their financial information. These risks can be managed by the integration of new technologies and applications that can reduce and prevent the risks related to the loss of information (Abai et al., 2015).

The combination of the multi-segments and multiple factors is required for the smooth functioning of the system in the banks in Malaysia. Due to the increased issues and challenges in the banking sector because of the increasing number of customers, there is a need to

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integrate the applications and technologies in the banks so that the large amount of the data related to the customer and banks can be secured (Qushem et al., 2017). The competition within the banks in Malaysia was also increased due to the use of modified technologies in few banks that offered several facilities for the customers to enhance their quality services and risk mitigation strategies. The use of BI technologies was found helpful for the banks to modify their system and provide the customers with the upgrading facilities through which the business employers can do the dealings with their international clients (Teoh et al., 2014). The opportunities for the customers using the banks with the BI applications and technologies were found to be increased. A large amount of data management and handling and risk management can be possible due to the use of BI technologies in the banking sector.

Despite the increase of the challenges in the banking sector, there are a smaller number of research studies carried out on exploring the aspect of using the BI technologies in the banking sector and how it can be effective in enhancing the benefits and mitigating the risks for the banks, particularly in Malaysia (Nofal & Yusof, 2013). Furthermore, the proposed study seeks to close the knowledge gap in understanding the key factors that influenced the organization to adopt the BIS, specifically in context of banking sector in Malaysia. This thesis is design as comprehensive empirical study in exploring the feasibility of implementing the BIS in Malaysia banking industry, as well as the assessment on the readiness of banking industry to adopt the system. Previous empirical research has covered the critical success factors on organization to adopt BIS on their organization in global context (outside Malaysia) and within Malaysia as well. However, there is no specific empirical research was conducted to explore and examine the success factors in context of banking industry in Malaysia. With regard to close the knowledge and research gap, there is a need to study the factors that contribute to the readiness of BI in the banking sector of Malaysia. Besides, the thesis seeks to explore the efficacy of using BI technologies in the banking sector so that pros and cons can be evaluated effectively. The present study is therefore designed to critically evaluate the in-depth information regarding the use of BI techniques to deal with the challenges of the banking sector. The study findings will provide in depth understanding the factors that influence bank

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to adopt the BIS, therefore helps to bank to prevent or reduce failure rate during BIS implementation phase, and subsequently BIS can optimally offer the most effective in enhancing its benefits and mitigating the risks for the banks.

1.3   Research Objectives

This research aims to explore the critical success factors for the implementing Business Intelligence system in the Malaysian Banking sector. To achieve the aim of the study, some specific objectives have been made to gather complete details regarding the topic. Following are the main objectives of the research:

- To study the relationship the perception of the comparative advantage of Business Intelligence System (BIS) toward the implementation readiness of the systems

- To examine the relationship of the perception of Business Intelligence System's (BIS) complexity on Business Intelligence System (BIS) implementation readiness

- To analyse the roles and the relationship of the flexible and appropriate technological infrastructure framework towards Business Intelligence System (BIS) implementation readiness

- To explore the relationship of the management support on the implementation readiness of the systems

- To study and explore the relationship of organizational readiness to Business Intelligence System (BIS) implementation readiness

- To study the relationship of the competitive pressure factor toward the implementation readiness of the Business Intelligence System (BIS)

1.4   Research Question

The research question has been created to get in-depth information regarding the topic; these insights can be combined to achieve the complete details regarding the topic of the research. The main question lie on the topic research are to define what are the factors that

contribute to the implementation readiness of business intelligence in Banking in Malaysia; whereby the it has been elaborate into some of specific research question. Following is the research question:

- What is the role of the perception of the comparative advantage of Business Intelligence System (BIS) and its relationship on the adoption of Business Intelligence System (BIS)?

- What is the relationship of the perception of Business Intelligence System's (BIS) complexity and its impact on Business intelligence implementation readiness?

- What is the role of the flexible and appropriate technological infrastructure framework and its relationship on the adoption of Business Intelligence System (BIS)?

- What is the role of the management support and its relationship on the adoption of Business Intelligence System (BIS)?

- What is the role of the organization readiness and its relationship on the adoption of Business Intelligence System (BIS)?

- What is the relationship of the competitive pressure (industry competition and competitor's absorptive capacity) effect on n the adoption of Business Intelligence System (BIS)?

1.5   Significance of the study

In the world today, new innovations are introduced and launched in the market each day. Business intelligence systems are playing significant role in boosting the banking sectors globally. As study suggests (Acheampong and Moyaid, 2016), organizations who opt business intelligence systems get more benefits in their banking sectors. Business intelligence (BI) systems provide assistance in making good decisions, provides faster and better reporting and increased revenues etc. moreover, the study illustrates that by the fastest growth in the business markets each day, companies and organizations focus on the adoption of better technologies and plans that assist them in spreading their business wide. Another study (Owusu et al., 2017)

claims that banking sector needs to be updated with all the consequences and issues that are the part of business world.

Organizations should have a grip on making decisions. Innovative technologies and software are installed in the departments to adopt better policies and interventions in order to engage customers and clients with the organization. Furthermore, it has been noticed in the key findings that every organization have a concern about the frauds, risk managements, product management and the prevention from losses. Business intelligence (BI) systems have millions of data stored in them that have been kept confidential due to privacy concerns. In the banking sector the BI system is used for the profitability analysis of the customers and also increases the profitability of new products and services. It also seems to reduce the bank's credit losses and also improves customer support and service facilities and also helps strengthen the loyalty of the customers (Olszak et al. 2006).

The present study will be helpful to explore comprehensive information about the applications and implementation factors of the BI system in the banking sector. In addition, the study will provide in-depth information about the benefits and challenges involved in the implementation of this system in the banking sector. A rigorous comprehensive analysis and evaluation of BI readiness is still required (Anjariny & Zeki, 2013). This was observed that the BI system presented many benefits such as efficient decision making, large data handling, provide quality services and assisting with the risk mitigation strategies. On the other hand, the challenges of the system implementation involve the higher costs and time. It is required to analyse these factors that can encourage or discourage the implementation of the system for the employers of banks in Malaysia (Ahmad, 2015). Therefore, the present proposed study will be helpful to analyse the critical factors that can play a role in the success of the organisation. It was observed that many organisation including banks encountered challenges related to fraud cases and privacy leakage of the customers that required the integration of the innovative system to enhance the confidentiality of the customers and to reduce the concerns. This will enhance the profitability by increasing the generated revenues for the banks along

with the increase of the confidentiality of the customers to enhance the privacy of their data (Ikpefan & Akande, 2012).

This study will provide detailed information about the factors and innovations that can enhance the profitability of the banks and how they can overcome the challenges by using an innovative system such as BI technologies. In addition, the role of these strategies and their effectiveness and applicability can be found out by using the findings of the proposed study. The proposed research study will be significant in assessing and examining the key factors that influence the banking sector of Malaysia to adopt the BI system. The study will be significant with regards to the proposed outcomes in terms of exploring the applications of BI systems in the banking sector and finding out the pros and cons related to the application of this system.

1.6   The Organization of the study

This research is divided into different chapters, each chapter caters to a specific area of the study contains detailed information which is relevant to the topic within it along with authentic and proper references and citations. The first chapter consists of the background of the topic with the aims and objectives of the research along with the research question. The second chapter of the research contains the pre-existing data related to the topic from different researches, articles, journals, and papers. It starts from an introduction and ends at the conclusion; it also contains the theoretical framework of the topic. The third chapter is of the methodology in which the detailed methods which are being used in the research are discussed. The fourth chapter consists of the data analysis on the data which has been found from the primary methods of the research. And the last chapter includes the overall summary of the research, implications, limitation, direction for future research and conclusions.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Literature based study revealed that the present enterprises are required to fulfil the increasing customer demands and should provide quality product services within a short time period. Throughout the recent years in the banking sector the competition has increased and to compete against the other competitors it is crucial to be updated about all the information of the business for a better decision making (Taneja et al., 2015). The BI system is used for the interpretation of a large volume of data and also provides long term stability for the business to prosper (Qushem et al. 2017). The concept of the Business Intelligence system was first explained in 1989 by Howard Denser who used a computerized support system to develop the process of decision making (Bargshady et al., 2014). During the last decade a number of organizations have implemented the BI system in order to achieve improvements and enhance their decision making (El-Adaileh & Foster, 2019).

2.2 Underpinning Theory and Theoretical Framework

The survey of the literature gives the idea about the developments in the banking sector in the recent years. The banking is going through a major phase of transformation due to growing competition. The banking sectors are adapting the BI system to enhance their worth and to obtain profitability according to Mishra et al. (2016). The BI system applications in the Banking sector includes customer relationship management, performance management, asset and liability management, risk management and compliance (Acheampong and Moyaid, 2016). Not only to the large companies but due to the availability of inexpensive and generalized products BI is now also in the reach of smaller and medium size companies, and with the help of well-designed infrastructure, it makes competitive advantage are avail to the business organization (Nadeem & Jaffri, 2004). Going through the study, the greater high failure rates, sub utilization and withdrawal of BI solutions, the requirements to approach the

issues that prefer good planning, implementation and holding of these types of solutions is necessary. According to the researchers Hawking, P. & Sellitto, C. (2010) these are known to be the key success factors. Solution adoption, complexities in implementation and business purposes issues are more concentrated learning of key success factors for BI solutions (Yeoh et al, 2008). The problem for an organization is to find out the factors that are more influenced over the BI system (Sangar & Iahad, 2013). That is the issue because of this the key success factor has turned out to be the useful concept to understand the BI project, and then it becomes a pillar for people to understand the areas that can carry theory into practice (Arnott, 2008).

2.2.1   Business Intelligence

Business intelligence is an umbrella term for technologies, application and processes related with collecting, storing, utilizing, disclosing, and analyzing data to aid decision making (Gaardboe, Svarre 2018). The main objective of Business Intelligence is to facilitate managers in decision-making process. (Tyson 1986) defines it as a Business Intelligence system focused on the collection, processing, and presentation of data about customers, competitors, technology, markets, products and environments. The significance of business intelligence observed I the decision-making capacity along with the market competitor's demand for the business approach and help in the smooth growth in the market. Also, through the business intelligence it is easy to study the ways that can help to increase the organization profit. In addition to this, it also impacts in the analysis of the customer behavior by tracking the performance of the organization and customer services the organization challenges can be smoothly determined and solved. It is important to know the current market trends in order to accomplish the goals. The implementation of optimized operations in business intelligence system also help in driving the organization towards success.

Business Intelligence solutions are presently utilized mostly by large and medium-sized companies. These businesses produce the amount of structured data from which acquire, through various methods and analyses the useful information to support business process management. The data is generated in the company of the most common operating systems

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and are stored in a certain database structure, ready for processing. In current times Business intelligence is used for strategic initiatives and provocation of innovation in the existing business environment. The dynamic shift in the overall business culture has tilted the shift towards the use of such applications as being necessities (Liang & Liu, 2018). Companies all around the world have to sustain their competitive advantage and the use of applications like artificial and business intelligence makes this more practical.

The process of data management is complex as it compromises the accuracy, availability and accessibility of the data which are provided by the organization management and IT teams. In result to which the market campaigns are observed improved along with the optimize business operations and in progressive informed decision operations. On contrary the data quality problems and worse business analytical applications leads to the deployment of the data operations and eventually effect the efficacy rate of the business operations. Business intelligence applications and technologies can assist companies to analyze changing trends in market share; variation in customer behavior and spending patterns; customers' preferences; company capabilities; and market conditions. Business intelligence can be beneficial to analysts and managers in determining which adaptions are most likely to respond to changing trends (Khan, Quadri, 2012).

The complexity of Business Intelligence solutions is mainly based on the availability of a variety of automated and analytical tools and functions that necessitate data processing. The most common tools are: ETL, OLAP, Data Mining, and Reporting (Bourman, Dogen, 2009; Jenco, 2011; Novotny et all, 2005). The objective of these analytical tools is to increase the professional quality of the organization data. It also helps in gaining the insights and automation setting generate more dynamic report and data structures. Business intelligence has two primary activities including getting data in and out of the organization. Data gathering was also known as data warehousing and was considered one of the most difficult and vital business functions. The integration of data gathered from various sources is now facilitated by the use of business intelligence. The second activity required a greater amount of precautionary attendance, as only the data demanded was supposed to leave the organization. (Ain. et al,

2019). The whole process of data extraction and data mining has been automated by the use of BI applications, this leaves a sufficient amount of time for the management to focus on more core activities.

BI is a domain of Decision Support System (DSS) an information system that can be used to support complex decision making, and solving complex, semi-structured, or ill-structured problems (Azevedo & Santos, 2009; Nematiet al., 2002; Shim, et al., 2002). The goal of decision support system is to facilitate the information for the execution of the manageable and structured decisions for which different databases and software systems can be used. As, with the implementation the data can be mined through the external sources like internet. The size of the database depends on the organization supporting the information. Moreover, there are different methods that are used for the analytical observation and data processing of the company like mathematical methods. The software can be designed according to the desired outcome depending on the inputs and conditions (Martins, et al., 2019).

2.2.2 Critical success factors of Business Intelligence

There are different theories used by the researcher associated with exploring the determinants associated with the use of BI adoption in different organisations. There were three theories in listed in the previous literature named as "Diffusion of innovation (DOI)", institutional theory and TOE framework. Hatta et al., (2015) presents and discusses both theories, and also present relevant literature that related to technological innovation in the paper. It was noticed that there were five common determinants that impacted the rate of innovation adoption within different organisations. These determinants include relative benefits, complexity, compatibility, observability and trialability (Boonsiritomachai et al., 2014). These parameters or factors were positively associated with the rate of adoption of BI systems in the organisations to bring innovation. On the other hand, the institutional theory demonstrated about the factors such as customer pressure, requirements of suppliers and preferences of trading partners played a significant role for the organisations to adopt the BI

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technology system. Furthermore, the other leading factors explored by the institutional theory include the policies of government bodies and to gain success with the competitors affect the decisions of companies to use the applications of BI system. Another model or framework named as the technology, organization and environment (TOE) framework was applied by the organisations for the integration of the BI system. Tornatzky and Fleischer (1990) established the Technology–Organization–Environment (TOE) framework, which this theoretical conceptual framework has been frequently adopted by most researcher to analyze and examine the implementation of various technologies (Stjepić A. M. et al., 2021). The theory explained that organisations consider the different dimensions such as technological, environmental and organisational factors for the implementation of innovative technologies (Hatta et al., 2015). It was also stated that technological factors considered by the organisations for the integration of BI systems constitute internal and external technologies that can be used as a tool along with the processes significant for the organisation.

2.2.2.1 Technological factors

According to Owusu et al. (2017), technological factors have several characteristics including, relative advantage, complexity, compatibility, and flexibility that enables to influence the adoption of the BI system. Innovation is a key factor in improving analyticity of logistics information therefore. If any organization adopt to change itself into BI system, it helps them to be well-timed and precise as compared to the old one. Secondly, another factor is flexible and appropriate technology that can be influential on adopting BI system. Flexible IT infrastructure can contribute in term of incorporating and reconfiguring IT resources both internally and externally in order to respond to opportunities and pressures of the market (Chen, X., 2012). Lastly, the complexity of BI system technology, the key determinant which impact organizations negatively. The use of the personalized services to the customers benefits in the deliverance of more functionality and smooth business drive with the help of refined data analysis methods. These methods significantly improve the businesses data and resultant in greater customer support and organizational profit (Wang, et al., 2018). Since it is complex

in nature, it is difficult to adopt and learn hence, it can hinder people in the organization in adopting to the new innovation (Owusu et al., 2017). Business intelligence can contribute a lot to the existing technological framework of an organization. It encompasses various forms of technology which is further processed with the help of artificial intelligence in the implementation of business intelligence (Chen & Lin,2021). The CPM (corporate performance measurement) framework has improved substantially after the induction of business intelligence in organizations. The CPM had limited access to the overall informational infrastructure previously which was further restricted due to the lack of integration of various business applications, but after the implementation of business intelligence, the set of data is transported in the balanced scorecard to identify KPIs (Key performance indicators) integrated with the overall organizational goals. Similarly, there are other applications like ERP and CRM which have augmented their level of performance after amalgamation with business intelligence (Liang & Liu, 2018).

2.2.2.2 Organizational factors

One of the determinants in BI system execution process is the top management support. It provides vision, support, and assurance to build a positive insight about innovation. Hence, top managers provide the clear vision about the technology can provide them a positive impact on the firm (Puklavec et al., 2018). Additionally, organization readiness could be another factor which have positive impact on any organization. It helps in allocating necessary resources for innovation adoption i.e., the availability of financial, technological, and other necessary resources which could be significant in adopting BI system (Chaveesuk & Horkondee 2015). Other factor that impacts positively could be the presence of a champion who have all the knowledge and information about the new technology which can help in profiting the organization in the market. Presence of a champion can bring positive changes in the organization by providing awareness about the innovation, material resources and gaining organizational support (Puklavec et al., 2018).

Since the upper-level management acts as a key component in the decision-making process, the significance of the executive management is undeniable. The top-level management is not responsible for deployment and allocation of resources but is also the mainstream of the overall organizational culture. Not to mention the presence of an efficient senior management acts as a link between the outside world and the organization (Vugec.et al, 2020) The DSS (Decision support system) can only be amplified by the implementation of the Business intelligence, to begin with a structured and comprehensive decision support system must be in place. The main element of a DSS is the executives and board of directors who are directly indulged in the whole picture (Fink,Yogev & Even,2017). In conclusion, an organization cannot implement a business intelligence system successfully if it does not possess a supporting senior management.

2.2.2.3 Environmental factors

Environment of the organization can impact both positively and negatively as it can create both opportunities and threats. One of the major factors which positively influence BI system implementation is competitive pressure of market which provides any organization a chance to introduce innovation into the firm and compete with the opponent markets. By facing the competitive pressure, organizations can compare their current approach in managing their data storage and implement different new technologies to cope with that challenge (Rouhani et al., 2018). Similarly, external source could be another factor which can be a positive influence on the organizations by mining new knowledge and information from external source, therefore, provide organizations great way to introduce innovation in the firm. Lastly, the government support could be another determinant. Having a support by the government in IT implementation can get financial bonuses in order to run the company (Chaveesuk & Horkondee 2015).   The environment is considered to be the source of all positive and negative externalities outside the organization. Thus, despite the opportunities provided by the environment, there are also various forms of threats that can be inflicted on an organization. As mentioned above, business intelligence can intensify the positive externalities but can also

prevent the organization from the negative outcomes and threats posed by the environment, especially for a bank. This includes the fraudulent information processing of transaction or speculative business transactions, a breach of security or destruction by fire, or any physical form of incidental damage (Tirpude, Karandikar, & Welekar, 2020). Though business intelligence cannot prevent an organization from all aspects of disasters it can reduce the magnitude of various threats. This includes the identification of mysterious or speculative transactions by the whistle-blowers in place and an impenetrable firewall presence for prevention from any information theft (Owusu, et al. 2017). The business intelligence improvises the existing BCP (business continuity planning) in an organization to ensure data is transmitted into an offshore location on a real-time basis and without being decoded in the way. These are one of the few reasons which have led to BI awareness in today's environment and are becoming an essential part of the overall organizational infrastructure.

In addition, the environmental factors include the size structure of the industry, competition with the other organisations and macroeconomic contexts were the factors that affected the organisations to adopt the BI technology for the achievement of success. The organisational factors comprised of the organization strategy, structure, process and culture (Arefin et al., 2015).

2.2.3 Significance of Business Intelligence Systems (BIS)

When asked to prioritize technology investments, Chief Information Officers (CIOs) ranked Business Intelligence at the top (Gartner, Stamford 2014), this shows the significance of Business Intelligence systems in organizations. Business Intelligence was the biggest organizational IT investment in 2015 and it had maintained this record since 2009 (Kappelman et al 2015).

With respect to BI systems used by managerial level, Negash (2004 p. 179) suggested "BI assists in strategic and operational decision making" and that "Business intelligence is used by decision makers throughout the firm. At senior managerial levels, it is the input to strategic and tactical decisions. At lower managerial levels, it helps individuals to do their day-

to-day job." (p. 189). With strategic research approach the problems that are been faced by the organization teams in sales and services can be overcome. Also, these approaches also help in the product improvement and promote the potential relationship with the vendors and the customers (Božič and Dimovski, 2019).

The ever-growing importance of BI systems can be asserted by research done by Thomson (2004) classifying the major advantages of BI based on survey research. He concluded that BI sanctions faster and more accurate reporting (81%), enhanced decision-making (78%), refined customer service (56%) and increased revenue (49%). Data mining is one of the most state-of-the-art data analytical techniques used in BI systems; numerous Data Mining applications have been carried out in the telecommunication industry. The three fundamental applications are identified are: Marketing & Customer relationship Management (CRM), Fraud management and Network optimization (Pareek 2007). CRM software includes all the customers services that are being cater. The increment in the customer sales and revenue is made through the customer calls, emails, and meeting analysis. One of the common software that is used for the customer relationship management is cloud-based system that track the sheer amount of customer data. There are certain critical success factors that are used in the management control it involves executive information systems (EIS) as it eases in the management progress of the organization. The management of the information can be accomplished by the appropriate EIS design which is dependent on two main ideas that are the identification of the data gathered and the availability of the data to the management resources. Thus, empowering in the organization growth (Brar, 2018)

The acquisition and implementation of a Business Intelligence tool are also quite advantageous for the health organization. Healthcare organization usually store how their processes should be performed, specifically those that represent complex routine jobs involving multiple people and organizational units. These intelligence systems are facilitators of the management, storage, analysis, and visualization including ensuring access to large amounts of data in the context of BI (Brandao et al, 2016).

When we attain the significance of Business intelligence in terms of the banking sector there is a whole different range of elements to be considered. Since the banking sector poses as one of the basic and most vital corporate sectors of economic development, the factors initiating its smooth conduct of operations become even more significant. Several studies were conducted presenting the Ghana Banking sector as one of the models of evaluating the success of BI implementation in the banking sector, various advantages prompt positive feedbacks on both organizational and individual levels (Vallurupalli & Bose, 2018). Recent times require organizations to be customer-oriented rather than divert all their resources to attain profit maximization. The implementation of Business Intelligence has resulted in customer satisfaction and delight.

The customers tend to find connectivity easier with their respective banks and can easily access all the information required from a single platform. Different operational segments coincide and provide an integrated system for the consumer to perform several unrelated activities through their applications (Alzoubi. et al.2020.The applications implemented through business intelligence have made the banking system user-friendly and easy to comprehend. There is no restriction to literacy or any age parameter for the basic premise of using banking applications.

2.2.4 Overview of banking sector of Malaysia

The Malaysian banking structure has better alliance and evolutional outputs. The rise in the evolution resulted from the merger approach of local banking institutions into anchor banks that further proceeded to the competition in the market which are regulated (Sufian, Kamarudin and Nassir, 2017). The Malaysian banking sector consists of 27 commercial banks of which 19 are licensed foreign banks, 11 investment banks, 18 Islamic banks (Bank Negara Malaysia, 2020). Furthermore, according to Association of Development Finance Institutions Malaysia (ADFIM) (2021), there are also 17 development financial institutions (DFIs) in Malaysia as of September 2020, including Sabah Credit Corporation Berhad, Sabah Development Bank Berhad, Bank Simpanan Nasional, Malaysian Industrial Development

Finance (MIDF), Perbadanan Usahawan Nasional (PUNB) and Small Medium Enterprise Development Bank Malaysia Berhad (SME Bank). The DFIs were initiated by the government under The Development Financial Institutions Act 2002 to provide financial support to specific priority sectors of the economy to undertake required socio-economic obligation, and they are mostly sponsored by the government. As Malaysia's banking sector is large and diversified. Banking intermediaries, insurance companies and capital market firms have assets of close to 400 percent of GDP as of the last quarter of 2011 (as shown in Figure 1). Banking intermediaries account for almost half of the financial system. The economic growth of Malaysia lowered in 2019 for which different policy approach was being catered and in result to which the increment in the profit was noticed (World Bank, 2013).
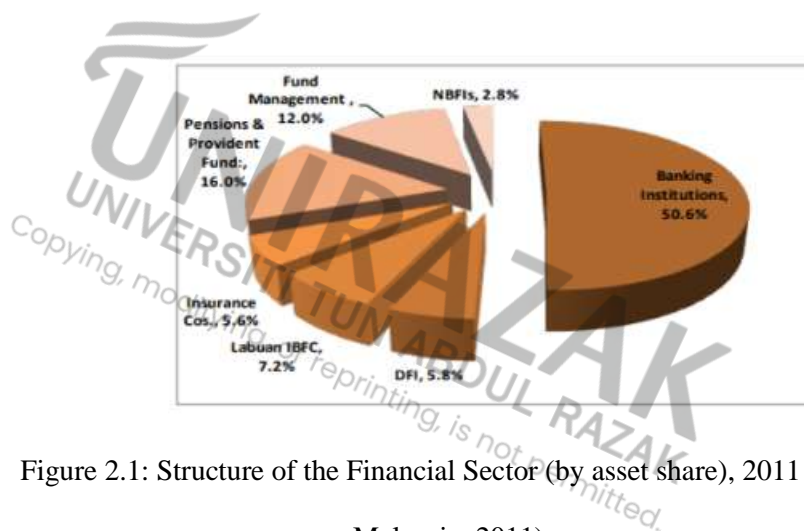
Figure 2.1: Structure of the Financial Sector (by asset share), 2011 (Bank Negara Malaysia, 2011)

2.3   Empirical Research

According to Mungree, D. et al. (2013) in the article "A framework for understanding the critical success factors of enterprise business intelligence implementation" is discussing the about the BI system implementation and critical success factors (CSF). This article analyses the success factors and their contextual issues that can help any firm or organization to attain an effective BI system implementation. The authors use the mixed approach for the methodology to figure out the results. The finding shows that the appropriate and usefulness of the various factors vary according to the phase of implementation.

Whitcomb, V. J. (2016) conducted research on the gap in knowledge concerning critical success factors (CSFs) for learning management systems (LMSs) implementation. Learning management systems (LMSs) are considered to be the technical basis for online learning programs that gives advantages to the learners in various areas. In this research, the study is done using phenomenological approach and the reason for this study is to find out the critical success factors (CSFs) by examining the lived experiences of 8 association executives who successfully managed LMS implementation through email communication. There is a possibility in this research to have a positive social impact that is due to the reduction of the risk of learning management systems (LMSs) that will make possible for the leaders in the organization to increase the learning opportunities to more individuals, which will be the source of prosperity for the membership association and the industries.

The business accomplishment of small and medium-sized enterprises (SMEs) relies on the adoption of many technological innovations, but somehow different internal and external risk will influence the adoption. The authors Stjepić A. M. et al., (2021) reported in his article about the risk that impact business intelligence system (BIS) adoption in small and medium-sized enterprises (SMEs) by using the technology, organization and environment (TOE) framework. The author collected the data by a questionnaire survey using a sample of 100 Croatian SMEs, and develops the logistic regression model. To test the model, the author used the survey research approach. The results show that if the TOE framework is applicable to examine BIS adoption in SMEs. From the outcomes, it is clear that the internal risks of SMEs are related to the organizational dimension and the external risks to the environmental dimension. The research does not declare the particular impact of technological risks that surrounds the characteristics of the technological innovation related to the technological dimension.

The business intelligence (BI) is a new direction in a public sector organization that needs to inspect the critical success factors (CSFs). Nonetheless there is not much enough evidence that provides the better knowledge of the CSFs for the BI implementation in public sector organizations. The author Magaireh, A. I. et al. (2019) conducted a research to identify

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the critical success factors (CSFs) for business intelligence system (BIS) in the background of public sector organizations. The research is done by using the mixed method approach, survey research method and qualitative interview by using the Jordanian public sector organization case. The findings of this research shows that the top management support, strategic planning, clear vision, user participation, team skills, organizational structure, development technology and user access are very demanding factors of BI implementation success in the public sector organizations, the findings of the study can also tell the organization that to focus on those CSFs of BI systems which provide them a good brief to implement, plan and manage the BI projects and to tackle the issues and concerns related to BI implementation.

The utilisation of the BI system was found helpful for the firms or companies with regards to making better decisions by comparing the previous and present data of the companies. The study showed that the tools of the BI system can be applied for better performance and selecting the appropriate benchmarks to enhance the productivity of the employees and make the system run more smoothly (Muhammad et al., 2014). It was noticed that the techniques of the BI system had its applications for the financial sector in terms of risk management and provides more profits to the clients. In the banking sector, the application of BI techniques attracts a large number of customers that generate more revenues and profitability for the banks. In addition, it was found that the quality services of the banks for their customers and other stakeholders can be increased due to meeting the compliance requirements

The dashboard management was also possible for the banks by integrating the applications of the BI system. In one study, it was reported that the use of Business intelligence technologies can assist and enable the organisations in gaining insight into new markets, assessing the demand for and acceptability of products and services for various market segments, and determining the effectiveness of marketing initiatives (Chugh & Ghandi, 2013). According to Muhammad et al., (2014), BI techniques was helpful for the banking employers, leaders and other employees to improve and streamline their operational efficiencies, improve the sales and marketing tactical strategies and also equip the organization with risk

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management plan by the ability of BI system to perform organization data analysis. Additionally, the services can enhance the customer service programs that can provide the solutions to deal with the customers efficiently with more outputs. The risks can be mitigated by using the BI system as it was found possible to use more risk management and development processes. Handzic, M. et al. (2014) in the study "Improving Customer Relationship Management Through Business Intelligence" investigates business intelligence (BI) function in customer relationship management (CRM). The data was acquired using a quantitative method from 165 participants from 73 various firms across Eastern Europe, including both the public and commercial sectors. The study confirms and validates the importance of BI in CRM by demonstrating its impact on the creation of organisational business and customer strategy.

In addition, the performance of the business and the banking operations can be managed by using the data analytics tool and software. Compliance and liability management can be possible by using these techniques. For instance, the BI system was found helpful for handling the issues such as customer complaints, transaction analysis, analysis of the profitability of the customers, analysis of the markets, risk analysis of the risk rates and analysis of the suspicious activities (Rao & Kumar, 2011). The study further documented that the BI system can be applied as it provides information about fraud detection in the organisation and predicting about the use of new products or services by the customers for checking the profitability. Radmehr & Bazmara (2017) on the research "A Survey on Business Intelligence Solutions in Banking Industry and Big Data Applications" state that banking industry employs business intelligence solution to provide insight namely on marketing, risk management, fraud detection, portfolio management, customer retention, success prediction, security exchanges etc.

Sujitparapitaya et. al (2012) aimed to determine the efficacy of ten variables in the organisational, technological and environmental factors and assessed their influence related to the use of the BI system in the private and public sector of the USA education system. The study collected the data from the 243 study participants by using the survey method. The findings showed that the structure and size of the organisation along with the legitimacy of the

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organisation and support of the stakeholders were amongst the significant determinants to adopt the BI technologies. The BI system was found effective in the study to gain competitive advantages and benefits for the organisations. In the other study, the factors were analysed that raised the adoption of the applications of BI for the organisations. Malladi (2013) aimed to employ the framework of *"Technology-organization-environment (TOE)"*. There was the collection of the data from 358 organisations located in North America by using the survey method. The findings indicated that the organisations utilised these BI techniques due to the perceived advantages, sophistication of technologies in terms of infrastructure and size of the organisation. The firms that required more knowledge with modifications enhance the requirement to integrate the BI technologies for the increase of outcomes and productivity.

Rouhani, S. et al (2018) carried out empirical study on Business Intelligence (BI) systems adoption model and aimed to examines of the various aspects affecting business intelligence adoption in the context of Iranian banking and financial industry. Nine relevant hypotheses relationship developed for the study that consists four hypotheses for technological factors, three hypotheses for organization factors and two hypotheses for environmental factors. The hypotheses validate and analyse using Structural Equation Modelling (SEM). The findings showed in terms of analysis of hypotheses of perceived costs factor, there is no significant differences found between Business Intelligence System (BIS) non adopters and adopters. The study suggested the remained eight hypotheses that construct by the factors of perceived tangible benefits, perceived intangible benefits, complexity, business size, organizational readiness, strategy, industry competition and competitor's absorptive capacity effect on BIS adoption is in banking and financial services industry.

The study carried out by Owusu et al (2017) aimed to analyse the factors that affect the organisation in Malaysia to adopt the BI system. The study was carried out to assess the applications of the BI system in the private universities of Malaysia. The research used the Technology-Organization-Environment (TOE) framework for the analysis of BI applications in the organisation. The data was gathered by using the survey method and the research instrument was based on the questionnaire. There were 120 study participants recruited

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comprised of managers and the employees associated with academics in Malaysia. The collected data was analysed through the method of Structural Equation Modelling (SEM). It was observed from the findings that the factors such as competitive pressure, IT infrastructure, management support, absorptive capacity, complexities and vendor selection were the factors that affected the adoption of BI technology in the University in Malaysia.

On the other hand, the study "Sustainability of Commercial Banks Supported by Business Intelligence System" carried out by Tunowski, R. (2020) is aimed to discover whether business intelligence (BI) systems contribute to commercial banks' sustainability by effecting their financial state. The study employs the comparative method which is compared bank's financial condition in three different aspects whereby: during pre and post BIS implementation, compare and gauge comparison average indicator towards the industry and also comparison on overall economic situation. Among thirteen (13) Polish commercial bank that listed in Warsaw Stock Exchange, only six prominent commercial banks in Poland involved in this study. The study confirmed that there is positive correlation between the adoption of Business Intelligence systems and financial condition. In other study, Preko, M. & Kester, Q. A. (2015) conducted study to examines the impact of implementation and adoption of BI systems in Ghanaian Banking industry. The study utilizes Technology Acceptance Model (TAM) and qualitatively analyze twenty-two (22) banks. The study confirmed that overall impact of the deployment of BI systems and technology was significant, indicating that the Ghanaian banking industry has truly embraced business intelligence.

The study carried out by Marefati and Hashmi (2012) aimed to analyse the efficacy of the BI system in the banking industry. The use of BI system comprised of tools, processes and technologies that help in the transformation of data to the required information that enhances the decision making in the organisation. The study explained the principles of BI and its application in the banking industry. It was observed that BI solutions can enhance the competitiveness of firms and organisations. The solutions provided by the BI system can be employed to gain the maximum benefits for being a leader and presented a better

understanding of customer requirements. In addition, better communication can be included in the system that will enhance the employees-customer relationships.

In another research study did by Sundjaja (2013) aimed to study the implementation of the BI system in the banking, education and retail industry. It was observed that the different organisations used to manage the large data sets that cannot be handled manually. It was nearly impossible to handle the large data sets of the customers by the individuals working in different sectors. The article discussed the applications of the BI system and its implications. It was found that the BI system can be used for data sourcing, data analysis, data management and for other's benefits. The data obtained from the study showed that integration of BI system in banking helped in obtaining, managing and analysis of the large data sets of consumers. Following table are summary recent empirical study on the area of the studies.

Table 2.1: Summary of Recent Empirical Study on the Area

NO	Author	Method	Respondent	Context	Variables/Factors/ Dimensions/Constructs	Research Findings
1	Stjepić A. M. et al., (2021)	Quantitative questionnaire survey using a sample (snowball approach as a sampling method) and develops the logistic regression model	100 Croatian SMEs	Croatia	TOE Dimension Independent variable Technology Perception of the comparative advantage of BIS Perception of the BIS's complexity BIS's compatibility with enterprise information system Key personnel ability to assess the BIS benefits . Organizational Context Top management organizational support Organizational readiness . Data management as a backbone for decision-making processes Environmental Context Competitive pressure has BIS vendors' quality has a Dependent variable SMEs' adoption of BIS.	The results demonstrated positive relationship between the use of the Business Intelligence systems and financial condition may be an indication for bank managers that investments in the Business Intelligence system improve the financial condition The obtained results confirm the research hypothesis and indicate a general improvement in the overall financial condition of banks as a result of using the BI system. The positive impact of using the BI system on financial condition indicators was identified in all the examined areas of the financial condition.

| 2 | Tunowski, R. (2020) | The comparative method (Qualitative) | Six out of the thirteen largest commercial banks listed on the Warsaw Stock Exchange in 2020, | Poland | Independent Variable - Use of the Business Intelligence management system.

Dependent Variable - Financial condition of commercial banks | The results demonstrated positive relationship between the use of the Business Intelligence systems and financial condition may be an indication for bank managers that investments in the Business Intelligence system improve the financial condition

The obtained results confirm the research hypothesis and indicate a general improvement in the overall financial condition of banks as a result of using the BI system.

The positive impact of using the BI system on financial condition indicators was identified in all the examined areas of the financial condition. |
| 3 | Magaireh, A. I. et al. (2019) | Mixed method approach using survey research method and qualitative interview (Semi-structured interviews with open-ended questions | Public sector organization | Jordan | Top Management Support Clear vision and strategic planning Team Skills User Participation Organizational structure User access Flexible and appropriate technological framework (Development Technology) Project management User education and training IT infrastructure Well defined users' expectation Peer support Development Approach Integration with other systems Adequate Resources Project Leader and Champion Data quality IS governance Sponsors Risk management support Coordination between IT and business units Data management Task compatibility Attitude toward change •Organizational competences External consultant Management processes Well defined a business problem, needs and processes Change Management Competency development Third-party interactions Project planning Map the solutions to the users Developer skills Voluntariness | The findings of this research shows that the top management support, strategic planning, clear vision, user participation, team skills, organizational structure. development technology and user access are very demanding factors of BI implementation success in the public sector organizations, the findings of the study can also tell the organization that to focus on those CSFs of BI systems which provide them a good brief to implement, plan and manage the BI projects and to tackle the issues and concerns related to BI implementation |

4	Rouhani, S. et al (2018)	Quantitative Analysis using SEM	Banking and financial industry	Iran	TOE dimension Independent Variables Perceived tangible benefits; Perceived intangible benefits; Perceived costs, Perceived complexity; Organization Business size; Organization's readiness; Organization strategy; Environment Industry competition; Rival's absorptive capacity. Dependent Variable adoption of BIS.	All eight hypotheses are supported except perceived cost. There is no significant relationship between lower perceived costs the BIS towards the impact on the BIS adoption.
5	Owusu et al (2017)	Quantitative The collected data was analysed through the method of Structural Equation Modelling (SEM).	120 managers and academicians in 12 private university	Malaysia	Technology-Organization-Environment (TOE) framework and the Diffusion of Innovations (DOI)	The results also indicate that most private universities in Malaysia are currently involved in level 2 of BIS adoption
6	Owusu et al (2017)	Quantitative Analysis using Partial least squares structural equation modeling (PLS-SEM)	130 Bank executives	Ghana	Independent variables Technological Relative Advantage, Complexity, and Compatibility Organizational Organizational Size, Top Management Support, Presence of a Champion, and Organizational Readiness Environmental Competitive Pressure, and Regulatory Body Dependent variable BI Systems Adoption	BI Systems adoption in Ghana Banks are influenced by the Relative Advantage of BI Applications, Complexity of BI Applications, Presence of a Champion, Organizational Readiness, and Regulatory Body
7	Whitcomb, V. J. (2016)	Qualitative Semi-structured interview questions	Interviewed nine individuals (learning program managers) for the study and used eight for coding purposes	Learning Management System USA	Critical Success Factors (CSFs) selected: Management support, Strategy goals and mission, Project management, Culture, The ability to change. Technology and vendor selection, System integration and support, Human resources Dependent variables: Learning Management System Implementations	All participants indicated that the end-user experience was critical for success. Of these, a streamlined and easy-to-navigate interface, seamless integration with the 124 association management system, and interesting and engaging content were the most significant. Technology and Software is primary concern is the Learning Management System implementation All participants expressed how important the vendor was in managing a successful implementation.

						All participants stated that project management teams included vendors and stakeholders inside the organization. Participants unanimously agreed that a good project manager on the vendor side was critical for a successful implementation.
						All participants, except for one, indicated that upgrading the LMS was a decision that involved upper management and major stakeholders.
						Minority of participants mentioned hiring a consultant to supplement experience or talent needed for a successful implementation.
8	Handzic, M. et al. (2014)	Quantitative The collected data was analysed through the method of Structural Equation Modelling (SEM).	166 respondents from 73 different organisations across private and public sectors	Eastern European country	Independent variables External competition and business intelligence Dependent variables Business strategy, Customer Strategy	In summary, the study demonstrated that higher pressure from external competition and greater use of BI led to better business strategies and subsequent superior customer strategies Overall, the respondents in this study exhibited positive attitudes and willingness to adopt BI systems even in moderately competitive environments. Consequently, they tended to significantly improve their CRM strategies

The BI techniques were found beneficial in providing the customers the more personnel services that enhanced the quality services provided by the bank to its customers. The previous studies also explored the use of BI techniques in the banking industry. it was observed that the banking operations can be improved due to enhanced reporting, data mining, built-up performance management of the employees and benchmarking. In addition, the predictive analysis can be done by using the techniques of the BI system in the banking industry. Overall, the BI techniques helped in enhancing the operational efficiency of the banks, enhanced the quality of delivered products and services, enhanced marketing and increased the satisfaction of the customers. The study also demonstrated the new strategies of the investment that can be provided to enhance the business and its productivity. There is a

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higher cost involved in the implementation of BI techniques in the banking industry (Owusu et al., 2017). In addition, the individuals working in the banks must have the skills to use the technology of the BI system. In one study it was observed that risk reduction was possible by integrating the techniques of the BI system in the banks, these advanced applications were enhanced to minimize the risk by tracking the withdrawals and transaction activities in the banking system (Rao & Kumar, 2011).

2.4   Conceptual Model Framework

The conceptual model presents the model that can present the graphical relationship between the variables. The model for the following study is provided as under:
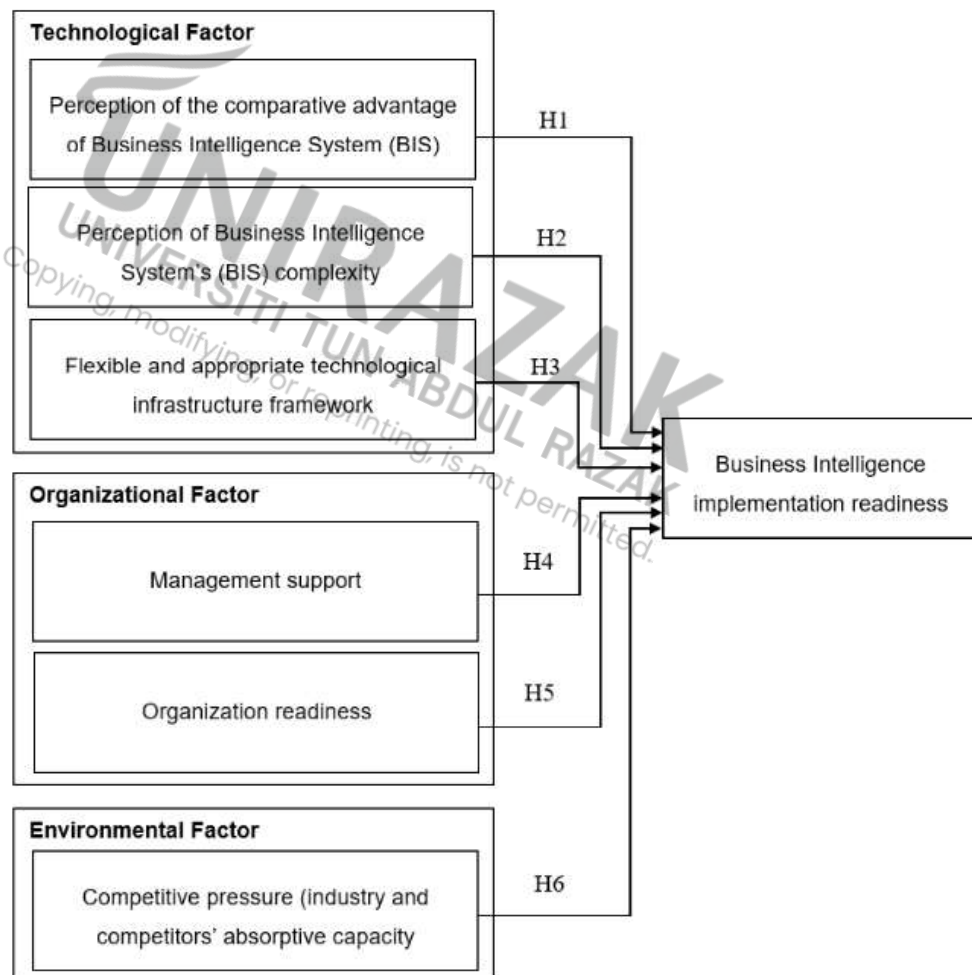
Figure 2.2: Theoretical Framework

There are different critical success factors within the companies that contribute towards business intelligence and supports in creating the positive environment for the

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implementation of business intelligence. Ahmad et al., (2020) conducted systematic literature review (SLR) on 84 published studies that release from 2011-2020 to explore the related significant determinants impact on Business Intelligence Systems adoption and acceptance. The findings indicated that in context of BI systems adoption, most researchers are utilized Diffusion-of-Innovation theory (DOI) follows by Technology-Organization-Environment (TOE) framework and Institutional theory. TOE's framework not only entail technological, but it also encompasses on organisational, and environmental aspects as well (Ismail & Ali, 2013).

Considering TOE as the foundation to determine the critical success factors, and in context of technological aspect, Stjepić A. M. et al., (2021) stated that perception of the comparative advantage and perception of the business intelligence system's complexity are two most critical factor that have significant impact that influence on the business intelligence system implementation and readiness. In another study, Mungree, D. et al. (2013) stated that flexible and appropriate technological framework is one of determinants that influence the BIS adoption. Furthermore, on another study, Chen, X., (2012) has empirically test the relationship of IT infrastructure flexibility and on the usage of Business Intelligence Systems, and the study concluded that IT infrastructure has positive impact on the BIS use.

Cidrin and Adamala (2011) suggest that a high level of top management support is correlated to BI project success. Similarly, according to Boyton et al. (2015) the most critical aspect in a successful BI implementation is acquiring management support. Petter et al., (2013) suggest that management support is the extent level of commitment from the management to promote and to sponsor as well as their motivation and commitment to provide the resource allocation adequately toward the implementation.

Puklavec et al. (2014) defined that organization readiness defined as adequate resources or capital that possess by the organization includes human, financial, technological, expertise, talents and so on. Similarly, under organizational factors, Puklavec et al., (2017) describes that organization readiness is the organization's ability to allocate the necessary resources for innovation adoption. Boonsiritomachai et al., (2016) stated that when evaluating

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the BI system implementation process within the firm, the availability of organisational resources is one of the critical determinants. Acheampong and Moyaid, (2016) discovered that organization readiness has determined to has a positive significant impact on the implementation of BI system.

In environmental context of TOE framework, competitive structure and pressure of market characteristics is considered one of it (Stjepić A. M. et al., 2021). This depicted that the intensity level of the competitiveness that exist on the market. Furthermore, Boonsiritomachai et al., (2016) suggested that competitive pressure has positive impact on the adoption of Business Intelligence System. According to Rouhani, S. et al (2018), environmental aspect is attributes by the industry's competition and as well as the competitors' absorptive capacity. Therefore, it is proposed that Competitive pressure (or industry and competitors' absorptive capacity) is one of independent variable that potentially has impact on the Business intelligence System's implementation and readiness.

2.5   Research Hypothesis

The hypothesis of this research is provided as under;

- H1: Perception of the comparative advantage of Business Intelligence System (BIS) has a positive significant impact on Business intelligence implementation readiness.

- H2: Perception of Business Intelligence System's (BIS) complexity has a negative significant impact on Business intelligence implementation readiness.

- H3: Flexible and appropriate technological infrastructure framework has a positive significant impact on Business intelligence implementation readiness.

- H4: Management support has a positive significant impact on Business intelligence implementation readiness.

- H5: Organizational readiness has a positive significant impact on Business intelligence implementation readiness.

- H6: The more Competitive pressure has a positive significant impact on Business intelligence implementation readiness.

2.6   Summary of Chapter 2

Business intelligence systems have become an integral part for a business due to the rapidly growing customer demand and competition. These systems can be a considerable boost to an organizations productivity and customer relations. However, the successful implementation can depend on various different factors.

Technological factors are one category of critical success factors that affect BI implementation. It really impacts the implementation if the BI in question is innovative. Although being fast, reliable, flexible and relative to an organization is great, however, being overly complex will have negative implications. Organizational factors also play a major role in implementation. Good management support, good leading vision as well as a good amount of financial, human and technical resources does contribute to a more successful implementation. Environmental factors such as competition can pressure companies into implementing new tools to better function. Vendor support is also an important factor. As well as governmental support.

The banking sector has undergone major change in the last few years, which has only increased the demand for a successful BI system. The Technology-Organization-Environment Framework (TOE) has been recognized as a framework for BI implementation that is able to incorporate different domains.

The Empirical research for the identification of already known CSFs resulted in highlighting various Environmental, Technological and Organizational CSFs, however, importance of CSFs differed from depending on the target of research.

Finally, one the basis of the empirical and literary evidence, a handful of hypotheses were found.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

In this chapter, the researcher will explain that how the research will be conducted and what type of data collection method and analysis technique will be used in order to test the formulated hypothesis of the study. This chapter will specifically provide description regarding the research design, study population and sampling procedures, data collection method, Operationalization and measurement in which included independent variables, mediating variables, dependent variable and in data analysis technique included descriptive analysis technique and inferential analysis technique, and summary of the entire chapter.

3.2 Research Design

Yilmaz (2013) stated that the quantitative research design is based on the collection and interpretation of numerical or statistical data in order to make research findings generalized. The use of quantitative research design will allow researcher to collect data from large sample size and interpret the responses of the targeted population using consistent and reliable quantitative data or statistical analysis technique. In this research, the application of data analysis technique will allow researcher to explore the success factors of business intelligence implementation readiness on the basis of responses of the population and analysis of their responses using statistical analysis. Furthermore, there is another way to conduct research According to Creswell (2009) in a mixed-method research design employs both the combination of quantitative and qualitative data used to conduct research. For example, the researcher evaluates the skills and risk perceptions of the people by collecting data about genetically customized food by conduct a mixed study of open-ended (qualitative) and closed-ended (quantitative) questions that both data are integrated and analysed. Ideally, the mixed method of quantitative and qualitative is best research design to adopt on this present study. To further understand in-depth knowledge regarding the respective area of study, the study is

to conduct a quantitative method and to follow up with qualitative face to face interview with organization's Subject Matter Expert (SME) and as well with targeted respondent for each individual factor and its TOE dimensions. But, due to time constraint of the study and as well as the strict organization policy due to Covid-19 pandemic that limit face to face interview, therefore in this research study, the researcher will adopt quantitative research design in order to explore the success factors that are required for the readiness of business intelligence implementation within the context of banking sector in Malaysia.
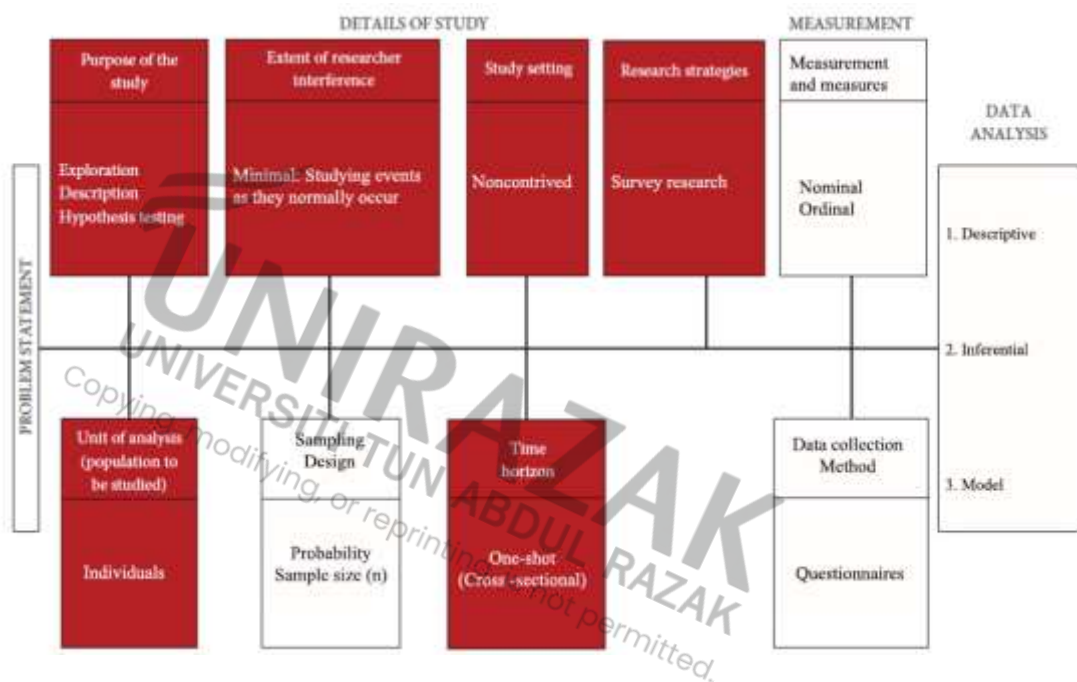
Figure 3.1: Detailed of Research Design

3.3 Study Population and Sampling Procedures

In this research study, the population that will be targeted or included are the bank employees includes non-executives, executives and managers employed in the banking sector of Malaysia. The population for this study is comprised of banking sector employees across Malaysia. According to 1Q 2018 Labour Market Statistics of the Financial Services Sector released by Bank Negara Malaysia (2018), as at end of the first quarter of 2018, there were 164,216 employed people in the financial services industry, which included banking institutions, development financial institutions, and insurance companies/Takaful operators

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compared to 165,318 peoples employed on ending same quarter in 2017. With a population workforce of more than 150 thousand people, it's vital to apply a statistical model to calculate the sample size.

There are numerous methods for calculating sample size. For small populations, these include using a census, imitating a sample size from similar studies, using published tables, and using formulas to calculate a sample size (Israel, 1992). Furthermore, Israel explains that the difficulty of establishing a reliable estimate of population variation has boosted the popularity of proportional sample sizes. Taro Yamane's (1967) formula, which is a simplified proportion formula, has gained prominence among researchers for these considerations (Adam, 2020). Taro Yamane's (1967) formula, which is a simplified proportion formula, has gained prominence among researchers for these considerations (Adam, 2020). Therefore, the study is adopting Taro Yamane's formula sampling population where the confidence level is at 95% and P=0.5, whereby higher level of acceptable sampling margin of error (0.08) is considered on the study due to time constraints of investigation and considering response rate of respondent to perform additional task during their busy schedule.

Therefore:

$$n = \frac{N}{1 + N(e)^2}$$

Whereby,

n = sample size

N = population size

e = acceptable sampling margin of error (0.08)

By resolving the formula, thus

$$n = \frac{164216}{1 + 164216 \, (0.08)^2}$$

n = 156.101

Therefore, the study designed to collect target sample of 156 employees of banking personnel based on Taro Yamane's formula. With the determined sample size of 156

respondents of bank employees from which survey questionnaire (with 5-point Likert scale measurement) will be filled out via electronic mail (email) or click on a hyperlink sharing. In order to select sample size of the study, the researcher will use convenience sampling technique in which the research collect the data from available pool and it is very economical. So, in this convenience sampling technique allow researcher to include those bank employees in the study that can easily or conveniently be approached (Etikan, et al., 2016). There are some advantages used of convenience sampling in which include data can collect easily, less investment needs to generate samples, easy to do research, less cost needed, sample always available and less rules which needs to follow. For the quick analyze the convenience sampling some easiest way which can be adopted for suppose, researcher can take multiple samples, can repeat the survey and can try cross-validation.

3.4   Research Philosophy

Research Methodology includes the research philosophy that deals with the sources and the development of the knowledge extracted. Research philosophy refers to how the data is collected, analysed and then evaluated for the study. Mostly, the research philosophy may include pragmatism, positivism, realism or interpretivism (Bajpai, 2011)

3.5   Research Approach

The research approach in methodology includes two approaches that are inductive and deductive approach. The inductive approach focuses on the systematic ways to analyze qualitative data where there is analysis on the objectives provided. The purpose of using the inductive approach is to compact the raw data into a summary and to evaluate the objectives provided. It provides a systematic approach to find the validity and reliability of the study (Thomas, 2006). Generally, the deductive approach comes out with a hypothesis that mainly focuses on the cause and effect of the study. Furthermore, deductive approaches are usually conducted with a quantitative

approach whereas, the inductive approach emphasises the work of the previous research from a different perspective that is the qualitative research (Gabriel, 2013). However, the researcher used deductive approach in this research.

3.6   Types of Investigation

There are three main ways through which the data can be investigated as stated by Yin, R. (1994) that includes exploratory, explanatory, and descriptive. First is exploratory research, which is applied when the problem of the research is not defined. Second is explanatory research, it is applicable when there is no need for decision making, however, they are used for the details of the research and the cause and effect of the research is used. The last is the descriptive research, it includes the quantitative approach where there are surveys and questionnaire conducted from a random sample. The nature of the research is explanatory research.

3.7   Data Collection Method

According Sachdeva (2013), two methods are used in data collection. It includes primary and secondary data. Primary data is collected by the researcher that are taken sources mainly through the interviews, surveys, experiments, etc. Primary data are collected from those sources. The methods of primary data collection include observation, interviews, questionnaires and surveys. Similarly, secondary data is collected is extracted through the previous researchers (literature review), and journal articles. The methods of secondary data include statistical reports, articles, academic journals, and researches etc. Primary data is applied in the current research. In this study, the researcher can adopt either primary or secondary data collection method in order to evaluate the success factors contributing to the readiness of business intelligence implementation in the banking sector of Malaysia. However, as per the nature of the study, the researcher intends to adopt primary data collection method in order to collect primary data to address the formulated research hypothesis. Roopa and Rani (2012) stated that primary data collection method refers to the collection of data from primary

sources such as surveys, interviews, field observations, etc. In this study, the researcher will use survey questionnaire in order to collect primary data from participant of the study. The use of survey questionnaire will employ 5-point Likert scale will allow researcher to collect large amount of data regarding factors associated with the successful business intelligence implementation readiness from large set of population with relatively quick and efficient way.

3.8   Operationalisation and Measurement

The survey questionnaire comprises three (3) sections in which Section A is cater demographic survey that designs to evaluate demographic data such as age, gender, job group position in the bank, Section B that design to evaluate six (6) independent variables and follow by Section C that design to evaluate the one (1) dependent variables of the study. The measurement of Section A is nominal, and both Section B and C s will be measures as ordinal using Likert-scale. The unit of analysis in term of population to be studied on the research is individuals.

3.8.1   Independent Variables

Six (6) success factors or determinants in TOE framework have been identified as independent variables for this study which are comprises three independent variables of technological dimensions, two independent variables of organizational dimensions and one independent variable of environmental dimension. Therefore, the independent variables for this study are *perception of the comparative advantage of business intelligence system (BIS), perception of business intelligence system's (BIS) complexity, flexible and appropriate technological infrastructure framework, management support, organizational readiness,* and *competitive pressure.* All of the variables are likely to influence on the dependent variables of the study. All of the defined independent variables will be measures on the ordinal based on Likert-scale questionnaire survey.

Operationalisation and measurement for defined independent variables for present study are as per following table:

Table 3.1: Independent Variable Operationalisation Measurement

Dimension	Constructs	Item	Key Sources
Technological	T01: Perception of the comparative advantage of business intelligence system (BIS)	By adopting BIS, I might protect organization from unnecessary costly expenses and save time.	(Stjepić A. M. et al., 2021), (Rouhani, S. et al., 2018)
		BIS is much more cost effective than other decision support systems (software).	
		On my perception, the use of BIS help to facilitate more effective decision-making.	
		On my perception, BIS facilitates better & quicker execution and decision-making.	
		On my perception, BIS simplifies organization tasks execution.	
		On my perception, the adoption of BIS allows for improved business control.	
	T02: Perception of business intelligence system's (BIS) complexity	On my perception, the process of getting conversant BIS is time-consuming, difficult to comprehend and complex.	(Stjepić A. M. et al., 2021), (Rouhani, S. et al., 2018}
		On my perception, the process of introducing the BIS is intricate and complex.	
		Using BIS is complex and demanding for users.	
		It is challenging to learn how to use BIS.	
		Resistance to the use of BIS is a result due to complexity of working with BIS.	
	T03: Flexible and appropriate technological	My organization has a high degree of	(Chen, X., 2012)

		infrastructure framework	information systems inter-connectivity.	
			Information systems in my organization are sufficiently flexible to accommodate electronic connections to external parties.	
			Our organization information systems enable remote users with seamless accessibility to centralised data.	
			Data is captured and made accessible and available to everyone in my organization in real time using information systems	
			Software applications can be easily transacted and used across multiple information systems platforms in my organization.	
			Our information systems user interfaces deliver a consistent and transparent access across all platforms and applications.	
			External users can access my organization's information systems through a variety of interfaces or access points gateway (i.e., web access).	
			To integrate critical enterprise applications, my organisation makes extensive use of information systems middleware (ability to connect different information systems platforms).	
Organizational	O01: Management support	Top management provide supports the implementation and adoption of the BIS.	(Stjepić A. M. et al., 2021), (Rouhani, S. et al., 2018)

		Top management willing to allocate sufficient resources for implementation and adoption of the BIS.	
		Top management actively participates in establishing the vision and shaping the strategy of BIS adoption.	
		Top management is willing to accept the possible risks the risks associated with BIS adoption and utilisation.	
		There is a person at the management level who strongly advocates and adamant on the implementation of the BIS (warns the importance of implementing the system).	
		There is a person at the management level who shows great enthusiasm in initiating the BIS adoption (motivates to adopt the system).	
		There are one or more people at the management level who continuously emphasizing the benefits of BIS.	
	O02: Organizational readiness	Managers and employees know how to use BIS for business support.	(Stjepić A. M. et al., 2021), (Rouhani, S. et al., 2018)
		Managers and employees comprehend and understand well how to use BIS in business.	
		We have adequate training and guiding procedure to use BIS in business.	
		We have enough technical, managerial, and other necessary skills required to adopt the BIS.	

		We have adequate financial, technological, and other resources required to adopt the BIS.	
Environmental	E01: Competitive pressure (industry and competitors' absorptive capacity)	We will lose our customers, if we do not adopt BI (due competition degree on business environment)	(Stjepić A. M. et al., 2021), (Rouhani, S. et al., 2018)
		We will need to adopt BI because of our business strategic necessity.	
		Our organization had to start using BIS to maintain its competitive advantage in the market.	
		Our competitors have made significant investments in acquiring new knowledge.	
		Our competitors can quickly discover and swiftly obtain the information they require.	
		Our competitors make a serious effort to acquire new knowledge as soon as it becomes available.	
		Our competitors constantly try to increase the number of information sources they have.	
		Our competitors can discover and learn new things effortlessly.	
		Our competitors can easily interpret the information they acquire.	
		Our competitors are good at connecting new and existing knowledge.	
		Our competitors are good at integrating information from different sources to their advantage.	
		Our competitors' existing practices make it possible to use new and current capabilities.	

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		Our competitors are good at using new knowledge in their operations	

The business information is influencing the customer's preferences as they are getting the easy way to access their accounts through the latest technology of innovations such as, mobile and internet banking. The dependent and independent variables which are selected for the conduction of the research defines the capability of the banking sectors to grab the opportunity and make their operations more effective and less complex. The artificial intelligence (AI) technology helps the businesses to grow with a pace towards the success and sustainable expansion, the AI helped in several industries such as transportation and manufacturing, and it is now adopted and implicated into the banking sector, which means the financial sector of the countries such as private and public banks will no longer be operated on the manual basis, and most of the operations would be automated.

The requirement of automation and BI is not only at the end of consumer's satisfaction purpose, but it could also be implemented in the management support and other relevant supporting function. In some conditions the management are relieved to rely on the automation as they are provided enough authority to make the small decisions on their own, which helps the management to focus into more important matters or business operations. The banking sector in Malaysia is quite developed as compared to the other developing countries, and the independent variables which are selected in this research are perfectly fitted into the banking sector of Malaysia as it was identified in the study.

There were some other independent variables which were sensibly fitting into the research domain, like customer satisfaction, but to keep the research relevant according to the topic, the necessary variables were selected. Each of the dependent and independent variable are categorized in such a way that the research objectives and the aim of the research could be achieved.

3.8.2 Mediating Variables

The mediating variable defines the relationship among the variables or between two variables and the effect of one on other, in this way the researchers can identify the role of each variable by the mediating variable. A mediating variable is a type of variable which is used to link the independent to the dependent variables, and the existence of this mediating variable explains the relationship among the other variables which are used in research. A mediating variable is also called a mediator variable. The role of mediating variable in this is to make the consequences predictable as in the researchers are to make the decisions and conclusions on the basis of the results and findings. Moreover, the mediating variable helps the researchers in determining the effect of one variable on the other. Therefore, in this study no mediating variable is include.

3.8.3 Dependent Variables

The dependent variables of the study include business intelligence implementation readiness as it is likely to be influenced by the success factors that are independent variables of the study. There are many suitable dependent variables that can assist researchers with improving development as a marvel. As an example, the entrepreneur may fittingly contemplate the connection between: growth exercises and the likelihood of real business establishment, past pioneering experience and trust in current beginning up adventure or enterprising goals and later changes to a proposed way or plan. With such countless pertinent dependent variable and different theoretical systems for anticipating and clarifying them, issues related with heterogeneity are unavoidable. Furthermore, rise can happen, and in this manner impact different variables, at various levels. The dependent variables which were selected for research such as, business intelligence, helps the researchers to know the effect of the independent variable on the subject.

As the domain of the research is the banking system, there were numerous dependent variables which might have been added to the proposal and the research, but there was a risk of the research to go outside the domain of the research and keep it relevant to the topic, the

dependent variables were selected carefully. Therefore, in this study, the dependent variable is identified as *business intelligence implementation readiness* and measures on the ordinal based on Likert-scale questionnaire survey. Operationalisation and measurement for defined independent variables for present study are as per following table:

Table 3.2: Dependent Variable Operationalisation Measurement

Constructs	Item	Key Sources
IR: BIS Implementation Readiness	I will continue to use software and BIS (provided by organization) as my priority when dealing with work task	(Stjepić A. M. et al., 2021), (Rouhani, S. et al., 2018), (Chen, X., 2012)
	I believe that System software help me to support and simplifies/ease my daily work task	
	Technically, I believe that our company possess technological capability to implement BIS and related software system	
	I believe that management are ready supports the implementation BIS for the benefits of the organization	
	I believe that we are ready to support implementation of any innovation software and BIS that introduce by organization	
	I believe that with implementation of BIS will ensure the organization to remain competitive on the industry.	

3.8.4   Reliability of Operationalisation and Measurement Development

As the operationalisation and measurement uses on present study are mostly adopted and adapted to some study conducted by other researcher (Stjepić A. M. et al., 2021), (Rouhani, S. et al., 2018), (Chen, X., 2012) on different sub-context of the study, therefore, it is vital to conduct both reliability analysis to examine and assure the instrument's reliability as

to ensure that the operationalisation measurements are relevant and fits to current context of study.

A pilot test design to collect data from 25 respondent and reliability test is analyse. Based on pilot test reliability assessment, some of items with lower factor loading is identified and the items had been eliminated as the items probably not relevance to present study's context. This is to ensure that the internal consistency of the scale set or test items. Result of reliability of pilot test are as per following table of Construct Cronbach's alpha coefficients;

Table 3.3: Construct Cronbach's alpha coefficients (Pilot test, n=25)

Construct	Item to Total Correlation	Cronbach's Alpha
Perception of the comparative advantage of Business Intelligence System (BIS)		
T01_1	0.602	
T01_2	0.616	
T01_3	0.720	0.707
T01_4	0.717	
T01_5	0.596	
T01_6	0.704	
Perception of business intelligence system's (BIS) complexity		
T02_1	0.936	
T02_2	0.928	
T02_3	0.938	0.950
T02_4	0.954	
T02_5	0.930	
Flexible and appropriate technological infrastructure framework		
T03_1	0.895	
T03_2	0.884	
T03_3	0.877	
T03_4	0.890	
T03_5	0.917	0.908
T03_6	0.911	
T03_7	0.893	
T03_8	0.893	
Management support		
O01_1	0.873	
O01_2	0.873	
O01_3	0.844	
O01_4	0.853	0.890
O01_5	0.899	
O01_6	0.911	
O01_7	0.852	

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Organizational readiness		
O02_1	0.953	
O02_2	0.952	
O02_3	0.945	0.956
O02_4	0.938	
O02_5	0.939	
Competitive Pressure (Industry and Competitors' Absorptive Capacity)		
E01_1	0.882	
E01_2	0.816	
E01_3	0.847	
E01_4	0.777	0.835
E01_5	0.793	
E01_6	0.797	
E01_7	0.804	
E01_8	0.780	
Business Intelligence Implementation Readiness		
IR_1	0.799	
IR_2	0.831	
IR_3	0.787	0.830
IR_4	0.759	
IR_5	0.799	
IR_6	0.831	

3.9 Data Analysis Techniques

3.9.1 Descriptive Analysis Technique

In order to analyse the descriptive data that will be collected from survey questionnaire, descriptive analysis technique will be used. In particular, frequency analysis technique will be used in order to evaluate the descriptive data of participants on the basis of number of occurrences (frequency) and evaluate measures of dispersion, central tendency, percentiles, etc. In this study, frequency analysis will be used to evaluate the data in terms of age, gender, position in the bank, salary, type of bank, etc. Typically, descriptive strategies produce target descriptive of items as far as the apparent sensory traits.

3.9.2 Inferential Analysis Technique

Inferential analysis technique analyses the data obtained from sample of the study and make inferences regarding the larger set of population from which the sample was drawn

(Amrhein et al., 2019). In this study, the inferential analysis technique has been used for analysing the data collected from survey and making inferences accordingly. In particular, the regression analysis technique will be used in order to analyses the impact of success factors on the business intelligence implementation readiness within the banking sector of Malaysia. To confirm the reliability, Cronbach-Alpha analysis will be performed on each of six determinants. To further confirm the validity of the data, Composite reliability (CR) and Average Variance Extracted (AVE) analysis will be conducted on the collected data. Besides, to further validate the hypotheses, a Confirmatory Factor Analysis (CFA) and Structural Equation Modelling (SEM) will be use. To further validate the hypotheses, the multiple model regression analysis will be evaluated. The study hypotheses will be examine using the IBM Statistical Package for the Social Sciences (SPSS) and IBM SPSS Analysis of Moment Structures (AMOS) software due to the conceptual and theoretical complexities.

3.10   Summary of Chapter 3

In this chapter, the researcher has identified that how the research will be conducted and what type of data collection method and analysis technique will be used in order to analyses the descriptive and inferential data of the study. This chapter has also provided description regarding the research design, study population, data collection method, variables of the study, and data analysis techniques that will be used in this study in order to attain aim and objectives of the study. This chapter has indicated that the quantitative research design will be used in this study in order to explore the success factors that are required for the readiness of business intelligence implementation within the context of banking sector in Malaysia. It will allow researcher to collect data from large sample size and interpret the responses of the targeted population using consistent and reliable quantitative data or statistical analysis technique. It is also determined that 156 bank employees will be the sample size of the study from which survey questionnaire will be filled out will be filled out via electronic mail (email) or click on a hyperlink sharing. This will make researcher able to collect large amount of data regarding factors associated with the successful business intelligence

implementation readiness from large set of population with relatively quick and efficient way. In this chapter, it is also determined that frequency analysis will be used to evaluate the data in terms of age, gender, position in the bank of the respondents. In contrast, Confirmatory Factor Analysis and Structural Equation Modelling (SEM) will be used in order to determine and achieve the good fit model. The regression analysis will be conduct as for the hypothesis testing for each hypothesis. Considering a complexity conceptual on the present study, the analysis will be examine using IBM SPSS and IBM AMOS software.

CHAPTER 4

RESULTS AND DISCUSSION

4.1   Introduction

The main aim and purpose of this respective chapter is to subject the data, collected for this research into the chosen data analysis techniques of this research and that is selected to be correlation, regression, descriptive statistics, frequency analysis, and lastly on confirmatory factor analysis (CFA) that's employs Structured Equation Model (SEM). Moreover, it can be further stated that it is also considered to be the main intent of this research to further subject the findings of this research into a discussion that will be used to assess whether the findings are in tandem with the hypotheses effectively.

4.2   Survey Response Analysis

With total population size of study is 164,216 employees employed in the financial services industry, the study was designed to collect target sample of 156 employees of banking personnel based on Taro Yamane's formula. With the use convenience sampling technique in reaching out the resurvey respondents, the present study able to collect 161 valid survey questionnaires that was returned via a google form that was shared to respondent via email and as well hyperlink sharing.

4.2.1   Respondent Demographic Analysis

The primary aim of this test is to examine the characteristics of the population of this research in terms of age, gender, and respondents' working position profiles.
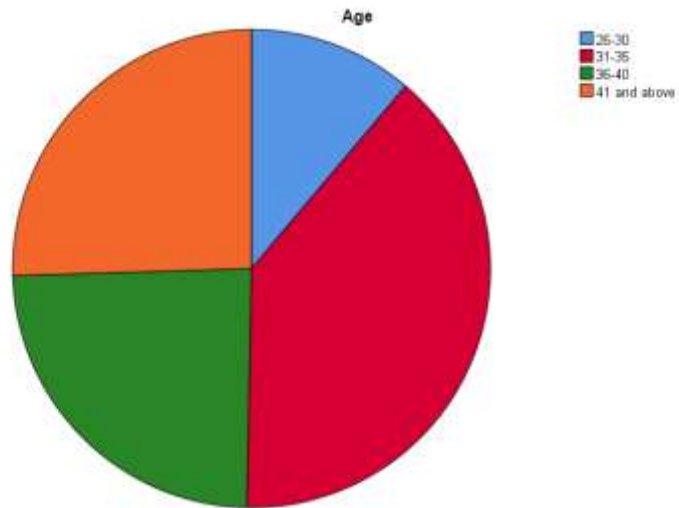
Figure 4.1: Respondent's Age Distribution

From the above figure, it is found that most of the respondents in this research belonged to the age group of 31 and 35 which represents 39.1% out of 161 respondents (63 respondents). This follows by age group 41 years old and above (with 25.5%) and age group 36-40 years old (24.2%). This shows that most of the participants of this research are experienced employees.
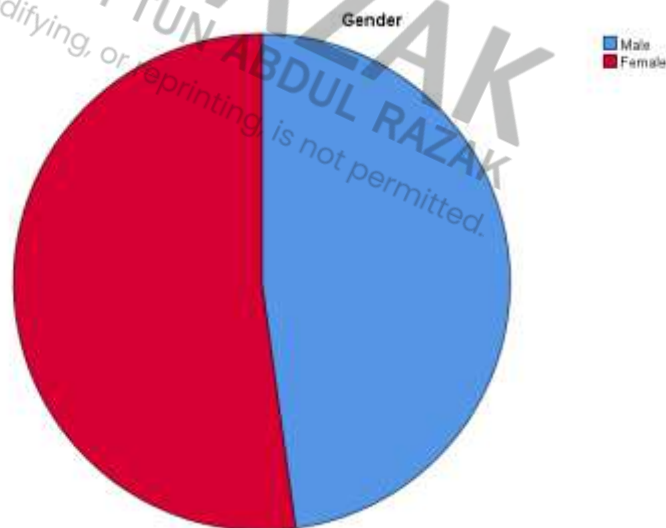
Figure 4.2: Respondent's Gender Distribution

Above figure signifies that large number of participants in this research were female. Female comprises of 52.2 % (84 female respondents) and male comprise of 47.8% of the total 161 respondents.
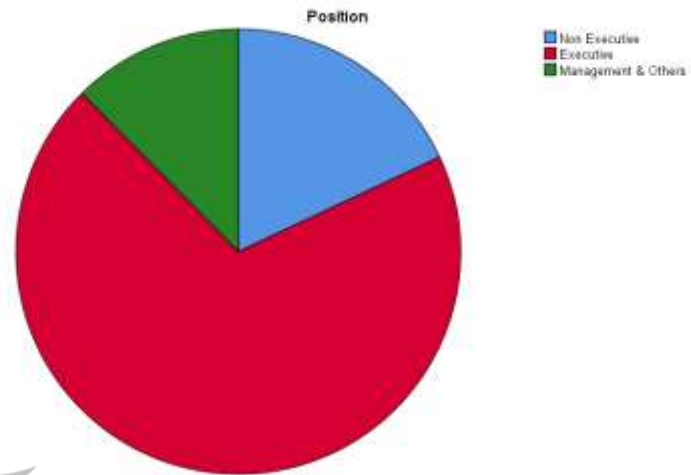
Figure 4.3: Respondent's Job Position

From the above figure, it is found that most of the respondents in this research belonged to Executive workgroup position with 112 respondents (69%) out of total 161 respondents. This follows by non-executives with18% (29 respondents) and only 12.4% respondents from Managements & others workgroup participates on the study.

Table 4.1: Respondents Profiles (n=161)

Characteristics	Category	No of respondents	Total sample %
Gender	Female	84	52.2
	Male	77	51.3
Age	26-30	18	11.2
	31-35	63	39.1
	36-40	39	24.2
	41 and above	41	25.5

	Non-Executive	29	18
Position	Executive	112	69.6
	Management & Others	20	12.4

4.3 Goodness of Data

Prior to conduct the data analysis for hypothesis verification, it is vital to conduct both reliability and validity analyses to examine and assure the instrument's reliability and validity.

4.3.1 Reliability

Cronbach's alpha is the statistical measure applied to evaluate the reliability or internal consistency of the scale set or test items. Furthermore, it can also be said that the reliability in any provided measurement denotes to the degree to which it is a steady evaluation of the idea, and Cronbach's alpha is referred as the finest way for computing the strength of internal consistency in the construct items (Pal and Bharati, 2019).

Table 4.2: Construct Cronbach's alpha coefficients

Construct	Item to Total Correlation	Cronbach's Alpha
Perception of the comparative advantage of Business Intelligence System (BIS)		
T01_1	0.729	
T01_2	0.713	
T01_3	0.703	0.782
T01_4	0.879	
T01_5	0.725	
T01_6	0.718	
Perception of business intelligence system's (BIS) complexity		
T02_1	0.812	
T02_2	0.612	
T02_3	0.614	0.731
T02_4	0.657	
T02_5	0.694	
Flexible and appropriate technological infrastructure framework		

T03_1	0.801	
T03_2	0.807	
T03_3	0.804	
T03_4	0.805	0.835
T03_5	0.806	
T03_6	0.816	
T03_7	0.817	
T03_8	0.864	
Management support		
O01_1	0.640	
O01_2	0.626	
O01_3	0.636	
O01_4	0.618	0.706
O01_5	0.642	
O01_6	0.737	
O01_7	0.774	
Organizational readiness		
O02_1	0.844	
O02_2	0.604	
O02_3	0.607	0.73
O02_4	0.600	
O02_5	0.690	
Competitive Pressure (Industry and Competitors' Absorptive Capacity)		
E01_1	0.793	
E01_2	0.818	
E01_3	0.778	
E01_4	0.754	
E01_5	0.771	0.807
E01_6	0.779	
E01_7	0.818	
E01_8	0.761	
Business Intelligence Implementation Readiness		
IR_1	0.801	
IR_2	0.785	
IR_3	0.805	
IR_4	0.780	0.804
IR_5	0.789	
IR_6	0.810	

In the above table, it can be seen evidently that the Cronbach's alpha of most of the construct is higher than 0.7, which is considered to be reliable because the standard value for declaring consistent items is said to be alpha 0.7 or higher (Kafle, 2019). The items that show

the value at 0.7 or higher are considered reliable in often social sciences circumstances. Thus, the above table signifies those maximum constructs or items are reliable.

4.3.2 Validity

Validity refers to the ability of measuring instrument and the method used to accurately provide the expected intended result (Linn, R.L. and Groundlund, 2000). Stewart (2009) listed that there are three forms of validity measures in which are Content Validity, Convergent Validity, and Discriminant Validity.

Table 4.3: Average Variance Extracted (AVE) and Composite Reliability (CR)

characteristics, criteria and formula

Name of Index	Characteristics	Formula	Criteria and Comments	Literature Support
Convergent Validity				
Composite Reliability (CR)	Reflects a latent construct's reliability and internal consistency	$AVE = \sum K2 / n$	If, CR > 0.7; and AVE > 0.5; and CR > AVE thus, achieved Convergent Validity	Hair, Ringle, & Sarstedt, (2011) Awang Z. (2017)
Average Variance Extracted (AVE)	Average proportion of variance explained by the measuring items for a latent construct	$CR = (\Sigma K)2 / [(\Sigma K)2 + (\Sigma 1 - K2)]$		

Below table (Table 4.4) depicted the CR and AVE of individual constructs for the present study.

Table 4.4: Construct Average Variance Extracted (AVE) and Composite Reliability (CR)

Item	Constructs and Measurement	Average Variance Extracted (AVE)	Composite Reliability (CR)
Perception of the comparative advantage of Business Intelligence System (BIS)		0.8657	0.5601
T01_1	By adopting BIS, I might protect organization from unnecessary costly expenses and save time.		
T01_2	BIS is much more cost effective than other decision support systems (software).		
T01_3	On my perception, the use of BIS help to facilitate more effective decision-making.		
T01_4	On my perception, BIS facilitates better & quicker execution and decision-making.		
T01_5	On my perception, BIS simplifies organization tasks execution.		
T01_6	On my perception, the adoption of BIS allows for improved business control.		
Perception of business intelligence system's (BIS) complexity		0.7997	0.5051
T02_1	On my perception, the process of getting conversant BIS is time-consuming, difficult to comprehend and complex.		
T02_2	On my perception, the process of introducing the BIS is intricate and complex.		
T02_3	Using BIS is complex and demanding for users.		
T02_4	It is challenging to learn how to use BIS.		

T02_5	Resistance to the use of BIS is a result due to complexity of working with BIS.		
Flexible and appropriate technological infrastructure framework		0.7456	0.6336
T03_1	My organization has a high degree of information systems inter-connectivity.		
T03_2	Information systems in my organization are sufficiently flexible to accommodate electronic connections to external parties.		
T03_3	Our organization information systems enable remote users with seamless accessibility to centralised data.		
T03_4	Data is captured and made accessible and available to everyone in my organization in real time using information systems		
T03_5	Software applications can be easily transacted and used across multiple information systems platforms in my organization.		
T03_6	Our information systems user interfaces deliver a consistent and transparent access across all platforms and applications.		
T03_7	External users can access my organization's information systems through a variety of interfaces or access points gateway (i.e., web access).		
T03_8	To integrate critical enterprise applications, my organisation makes extensive use of information systems middleware (ability to connect different information systems platforms).		
Management support		0.7648	0.5353

O01_1	Top management provide supports the implementation and adoption of the BIS.		
O01_2	Top management willing to allocate sufficient resources for implementation and adoption of the BIS.		
O01_3	Top management actively participates in establishing the vision and shaping the strategy of BIS adoption.		
O01_4	Top management is willing to accept the possible risks the risks associated with BIS adoption and utilisation.		
O01_5	There is a person at the management level who strongly advocates and adamant on the implementation of the BIS (warns the importance of implementing the system).		
O01_6	There is a person at the management level who shows great enthusiasm in initiating the BIS adoption (motivates to adopt the system).		
O01_7	There are one or more people at the management level who continuously emphasizing the benefits of BIS.		
Organizational readiness		0.8266	0.5499
O02_1	Managers and employees know how to use BIS for business support.		
O02_2	Managers and employees comprehend and understand well how to use BIS in business.		
O02_3	We have adequate training and guiding procedure to use BIS in business.		
O02_4	We have enough technical, managerial, and other necessary skills required to adopt the BIS.		

O02_5	We have adequate financial, technological, and other resources required to adopt the BIS.		
Competitive Pressure (Industry and Competitors' Absorptive Capacity)		0.7913	0.5262
E01_1	We will lose our customers, if we do not adopt BI (due competition degree on business environment)		
E01_2	We will need to adopt BI because of our business strategic necessity.		
E01_3	Our organization had to start using BIS to maintain its competitive advantage in the market.		
E01_4	Our competitors have made significant investments in acquiring new knowledge.		
E01_5	Our competitors can quickly discover and swiftly obtain the information they require.		
E01_6	Our competitors can discover and learn new things effortlessly.		
E01_7	Our competitors are good at integrating information from different sources to their advantage.		
E01_8	Our competitors are good at using new knowledge in their operations		
Business Intelligence Implementation Readiness		0.8737	0.5364
IR_1	I will continue to use software and BIS (provided by organization) as my priority when dealing with work task		
IR_2	I believe that System software help me to support and simplifies/ease my daily work task		

IR_3	Technically, I believe that our company possess technological capability to implement BIS and related software system
IR_4	I believe that management are ready supports the implementation BIS for the benefits of the organization
IR_5	I believe that we are ready to support implementation of any innovation software and BIS that introduce by organization
IR_6	I believe that with implementation of BIS will ensure the organization to remain competitive on the industry.

By considering all those criteria that listed on table of Average Variance Extracted (AVE) and Composite Reliability (CR) characteristics, criteria and formula; above table shows that all of the constructs on present study are achieved the Convergent Validity as per study by Hair, Ringle, & Sarstedt, (2011).

4.4   Descriptive Analysis

Table 4.5: Descriptive Analysis

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Perception of the comparative advantage of business intelligence system (BIS)	161	1.33	5.00	3.7992	0.72651
Perception of business intelligence system's (BIS) complexity	161	1.00	5.00	3.5081	0.68447
Flexible and appropriate technological infrastructure framework	161	1.50	5.00	3.8905	0.66538
Management support	161	1.86	5.00	3.6992	0.60853
Organizational readiness	161	1.00	4.60	3.5168	0.65710

Competitive pressure (industry and competitors' absorptive capacity)	161	1.50	5.00	3.8828	0.58957
Business intelligence implementation readiness	161	1.00	4.83	3.7826	0.66928
Valid N (listwise)	161				

Regarding the descriptive statistics, Mishra et al. (2019) states that it is considered to be the probable measures of the mean, median, and mode along with the standard deviation. It is further stated that within the descriptive statistics, the element of mean occupies major importance since it is used to accord a description of the given sample and is done through a singular value. Based on this description, the table presented above displays the mean value against each independent variable. In an overall scenario, the mean value of invariably each independent variables are considered to be below 40% and this is found to denote that around 40% of the selected samples are found to strongly agree with the selected variables for example around 38% of the samples are found to agree with the perception regarding the comparative advantage of the business' intelligence systems respectively. Besides, there are more 38% of samples found to agree with each of variables that the organization possess a flexible and appropriate technological, and environment's factor of competitive pressure respectively.

4.5   Confirmatory Factor Analysis (CFA)

Confirmatory factor analysis (CFA) is the next step after exploratory factor analysis to determine the factor structure of the data set. In the exploratory factor analysis, it is exploring the factor structure (how the variables relate and group based on inter-variable correlations), while in the confirmatory factor analysis is to confirm the factor structure that extracted in the exploratory factor analysis. In order to perform the confirmatory factor analysis, analysis using structural equation model (SEM) have been done.

In performing the procedure of structured equation model, several criteria have to be fulfilled. There are three criteria that need to be fulfilled in order to make sure the model of structured equation model is fit which are absolute model fit, incremental fit and

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parsimonious fit. At least one of the indices that need to be fulfil for each criterion. The

criteria for model fit assessment for structured equation model as in Table 4.5.

Table 4.6: Criteria for Model Fit Assessment

Name of Index	Characteristics	Comments	Literature Support
Absolute Model Fit: the degree to which the proposed model predicts the observed covariance matrix			
Root Mean Square Error of Approximation (RMSEA)	Average discrepancy per *df* expected to occur in the population	< 0.05 (good) < 0.08 (acceptable) < 0.10 (mediocre)	Browne and Cudeck (1993) MacCallum et al. (1996)
Goodness-of-Fit Index (GFI)	Overall degree of fit	> 0.9 is a good fit	Browne and Cudeck (1989)
Incremental Fit: compares the proposed model to a realistic null or baseline model			
Comparative Fit Index (CFI)		> 0.9 is a good fit	Bentler (1990)
Tucker-Lewis Index (TLI)	Comparative index between the proposed and null model	> 0.9 is a good fit	Bentler and Bonett (1980)
Normed Fit Index (NFI)	Relative comparison of the proposed model to the null model	> 0.9 is a good fit	Bentler and Bonett (1980)
Parsimonious Fit: diagnostic on model fit due to over fitting data with too many coefficients			
Normed Chi-Square (CMIN/DF)	X^2/df	The value should be less than 5.0	Marsh and Hocevar (1985)

4.5.1   Model Fit for Each Factor

For structural equation model (SEM), the model for each factor needs to be examined

and make sure the model is fit before proceed with the full model. If there is model that did

not fulfil the criteria for model fit, the modification needs to be done. In AMOS, the output

will show the modification indices. This process will ensure that there is no problem with the full model.

4.5.1.1 Perception of the comparative advantage of Business Intelligence System (BIS)

Before Modification	After Modification

Name of Criteria	Name of Index	Before Modification	After Modification
Absolute Model Fit	(RMSEA)	0.222	0.000
Incremental Fit	(CFI)	0.842	1.000
	(TLI)	0.737	1.016
	(NFI)	0.828	0.997
Parsimonious Fit	(CMIN/DF)	8.899	0.524
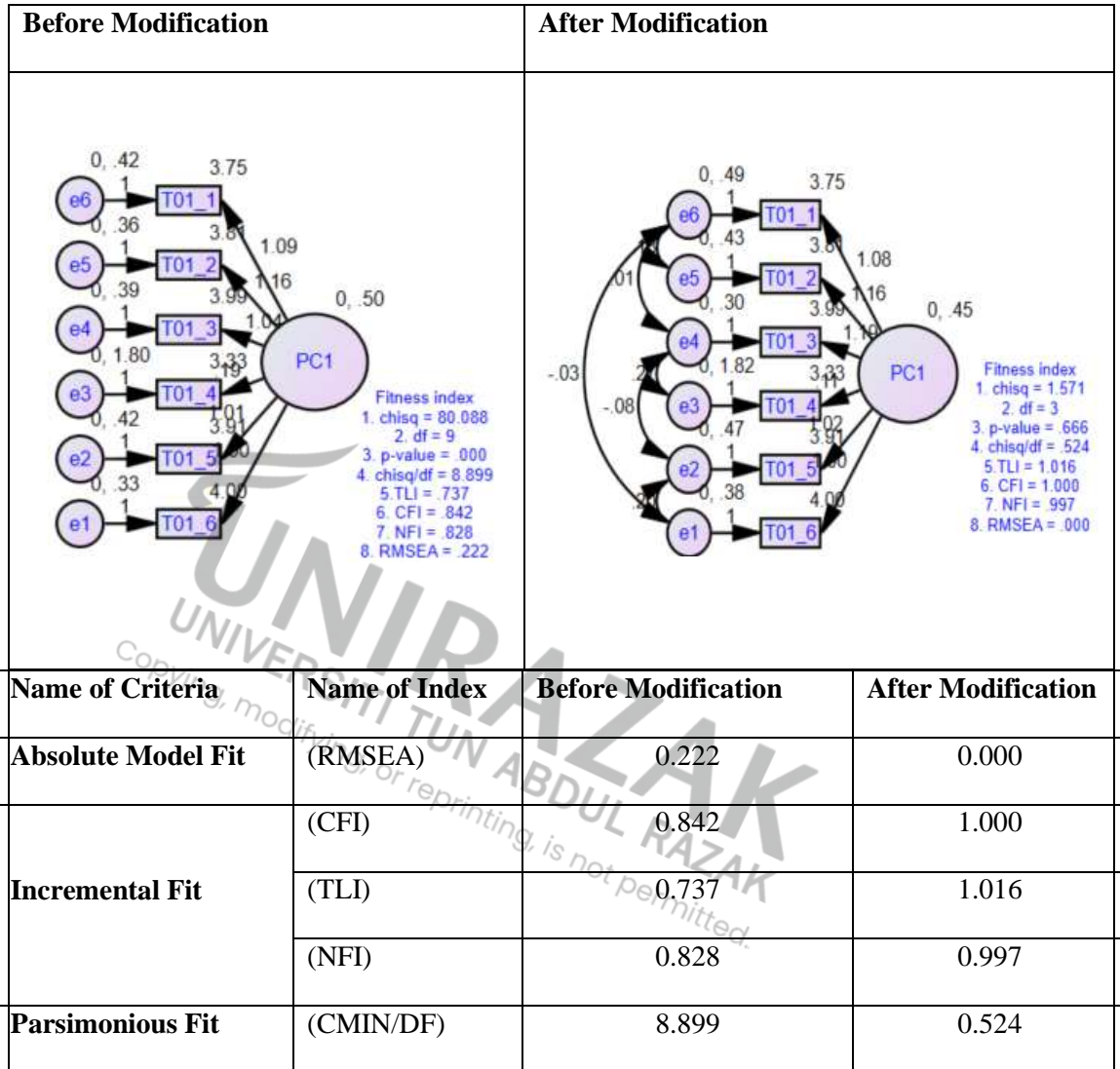
Figure 4.4: Confirmatory Factor Analysis (CFA) - Perception of the comparative advantage

of Business Intelligence System

4.5.1.2 Perception of business intelligence system's (BIS) complexity

Before Modification	After Modification
	Modification is not required because the initial model is already fit

Name of Criteria	Name of Index	Before Modification	After Modification
Absolute Model Fit	(RMSEA)	0.071	-
Incremental Fit	(CFI)	0.984	-
	(TLI)	0.967	-
	(NFI)	0.965	-
Parsimonious Fit	(CMIN/DF)	1.802	-
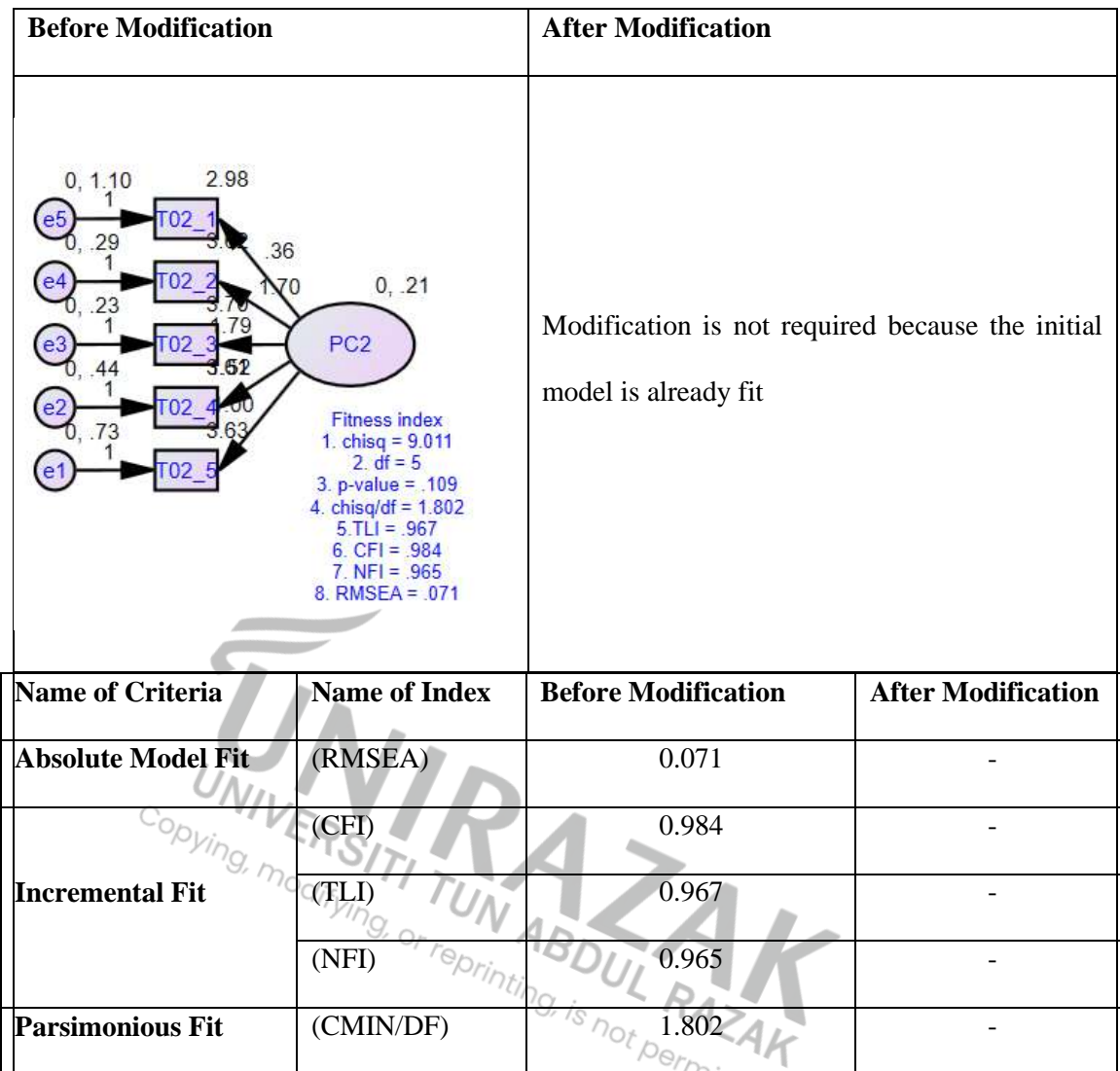
Figure 4.5: Confirmatory Factor Analysis (CFA) - Perception of business intelligence

system's (BIS) complexity

4.5.1.3 Flexible and appropriate technological infrastructure framework

Before Modification	After Modification

Name of Criteria	Name of Index	Before Modification	After Modification
Absolute Model Fit	(RMSEA)	0.157	0.000
Incremental Fit	(CFI)	0.844	1.000
	(TLI)	0.782	1.019
	(NFI)	0.815	0.980
Parsimonious Fit	(CMIN/DF)	4.946	0.521
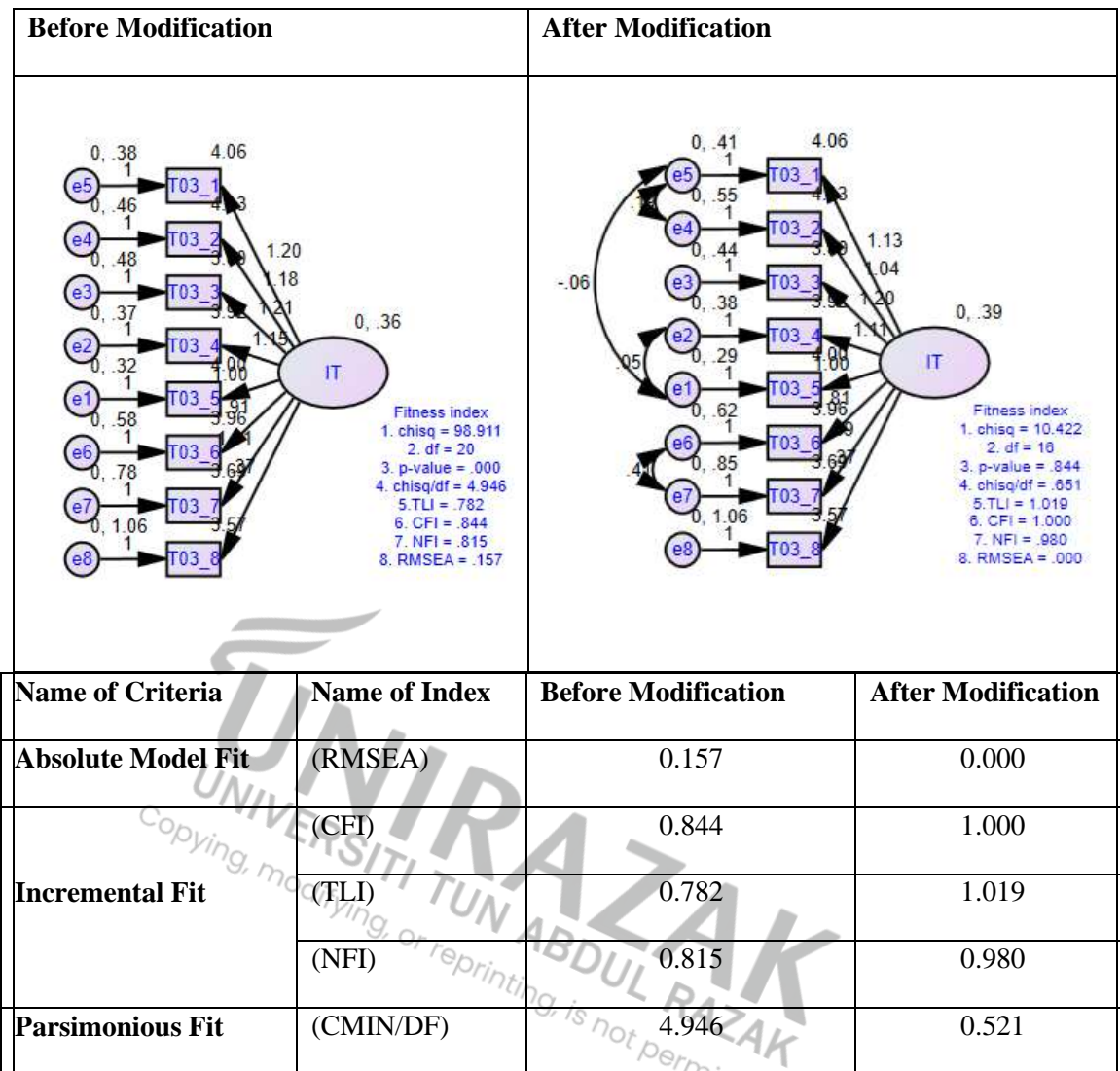
Figure 4.6: Confirmatory Factor Analysis (CFA) -Flexible and appropriate technological

infrastructure framework

4.5.1.4 Management Support

Before Modification	After Modification

Name of Criteria	Name of Index	Before Modification	After Modification
Absolute Model Fit	(RMSEA)	0.23	0.000
Incremental Fit	(CFI)	0.743	1.000
	(TLI)	0.615	1.006
	(NFI)	0.725	0.989
Parsimonious Fit	(CMIN/DF)	9.442	0.862
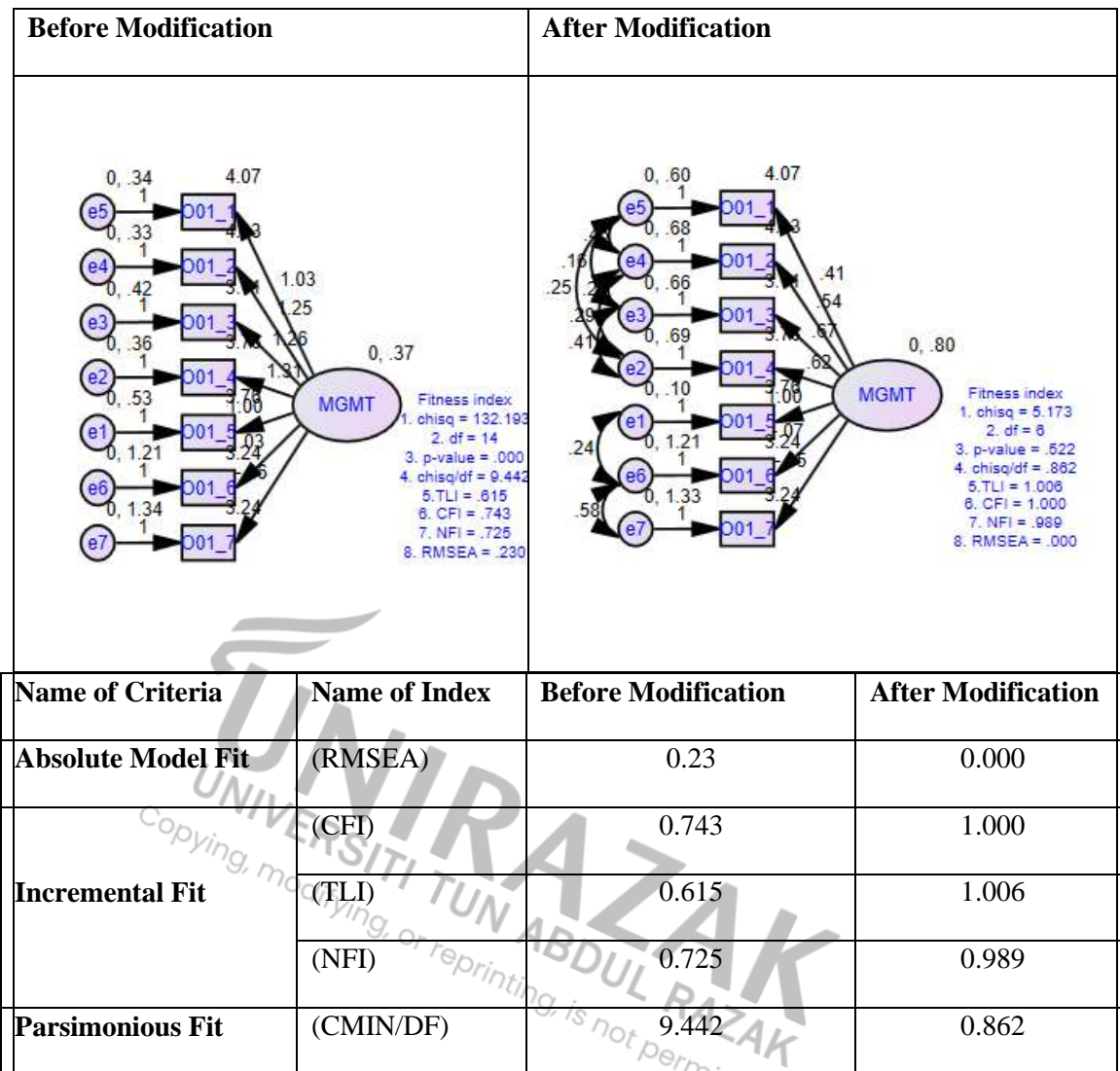
Figure 4.7: Confirmatory Factor Analysis (CFA) - Management Support

4.5.1.5 Organization Readiness

Before Modification	After Modification
	Modification is not required because the initial model is already fit

Name of Criteria	Name of Index	Before Modification	After Modification
Absolute Model Fit	(RMSEA)	0.040	-
Incremental Fit	(CFI)	0.996	-
	(TLI)	0.992	-
	(NFI)	0.980	-
Parsimonious Fit	(CMIN/DF)	1.260	-
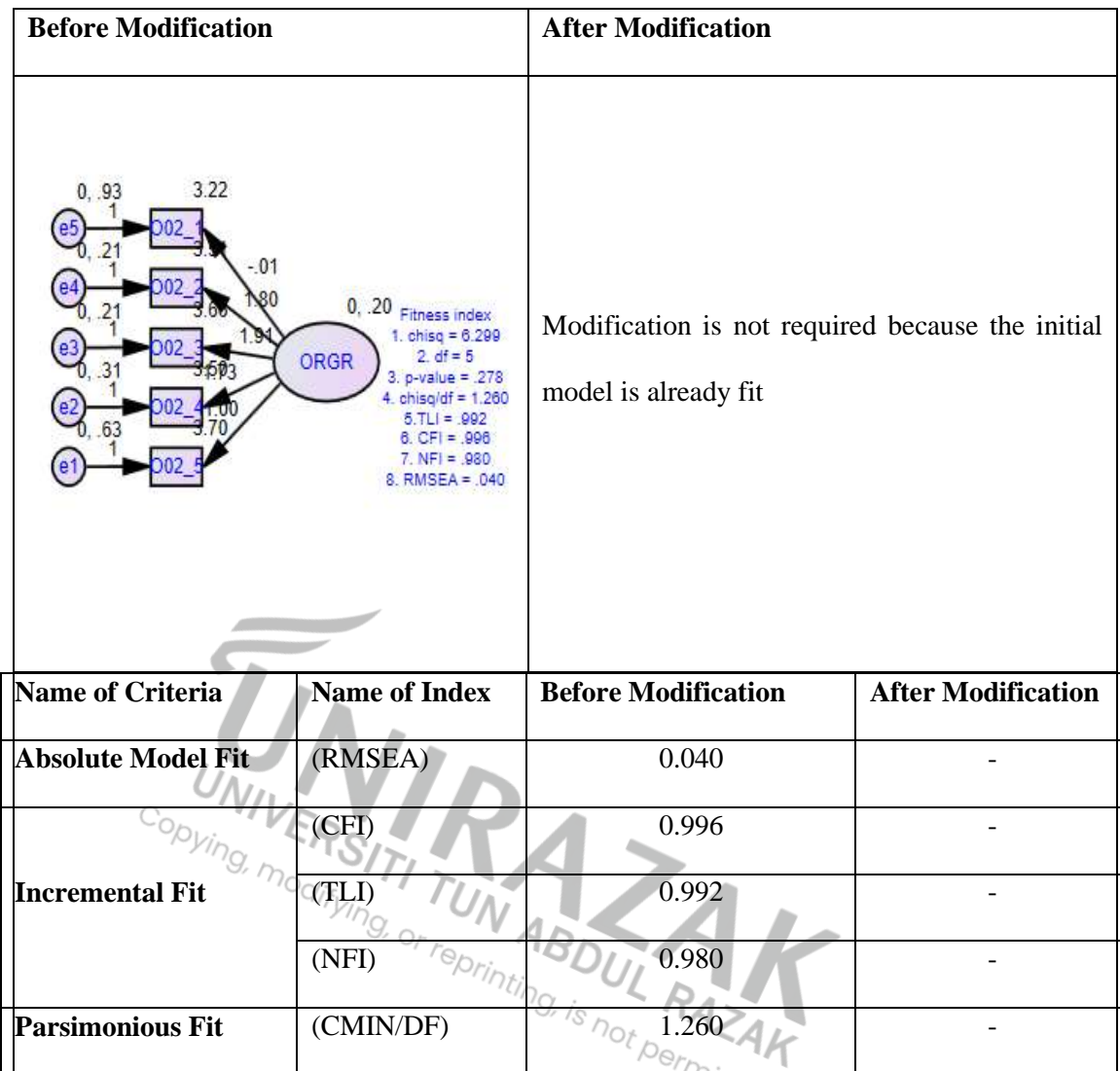
Figure 4.8: Confirmatory Factor Analysis (CFA) - Organization Readiness

4.5.1.6 Competitive Pressure (Industry and Competitors' Absorptive Capacity)

Before Modification	After Modification

Name of Criteria	Name of Index	Before Modification	After Modification
Absolute Model Fit	(RMSEA)	0.335	0.054
Incremental Fit	(CFI)	0.657	0.995
	(TLI)	0.520	0.995
	(NFI)	0.648	0.985
Parsimonious Fit	(CMIN/DF)	18.956	1.467
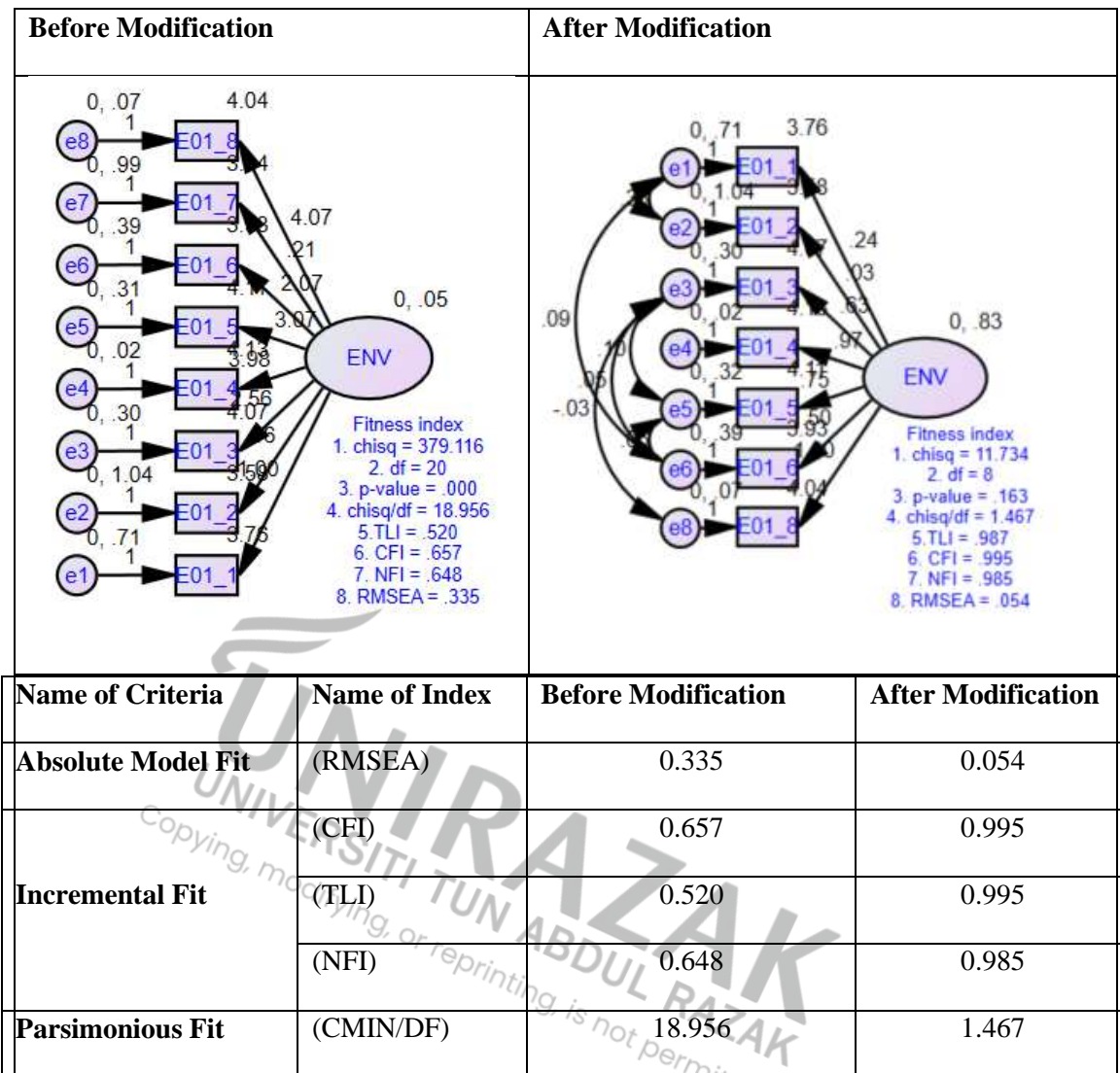
Figure 4.9: Confirmatory Factor Analysis (CFA) - Competitive Pressure (Industry and

Competitors' Absorptive Capacity)

4.5.1.7 Business Intelligence Implementation Readiness

Before Modification	After Modification

Name of Criteria	Name of Index	Before Modification	After Modification
Absolute Model Fit	(RMSEA)	0.188	0.042
Incremental Fit	(CFI)	0.847	0.997
	(TLI)	0.745	0.987
	(NFI)	0.828	0.989
Parsimonious Fit	(CMIN/DF)	6.655	1.283
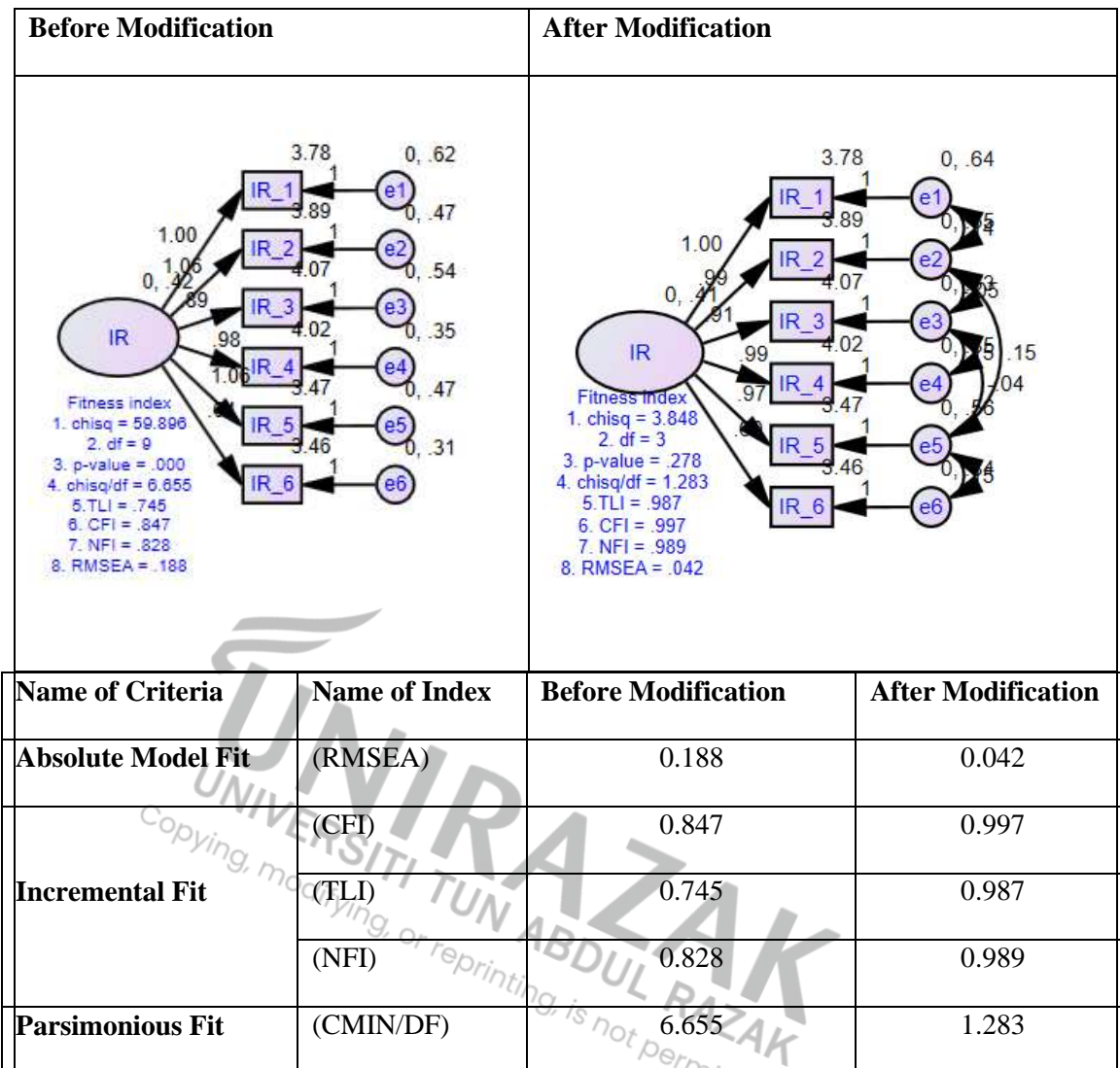
Figure 4.10: Confirmatory Factor Analysis (CFA) - Business Intelligence
Implementation Readiness

4.5.2   Model Fit for Overall Model
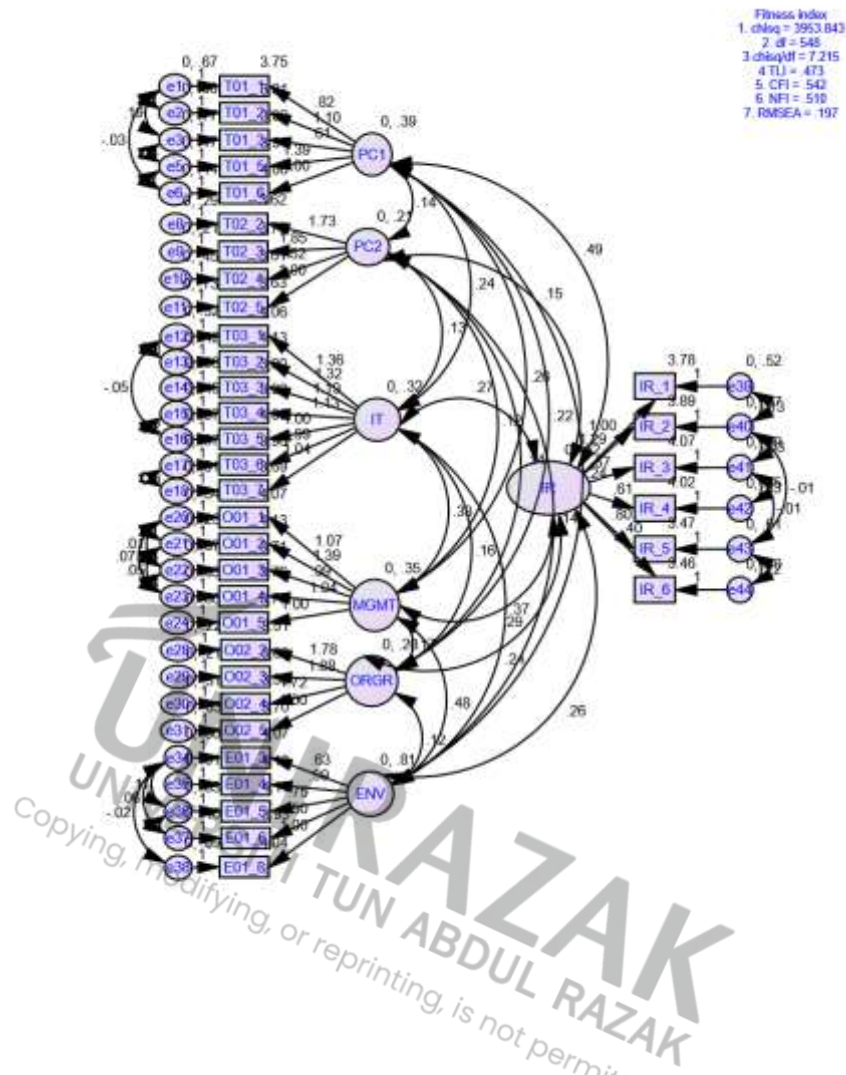
Figure 4.11: Confirmatory Factor Analysis (CFA) - Before Modification (Overall Model)

Table 4.7: Confirmatory Factor Analysis (CFA) Overall Model Fit Assessment (Before Modification)

	Fit Indices	Fit Statistics	Recommended Fit Criteria
	CMIN/DF	7.215	< 5.0
Overall Model Fit	TLI	0.473	> 0.9
	CFI	0.542	> 0.9
	NFI	0.51	> 0.9
	RMSEA	0.197	< 0 .08

According to Table 4.6 the assessment on the overall model fit of the initial model of overall CFA does not achieve recommended fit criteria. Therefore, the CFA model modification conducted based on AMOS output suggestion on modification indices as well as eliminating some of individual factors with lesser factor loading. Prior to that, the below Figure 4.12 depicted the overall model after considering AMOS modification indices.
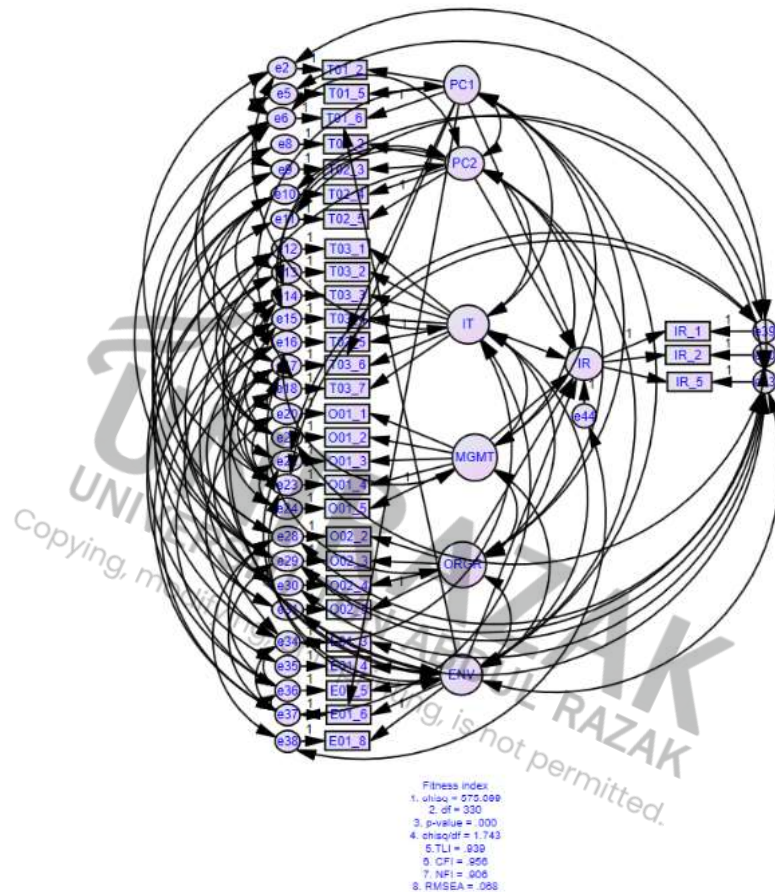
Figure 4.12: Confirmatory Factor Analysis (CFA) - After Modification (Overall Model)

Table 4.8: Confirmatory Factor Analysis (CFA) Overall Model Fit Assessment (After Modification)

	Fit Indices	Fit Statistics	Recommended Fit Criteria
	CMIN/DF	1.819	< 5.0
	TLI	0.932	> 0.9
Overall Model Fit	CFI	0.952	> 0.9
	NFI	0.901	> 0.9
	RMSEA	0.072	< 0 .08

According to Table 4.7 the assessment on the overall model fit indicates an acceptable fit since all the fit indices under consideration are well above the recommendations value. The CFI, TLI and NFI index also have shown improvement above the cut-off value 0.9 respectively and are much better improvement from the initial model. Thus, the overall model fit is considered to be adequate and acceptable for further analysis for SEM modelling

4.5.3   Structural Equation Model Path

For structural equation model (SEM), the representation diagram developed once the CFA modelling is achieves all the recommended fit criteria as per table 4.9. For present studies, SEM path demonstrates as AMOS represent diagram as per below diagram.
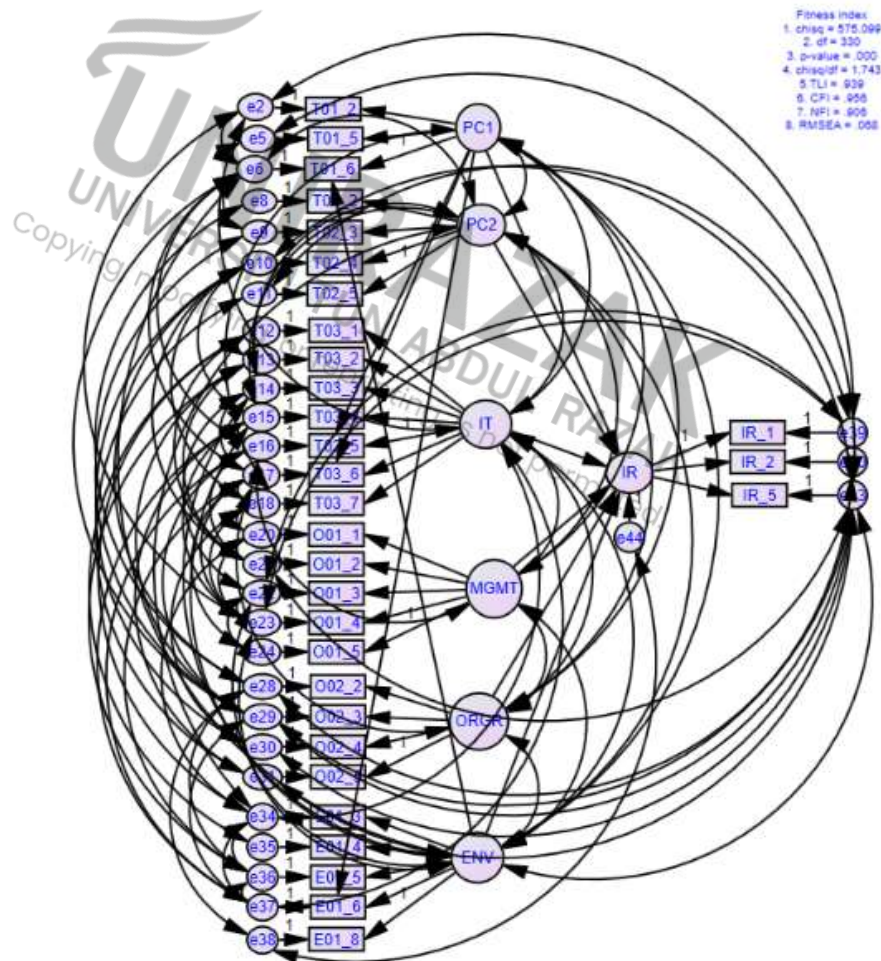
Figure 4.13: Structural Equation Model Path – Overall Model

Table 4.9: Structural Equation Model (SEM) - Overall Model Fit Assessment

	Fit Indices	Fit Statistics	Recommended Fit Criteria
	CMIN/DF	1.743	< 5.0
	TLI	0.939	> 0.9
Overall Model Fit	CFI	0.966	> 0.9
	NFI	0.906	> 0.9
	RMSEA	0.068	< 0 .08

According to Table 4.8 the assessment on the overall SEM indicates an acceptable fit since all the fit indices under consideration are well above the recommendations value. The CFI, TLI and NFI index also have shown improvement above the cut-off value 0.9 respectively and are much better improvement from the initial model of CFA.

4.6   Multiple Regression

The present study employed multiple regression analysis. The regression analysis is the statistical test that is used to examine the cause and effect and impacting association amid independent and dependent variables. This statistical test allows the researcher to examine the percentage by which an independent variable can predict or explain the dependent variable (Shrestha and Basnet, 2018). The decision rule is based on three factors, including Adjusted R-square, the value of significance that is P-value and the coefficient value, which tells regarding the direction of the relationship (Pal and Bharati, 2019).

Table 4.10: R-squared value and the relationship strength

R-squared value (R^2)	Strength of the relationship	Literature Support
$R^2 < 0.3$	None or very weak effect size	
$0.3 < R^2 < 0.5$	Weak or low effect size	Moore, Notz, and Flinger (2013)
$0.5 < R2 < 0.7$	Moderate effect size	
$R^2 > 0.7$	Strong effect size	

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Based on current study, the R-squared of this model in the data analysis is 0.842, which means Business intelligence implementation readiness is predicted by 84.2% by all independent variables that include competitive pressure, perception of comparative advantage, perception of the complexity of BIS systems, management support, organization readiness, and flexible and appropriate technological infrastructure framework. This implies that the future implementation of BI systems in organizations can be predicted by all selected independent variables in the study. Based on table 4.8 above, the obtained value of R-squared for current study signifies that it has strong effect result.

Table 4.11: Constructs P-Value

Constructs	P-value	Results
Perception of the comparative advantage of Business Intelligence System (BIS)	P-value < 0.05	Yes
Perception of Business Intelligence System's (BIS) complexity	P-value < 0.05	No
Flexible and appropriate technological infrastructure framework	P-value < 0.05	Yes
Management support	P-value < 0.05	No
Organizational readiness	P-value < 0.05	Yes
Competitive pressure	P-value < 0.05	No

Based on table 4.9 above, perception of the comparative advantage of Business Intelligence System (BIS), flexible and appropriate technological infrastructure framework and organization readiness statistically significant as factor toward BIS implementation readiness as P-Value achieved less than 0.05, meanwhile other factors (perception of Business Intelligence System's (BIS) complexity, management support and competitive pressure) are not statistically significant as factor toward BIS implementation readiness.

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Based on table 4.10 below, it is found that comparative advantage factor, flexible and appropriate technological infrastructure framework and organization readiness factors have moderate and positive relationship toward BIS implementation readiness. However, even complexity factor in which the results p-value indicates not statistically significant as factor toward BIS implementation readiness, but the Beta Weight show negative direction as per hypothesis. Besides, even management support and competitive pressure factors have p-value that indicates not statistically significant as factor toward BIS implementation readiness, but the Beta Weight show positive direction as per hypothesis.

Table 4.12: Constructs Beta Weight

Constructs	Beta Weight
Perception of the comparative advantage of Business Intelligence System (BIS)	0.261
Perception of Business Intelligence System's (BIS) complexity	-0.003
Flexible and appropriate technological infrastructure framework.	0.274
Management support	0.096
Organizational readiness	0.402
Competitive pressure	0.066

4.7   Hypothesis Testing

In this section, a summary of the research findings is provided in relation to the four hypotheses of this study. Table 4.11 shows the summary result of the hypothesis testing.

Table 4.13: Summary Result of Hypothesis Testing

Hypothesis	P-value	Beta Weight	Results
H1: Perception of the comparative advantage of Business Intelligence System (BIS) has a positive significant impact on Business intelligence implementation readiness.	P-value < 0.05	0.261	Supported
H2: Perception of Business Intelligence System's (BIS) complexity has a negative significant impact on Business intelligence implementation readiness.	P-value > 0.05	-0.003	Not Supported

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H3: Flexible and appropriate technological infrastructure framework has a positive significant impact on Business intelligence implementation readiness.	P-value < 0.05	0.274	Supported
H4: Management support has a positive significant impact on Business intelligence implementation readiness.	P-value > 0.05	0.096	Not Supported
H5: Organizational readiness has a positive significant impact on Business intelligence implementation readiness.	P-value < 0.05	0.402	Supported
H6: The more Competitive pressure has a positive significant impact on Business intelligence implementation readiness.	P-value > 0.05	0.066	Not Supported

Hypothesis 1: Perception of the comparative advantage of Business Intelligence System (BIS) has a positive significant impact on Business intelligence implementation readiness.

The first hypothesis of this study is Perception of the comparative advantage of Business Intelligence System (BIS) has a positive significant impact on Business intelligence implementation readiness. The result indicates that perception of the comparative advantage of Business Intelligence System (BIS) were significantly positively ($p < 0.05$) related to Business intelligence implementation readiness. Therefore, the first hypothesis is accepted.

Hypothesis 2: Perception of Business Intelligence System's (BIS) complexity has a negative significant impact on Business intelligence implementation readiness.

The second hypothesis of this study is to examine the relationship perception of Business Intelligence System's (BIS) complexity towards the implementation readiness of BIS. The results indicates that perception of BIS complexity was found to be not significantly related ($p > 0.05$) towards the BIS implementation readiness. Therefore, the second hypothesis of this study can't be achieved and rejected.

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Hypothesis 3: Flexible and appropriate technological infrastructure framework has a positive significant impact on Business intelligence implementation readiness.

The third hypothesis of this study is to examine the relationship between organization's flexible and appropriate technological infrastructure framework toward the readiness of BIS implementation. The results indicated that the two variables were not significantly ($p < 0.05$) related to each other. Therefore, the third hypothesis is accepted.

H4: Management support has a positive significant impact on Business intelligence implementation readiness.

The fourth hypothesis of this study was to examine the relationship between the management support and the BIS implementation readiness. The results revealed that there is no significant relationship between between the management support and the BIS implementation readiness ($p > 0.05$). Therefore, the fourth hypothesis of this study is not supported and rejected.

Hypothesis 5: Organizational readiness has a positive significant impact on Business intelligence implementation readiness.

The fifth hypothesis of this study is to examine the organization readiness toward BIS readiness to implement BIS. The results revealed that there is a significant relationship between organization readiness and BIS implementation readiness ($p < 0.05$). Therefore, the fifth hypothesis of this study is accepted.

Hypothesis 6: The more competitive pressure has a positive significant impact on Business intelligence implementation readiness.

The sixth hypothesis of this study to examine between the relationship of competitive pressure and BIS implementation readiness. The result indicates that this environmental factor of competitive pressure includes both industry and competitors' absorptive capacity was found to be not significantly related ($p > 0.05$) towards the BIS implementation readiness. Therefore, the sixth hypothesis of this study is rejected.

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4.8   Summary of Chapter 4

This chapter four (4) describes and discusses the analysis process of data collected throughout the research study. The analysis involves the analysis of survey response, describes the demographic analysis and provide the descriptive analysis of the data collected. Furthermore, the chapter also provide analysis of measurement of validity and reliability of the data and findings indicates that the data use on the research study are valid, confirms the reliability of Cronbach Alpha for each variable used and the data is confirm achieved Convergent Reliability by analysis of its Composite Reliability (CR) and Average Variance Extracted (AVE) measures that similarly to convergent reliability criteria by Hair, Ringle, & Sarstedt, (2011) Finally Confirmatory Factor Analysis (CFA) and Structured Equation Model (SEM) is developed using the presentation of IBM AMOS software, and also discusses analysis model fitness indices. Besides, the chapter describes the regression analysis and conduct the hypothesis testing for each hypothesis that had been developed on early stage of the research.

The outcomes of the results confirm that H1, H3 and H5 in which are Perception of the comparative advantage of Business Intelligence System (BIS), flexible and appropriate technological infrastructure framework and organizational readiness have a positive significant impact on Business intelligence implementation readiness. Meanwhile, the rest of hypothesis (H2, H4 and H6) does not attain a significant relationship on the implementation readiness of BIS in banking industry in Malaysia.

CHAPTER 5

CONCLUSION

5.1.   Introduction

In the present era, business intelligence (BI) in banks, specifically in Malaysia is increased with the increasing demand and competition in the market. Business intelligence (BI) application supports work operations of banks effectively and efficiently. This chapter of the dissertation presents a summary of findings, recommendations, future implications, and conclusion of the complete study. In summary of findings, the researchers have analysed in order to make the research value and to ensure reliability and validity in the study. The researchers have carried out the demographic analysis, descriptive analysis, validity and reliability analysis included Cronbach Alpha, Composite Reliability (CR) and as well as Average Variance Extracted (AVE) analysis. Besides, researcher conducted Confirmatory Factor Analysis (CFA) using Structured Equation Modelling (SEM) and furthermore conducted regression analysis for hypothesis modelling. The analysis and results of study has discussed on previous chapter. Therefore, in this chapter discussed the summarised finding on subchapter 5.2. The research limitation and direction for future research described the scope of research and its role in assisting the studies in the future. In addition to this, this study can be explored in other ways as well, and other methods of research can be utilized to create effective results. This study is beneficial for the banking sector of Malaysia as the benefits of the business intelligence (BI) system are provided along with the critical success factors for the purpose of comprehending and managing the challenges arising from the execution of the business intelligence (BI) plan.

5.2   Success Factors for Business Intelligence System (BIS) Implementation Readiness for Banking Sector in Malaysia

The present research was conducted via the quantitative method, and the findings of the study were based upon statistical analysis. The literature review was focused upon the

procedure acquired for obtaining information from secondary sources. The study's findings from statistical analysis showed descriptive and inferential analysis. The results from the descriptive analysis showed the mean of the independent and dependent variables.

5.2.1 Perception of the comparative advantage of Business Intelligence System (BIS)

Consistent with most prior findings, the study analysis findings indicates that perception of the comparative advantage of Business Intelligence System (BIS) were significantly positively ($p< 0.05$) related to Business intelligence implementation readiness. These findings also support the results proposed by Wang et al. (2018), where the researcher also found that methods BI systems enhance the business data analysis and consequence in higher customer support and company profit that further modifies organization's perception and its readiness regarding acceptability and implementation of BI to gain its comparative advantage.

5.2.2 Perception of Business Intelligence System's (BIS) complexity

The analysis results indicates that perception of BIS complexity was found to be not significantly related ($p > 0.05$) towards the BIS implementation readiness. Therefore, the second hypothesis of this study can't be achieved. Based on the findings, it is implying that when perception about the complexity of the system increases, implementation readiness also increases. These finding supported the results proposed by Stjepić A. M. et al., (2021) where the researchers also found do not attain a significant impact on the implementation of BIS. Similarly, according to some studies (Gu et al., 2012), (Ifinedo, 2011) complexity is insignificant to innovation implementation. In other hand, these findings contradict the results provided by Rouhani et al. (2018), where the researcher signified complexity as the main determinant of organisational readiness. If complexity is higher, organisations do not opt to implement Business Intelligence systems. The explanation for such results is the present study is due to facts that majority of participants are executive level, and related to previous finding on comparative advantages indicates that have significant relationship to BIS implementation,

therefore to the fact that the important of BIS to facilitate the decision-making process and more value added are more superior compared to its complexity during the initial implementation stage.

5.2.3 Flexible and appropriate technological infrastructure framework

Consistent to previous study, the present study analysis findings indicated that the two variables are statistically significant ($p < 0.05$) related to each other. In the context of current study, its indicates that the BI does necessarily must have flexible and suitable infrastructure aligned with the strategic aims and objectives of the organisation to enhance its implementation across the business. These findings aligned and supported by the results provided by Chen, X., (2012), where the researcher signified that he positive relationship between IT infrastructure flexibility and usage of business intelligence. As a result, Chen suggests that an information system's flexibility and appropriateness can stimulate its BIS implementation on the organization. The explanation for such results is the implementation of BIS require proper information management infrastructure in organization as to ensure the BIS can be use optimally. The finding also consistent with study by Mungree (2013) that stated that BIS implementation requires high degree of technological infrastructure to technically compatibly fit with Business Intelligence software and hardware.

5.2.4 Management support

Within the organization dimension, the results study on the management support constructs is contrarily to the expectation. The analysis study results revealed that there is no significant relationship between between the management support and the BIS implementation readiness ($p > 0.05$). Therefore, in the context of current study shows that the increase of management support towards the implementation of BIS does not have significantly correlate on the readiness to implement BIS project in organisations. These findings aligned with study by Owusu (2017) on the adoption of BIS in Ghanaian Bank, where the study revealed that top management support does not statistically significant to adoption of BIS for Ghanaian Bank.

Similarly, the finding is supported by results of the study by Stjepić A. M. et al., (2021) where researchers found that top management organizational support is not significant on BIS adoption. The explanation for such results can rely on the facts that are least management representative participated on the study which are only 20 respondents or 12.4%. Due to that, in general the majority of other respondents are not from management level, the view is not from management perspectives and unavoidable possibly cause a bias on judging the construct of the study.

5.2.5   Organizational readiness

According to study by Ifinedo (2011), within organizational dimension, the financial resources, and employee competency and knowledge is described to constructs of the organization readiness in organization. Consistent with previous literature study and other empirical study, the results on current study revealed that there is significant relationship between organization readiness and BIS implementation readiness ($p < 0.05$). Therefore, in current context of the study, it revealed that the readiness of the organization and employee in term of skills, competency, set of guided procedure, resources capabilities etc. is necessarily require as to guarantee and it impacting the readiness of BIS implementation. Puklavec et al., (2017) revealed that Organizational readiness has a significant impact on BIS evaluation. The present study is finding is in line supported by Owusu (2017), Rouhani et al. (2018), Stjepić A. M. et al., (2021) that indicates organization readiness is significantly have positive influence toward the BIS adoption.

5.2.6   Competitive pressure

Competitive pressure has been discovered to be a determinant and as well as a substantial influence towards the implementation of many technical innovations (Olszak et al. 2006) (Puklavec et al., 2014). However, surprisingly, despite the intense competitiveness in the banking sector, this study found that the analysis results of the current study do indicate that this environmental factor of competitive pressure includes both industry and competitors'

absorptive capacity was found to be not significantly related (p > 0.05) towards the BIS implementation readiness. These findings also support the results proposed by Owusu (2017) where the study indicates competitive pressure does not statistically significant to adoption of BIS for Ghanaian Bank. Similarly, Sujitparapitaya et. al (2012) in his study in which based on data collected from 243 participants in USA indicates that competitive pressure does not significantly relate to BIS implementation. But this finding is contradicting to the results provided by Boonsiritomachai et al., (2016), Rouhani et al. (2018) and Stjepić A. M. et al., (2021) where the researchers found that competitive pressure has a significant impact on BIS implementation and adoption. The present study results can be explained as sampling data for this factor are from diverse job background of employee in which slightly biased to job group's perception and perspective. In term of different type of banks and institutions, there are variety of environment brings a different challenges and dynamicity the institution involved possibly explained the findings of the study.

5.2.7   Other findings

Apart of the CFA and regression findings, in the general of individual frequency analysis showed that the majority of the participants agreed that organisations should implement business intelligence systems in order to improve their performance because business intelligence systems are considered more effective in terms of managing a large amount of data which can become a problem for organisations. It was also shown in the results that around 51.1% of participants agreed (25.5% agree and another 26.1% are strongly agreed) to the fact that business intelligence systems facilitate the decision-making process, which can be analysed by saying that the remaining participants do not agree with this statement.

Most of the participants in which 75.8% participants agreed (47.8% agree and 28.0% strongly agreed) and have a positive perception of the business intelligence system to accord better execution and deliverance of the company's intended projects. Furthermore, it can be stated that Business Intelligence Systems provides better data quality and thus helps in developing a better understanding regarding the project's requirements. It was also analysed

from the analysis that the majority of the participants agreed to the fact that Business Intelligence systems can be regarded as to be inherently complex, which contributed to the inability of the organisation to gauge its data effectively. It was also found in the results obtained from the participants that around 77.7% of the respondents favoured that business intelligence system acts proactively in terms of managing information, large amount of data and allows for improved business control in which is considered beneficial for businesses.

5.3   Implications of The Study

As the purposes of the study to empirically explore success factors for Business Intelligence System (BIS) implementation readiness for Malaysian banks, therefore the study offers some theoretical and practical contributions.

5.3.1   Contribution to Theory

The key contribution of the present study is the development and the empirical study validation on the exploration of success factors for readiness of banking sector in Malaysia to feasibly adopt Business Intelligence System (BIS). A thorough review of the literature on the BIS, implementation and adoption had been discussed on earlier from TOE framework perspective on present study.

Throughout the analysis of collected participant's survey data, the study validated the TOE framework theories on the context of banking sector in Malaysia. Furthermore, there is no specific empirical study made regard to BIS implementation readiness for the context of Banking industry in Malaysia to date as of the present paper conduct. Therefore, with a validated literature that had been reviewed and discussed together with empirical study conduct on present study, it will provide empirical evidence on TOE framework in context of Malaysia banking sector. With the present study employs Confirmatory Factor Analysis (CFA) and Structured Equation Modelling (SEM), it confirms the factor structure that extracted in the exploratory factor analysis. Therefore, CFA and SEM analysis and model representation using IBM AMOS create better understanding on how the overall model look in graphical

view and as well demonstrates how the factors and constructs item are inter-related or covariates on each other. These cross related items could provide a basis to future researcher to consider to apply similar item or questions on other factor or variables. Therefore, the present study offers and assist future researcher to conduct the similar study based on more specialized scope as well on different sectors.

5.3.2 Practical Implications

The findings of present study offer significant and useful implications that applicable to both theoretical and practical context. Business Intelligence Systems (BIS) is a part of Decision Support System (DSS) which facilitate complex decision-making, induces value addition in the pre-existing business culture. With the implementation of BIS on the organization, BIS allow the organization especially banks to evaluate large data of the customers effectively and increase customer satisfaction. Due to value addition and benefits of BIS, it has led to the adoption and implementation of BIS by a wide range of businesses from various industries and geographical locations. However, the BI project plan failed due to a lack of BI knowledge and a poor understanding of the BI. Due to ineffective or failure on the BIS adoption, the organization could not enjoy the overall benefits and impacts of BIS optimally, and this could result of wasted resources allocation. It is necessary to organization to plan, organize and implement the system properly, and prior to implementation, the organization is necessary to assess the readiness of all dimensions of technological, organizational and environmental as to reduce the failure rate of the adoption.

Practically, the significance present study and the findings is helpful to organization and management to analyse the factors that can play a role in the success of the implementation of the organisation. The study suggests that perception of business comparative of BIS, organization's flexible and appropriate technological infrastructure framework and organizational readiness are vital to stimulate the BIS adoption and feasible implementation of BIS for banking industry in Malaysia. Practically, the organization could provide better understanding and highlight to employee how the BIS could offer comparative advantage and

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value addition to organization. Technically, prior to the BIS adoption and implementation, the organization must ensure that the organization are technically ready and possess an appropriate flexible information management system (both hardware and software) that technically fit to adopt BIS as to induce the success rate of implementation, In term of organizational readiness, the managerial must play vital roles to equip the organization and employee with set of necessary skills, competency, set of guided procedure, resources capabilities etc. Although the study findings indicate that BIS's complexity, management sponsorship and support, and competitive pressure does not attain statistical significance relationship to BIS implementation readiness, but managerial should consider to take it into account as well as these factors probably could complement other factors and improve the overall process of implementation in practical.

Additionally, the organisation could consider to understands and adopt similar investigation as a brief pre-check assessment to organisation prior to stage of evaluation, adoption, implementation and use of BIS to understand and assess the readiness level of all factors.

5.4 Limitation of the Study

The present study, like others empirical study has limitations. The study findings and the results present probably cannot be generalized the BIS implementation readiness for all sector or for all geographical context. The present study designed to collect target sample of 156 employees of banking personnel based on Taro Yamane's formula whereby higher level of acceptable sampling margin of error (0.08) is considered on the study due to time constraints of investigation and considering response rate of respondent to perform additional task during their busy schedule. Besides due to pandemic that hit the world, there was some constraints on data collection methods, where is there is no opportunity to conduct face to face interviews and qualitative analysis as it provides in-depth knowledge regarding the respective area of study. The initial plan of the study is to conduct a quantitative method and to follow up with qualitative face to face interview with targeted respondent for each factor and as well with

organization's *Subject Matter Expert* (SME) on each factor as to understand in-depth knowledge regarding the respective area of study. Besides, this is to ensure the element of trustworthiness as well. Due to that, the questionnaire developed and reach out to participant in general.

Additionally, another limitation is the bias and variation on the data collected where by all the TOE dimension collected from diverse job group background and from various bank type environment. Therefore, the insights and judgement towards factors and constructs probably varied and biased to their own perspective of view. Due to the fact that unavailability to conduct qualitative method, there is not adequate information on the level of adoption (i.e., adopter or non-adopter, evaluation, post evaluation), as well information on technical readiness level of each of the organisation.

5.5   Direction for Future Research

The findings of this research provide suggestions and some specific guidelines for the practitioners and researchers in the banking sector of Malaysia, which could be used effectively in the future. The researchers can carry out further investigation on the issue from distinct perspectives and collect the data from the various context in order to create a better understanding related to the efficiency of business intelligence (BI) system for the banking sector. Additionally, the researchers can conduct the study on more specialized or niche, or to narrow down the scope as to the there are few types of financial institutions and banks in which that different and dynamic environment possess different resources capability, various strategic planning and as well have different challenges. It would help the researchers in having varied and less biased views with a more reliable and valid interpretation of the information.

Future studies can use a variety of different methods, which can ensure the element of trustworthiness as well. Moreover, other ways of collecting data can be considered. This research has used primary sources for collecting data, and it has adopted a quantitative method where by conducted on general user and practitioner. Future studies can use a secondary

method of data collection with qualitative analysis as it provides in-depth knowledge regarding the respective area of study. Future researchers should conduct studies via mixed methods of quantitative and qualitative so that they can provide a new perspective and represent the study from a new angle. The data analysis can also be done through thematic analysis, which involves the perspective of participants regarding the business intelligence system in the organisation. Data can be collected from larger sampling populations in order to create authenticity in the study. Additionally, to ensure more accuracy on each factor on construct, the researchers can apply and aim the both quantitative and qualitative method toward more specific targeted group and refer to *Subject Matters Expert* (SME) for each of construct. In example, considering TOE theoretical framework as a basis of study, on Comparative Advantage constructs of Technology dimension, the researcher can apply the survey on general to all employee as a main stakeholder on the organization including system user, executives, strategic business planning unit and management. For complexity, researcher could apply the question to BIS user and as well the management. However, for flexible and appropriate technological infrastructure framework construct, the researcher can target technical SMEs including Chief Information Officer and Information Systems executive or custodian of Information Management System on the organization. On the Organizational dimension, for Management Support factor, research can aim both qualitative and quantitative approach on the executives, strategic business planning unit and management level, meanwhile for Organization Readiness factor, the researcher can aim the study on any of employee as a system user as to understand their whole organizational readiness toward the implementation of BIS. Furthermore, on the Environmental dimension, for the Competitive Pressure factors, the researcher can aim the study using both qualitative and quantitative methods to targeted group of representatives from strategic business planning unit and management group as this will help the researchers in in depth insights with less biased views and more reliable view on the factors, as well valid interpretation of the information.

Furthermore, it is suggested for future studies to consider the importance of business intelligence (BI) system in other sectors as well, which may include, manufacturing sector,

retail sector, agricultural sector, energy sector, health care sector, and so on. The diverse areas would benefit the operational and financial working of organizations lying under their respective sector. Banks of other countries or from cross borders can be considered for future studies, for instance, China and the USA. Future researchers can link the significance of the business intelligence (BI) system in the banking sector during the uncertain situation of the Covid-19 pandemic as the BI system has significantly helped the organizations in this situation.

Future researchers can add more variables in the research so they can analyse their results and represent different perspectives of business intelligence systems in organisations. They can collect data from different companies that have implemented business intelligence systems in order to enhance their current performance. Therefore, the researcher can evaluate and learn the success factors comprehensively. Furthermore, the researcher can evaluate and compare the significance value and benefits of BIS implementation between adopter and non-adopter.

Moreover, future researchers can relate business intelligence with the innovation in technology and its uses so that the requirements of consumers can be fulfilled. Future researchers can use content analysis for analysing their data so that quantitative and qualitative results can be compared. Future researchers can also include literature from the latest published articles related to business intelligence systems. Additionally, the researchers can conduct study on the post implementation evaluation and as well as assessment of BIS Maturity Level on BIS adopters such as to assess the maturity stage whether on strategic level, tactical level, and operational level.

5.6   Conclusion

Nowadays, the use of business intelligence (BI) in the banking sector of Malaysia has been increased. It involves applications and business models for the purpose of collecting, storing, and analysing the information to improve the existing business modelling and data technology. The implementation of BI encourages value addition in the existing business

culture, which makes essential variations in establishing customer base through conversion of raw information into useful information with the standardized help database. BI effectively supports the operational activities and efficiently integrates the existing systems, which results in further development and innovation in the banking sector. The significant success factor of BI is that it provided quality data and process information, which fulfils the demand of the targeted market. BI is a part of the Decision Support System (DSS), which supports complex decision-making and resolves ill-structured problems. Furthermore, it facilitates information execution by using databases and software systems.

In the last few years, the banking sector in Malaysia has gone through major changes, which has increased the demand for a business intelligence system. The banking sector of Malaysia is complex but has a better alliance and evolutional outputs. A framework is recognized that has the ability to effectively implement BI systems in banks along with the incorporations of distinct domains. With the rapid growth of competition in the market and the demand of potential customers, BI technologies can boost organizational productivity and can improve the relationship between the banking sector and customers. Banks in Malaysia consider technological factors before implementing the application in order to ensure flexibility, reliability, and validity in the process. Technological factors assure the provision of relative advantage, flexibility, and compatibility. By considering the factors, the digital application changes information at hand into actionable comprehensions (Lim, Chen, & Chen, 2013). Then the flexible IT infrastructure towards incorporating and reconfiguring information technology resources both internally and externally for the purpose of giving response to the prevailing opportunities and threats in the market. The banks in Malaysia are recommended to integrate a cross-functional team from the beginning in order to ensure successful implementation.

Management support and sponsorship is dynamic, as it demonstrates the rest of the business and the strategic standing. The stakeholders also play an essential role in the execution of business intelligence applications; they must be identified for the purpose of understanding and using the data for benefit. In addition to this, an organizational factor plays

an essential role in the smooth implementation of business intelligence technology. It involves a contribution of financial and technical resources for a successful implementation.

The BIS delivers personalized services to potential customers with the assistance of refined data analysis methods. It improves business data and provides greater customer support, which enhances the profitability of banks. The upper management makes decisions regarding the allocation of financial and technological resources for introducing the BIS in an organization. An adequate amount of resources should be utilized to attain success, which would include staffing, operational and financial resources, and the cost associated with information technology (Moro et al., 2015). The availability of material resources, awareness related to innovation, organizational support brings positive changes in the business.

Environmental factors can pressurise the banks or organizations for implementing new digital tools in order to provide better experiences to customers. For instance, emerging competition. There is a presence of threats inflicted on an organization in a bank. The BIS intensifies the positive externalities to mitigate the effect of negative outcomes specifically for a bank, such as fraudulent activity in the process of financial transactions. BI system handles this issue by identifying speculative transactions through a firewall, which prevents information theft. Conclusively the effective execution of business intelligence system in banking sector of Malaysia is vital to ensure outcome of BIS implementation meets the objective of BIS and also provide a beneficial value to the organization.

5.7   Summary of Chapter 5

This chapter five (5) describes and discusses in this chapter discussed the summarised finding on subchapter 5.2. The outcomes of the analysis from Chapter four (4) confirm that H1, H3 and H5 in which are Perception of the comparative advantage of Business Intelligence System (BIS), flexible and appropriate technological infrastructure framework and organizational readiness have a positive significant impact on Business intelligence implementation readiness. Meanwhile, the rest of hypothesis (H2, H4 and H6) does not attain a significant. Therefore, in chapter five (5), researchers explained and discussed the results

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obtained that insignificant relationship due to demographic of survey participant which are that majority of participants are executive level and the view is not from management perspectives and unavoidable possibly cause a bias on judging the construct of the study. Besides, the discussion of findings of study on success factor toward feasible BIS implementation also been supported by findings from others empirical study by other researchers.

Both research implications to theoretical and practical to managerial discusses in this chapter, in which in this present study provides a validation to TOE framework empirically regard to Malaysia banking industry context and practically offer useful guidelines to organization to assess the readiness to adopt this system whereby the application of guidelines could possibly reduce the risk of failure rate of the system's implementation. The research limitation such as time constraints and unable to conduct initial research design of performing quantitative method follows by qualitative method of interview session with targeted respondents of Subject Matter Expert (SME) described and discussed on this chapter. The direction for future research described and its role in assisting the studies in the future such as the recommendation to conduct future research using mixed method as well to conduct it on research on targeted respondent as create effective results. This study is beneficial for the banking sector of Malaysia as the benefits of the business intelligence (BI) system are provided along with the critical success factors for the purpose of comprehending and managing the challenges arising from the execution of the business intelligence (BI) plan.

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APPENDICES

September 2021

Dear respondents,

Subject: Participant Information Sheet

Researcher: Muhamad Faizal Bin Hanafi, Graduate School of Business, Master of Business Administration (Business Analytics)

This is Muhamad Faizal Bin Hanafi, a Master candidate in the Graduate School of Business at Universiti Tun Abdul Razak (UNIRAZAK), Malaysia. As part of my MBA research thesis as UNIRAZAK Graduate School of Business, I am conducting a survey to explore the implementation readiness of the Business Intelligence System (BIS) in banking sector in Malaysia.

BIS is all kind of software or system adopted to simplify daily operation such Microsoft Office, SaAS, Microsoft Power BI, Tableau, Tibco Spotfire, and Domo or specific system that are used by many in executing their daily responsibilities.

Participation from you would involve completing this questionnaire by using Google Form. Therefore, all questions asked will be about the BIS implementation readiness / adoption on the sector. The questionnaire probably takes less than 10 minutes to complete.

I would appreciate it if you could give your cooperation by devoting your precious time to the survey. Please try to answer all of the questions as honestly and accurately as possible in the said context. All responses to this survey will held in strictest of confidential. the findings from this survey will reported only in aggregated level and anonymity of individuals that response to this questionnaire is guaranteed.

Should you have any queries or wish to know more about this study, feel free to contact me,

Muhamad Faizal Bin Hanafi

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Your kind cooperation and contribution to my study is highly appreciated. Thank you.

Topic: **Exploring Success Factors for Business Intelligence System (BIS) Implementation Readiness: A Study on Malaysia Banking Sector**

Aim of Questionnaire: This research determined that 156 bank employees include non-executives, executives and managers will be the sample size of the study from which survey questionnaire will be filled out.

1. **Name:**

2. **Age**
- 21-25
- 26-30
- 31-35
- 36-40
- 41 and above

3. **Sex**
- Male
- Female

4. **Position**
- Non-Executive
- Executive
- Management / Others

5. **Year of experience:**

Factors and Constructs	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
T01: Perception of the comparative advantage of business intelligence system (BIS) Key sources: *(Stjepić A. M. et al., 2021), (Rouhani, S. et al., 2018)*					
By adopting BIS, I might protect organization from unnecessary costly expenses and save time.					

BIS is much more cost effective than other decision support systems (software).					
On my perception, the use of BIS help to facilitate more effective decision-making.					
On my perception, BIS facilitates better & quicker execution and decision-making.					
On my perception, BIS simplifies organization tasks execution.					
On my perception, the adoption of BIS allows for improved business control.					
T02: Perception of business intelligence system's (BIS) complexity Key sources: *(Stjepić A. M. et al., 2021),* *(Rouhani, S. et al., 2018)*					
On my perception, the process of getting conversant BIS is time-consuming, difficult to comprehend and complex.					
On my perception, the process of introducing the BIS is intricate and complex.					
Using BIS is complex and demanding for users.					
It is challenging to learn how to use BIS.					

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Resistance to the use of BIS is a result due to complexity of working with BIS.					
T03: Flexible and appropriate technological infrastructure framework Key sources: *(Chen, X., 2012)*					
My organization has a high degree of information systems inter-connectivity.					
Information systems in my organization are sufficiently flexible to accommodate electronic connections to external parties.					
Our organization information systems enable remote users with seamless accessibility to centralised data.					
Data is captured and made accessible and available to everyone in my organization in real time using information systems					
Software applications can be easily transacted and used across multiple information systems platforms in my organization.					
Our information systems user interfaces deliver a consistent and transparent access across all platforms and applications.					
External users can access my organization's information systems					

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through a variety of interfaces or access points gateway (i.e., web access).					
To integrate critical enterprise applications, my organisation makes extensive use of information systems middleware (ability to connect different information systems platforms).					
O01: Management support Key sources: *(Stjepić A. M. et al., 2021),* *(Rouhani, S. et al., 2018)*					
Top management provide supports the implementation and adoption of the BIS.					
Top management willing to allocate sufficient resources for implementation and adoption of the BIS.					
Top management actively participates in establishing the vision and shaping the strategy of BIS adoption.					
Top management is willing to accept the possible risks the risks associated with BIS adoption and utilisation.					
There is a person at the management level who strongly advocates and adamant on the implementation of the BIS (warns the importance of implementing the system).					

There is a person at the management level who shows great enthusiasm in initiating the BIS adoption (motivates to adopt the system).					
There are one or more people at the management level who continuously emphasizing the benefits of BIS.					
O02: Organizational readiness Key sources: *(Stjepić A. M. et al., 2021), (Rouhani, S. et al., 2018)*					
Managers and employees know how to use BIS for business support.					
Managers and employees comprehend and understand well how to use BIS in business.					
We have adequate training and guiding procedure to use BIS in business.					
We have enough technical, managerial, and other necessary skills required to adopt the BIS.					
We have adequate financial, technological, and other resources required to adopt the BIS.					
E01: Competitive pressure (industry and competitors' absorptive capacity) Key sources: *(Stjepić A. M. et al., 2021), (Rouhani, S. et al., 2018)*					

We will lose our customers, if we do not adopt BI (due competition degree on business environment)		119			
We will need to adopt BI because of our business strategic necessity.					
Our organization had to start using BIS to maintain its competitive advantage in the market.					
Our competitors have made significant investments in acquiring new knowledge.					
Our competitors can quickly discover and swiftly obtain the information they require.					
Our competitors make a serious effort to acquire new knowledge as soon as it becomes available.					
Our competitors constantly try to increase the number of information sources they have.					
Our competitors can discover and learn new things effortlessly.					
Our competitors can easily interpret the information they acquire.					
Our competitors are good at connecting new and existing knowledge.					
Our competitors are good at integrating information from different sources to their advantage.					

Our competitors' existing practices make it possible to use new and current capabilities.					
Our competitors are good at using new knowledge in their operations					
IR: BIS Implementation Readiness Key sources: *(Chen, X., 2012)* *(Stjepić A. M. et al., 2021),*					
I will continue to use software and BIS (provided by organization) as my priority when dealing with work task					
I believe that System software help me to support and simplifies/ease my daily work task					
Technically, I believe that our company possess technological capability to implement BIS and related software system					
I believe that management are ready supports the implementation BIS for the benefits of the organization					
I believe that we are ready to support implementation of any innovation software and BIS that introduce by organization					
I believe that with implementation of BIS will ensure the organization to remain competitive on the industry.					

APPROVAL PAGE

TITLE OF PROJECT PAPER: EXPLORING SUCCESS FACTORS FOR BUSINESS INTELLIGENCE SYSTEM (BIS) IMPLEMENTATION READINESS: A STUDY ON MALAYSIA BANKING SECTOR

NAME OF AUTHOR   :   MUHAMAD FAIZAL BIN HANAFI

The undersigned certify that the above candidate has fulfilled the conditions of the project paper prepared in partial fulfilment for the degree of Master of Business Administration.

SUPERVISOR

Signature   : _____

Name   :

Date   :

ENDORSED BY

_____

Dean

Graduate School of Business

Date: