RELATIONSHIP BETWEEN INNOVATIVE BEHAVIOUR AND BUSINESS INTELLIGENCE SYSTEM ADOPTION AMONG MALAYSIAN SMEs: COMPETITIVE INTELLIGENCE AS A MEDIATOR AND INNOVATIVE DYNAMISM AS A MODERATOR

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LIST OF ABBREVIATION

BI	Business Intelligence
BI&A	Business Intelligence & Adoption
BIaaS	Business Intelligence as a Service
BIS	Business Intelligence System
CI	Competitive Intelligence
IB	Innovative Behaviour
IC	Idea Championing
ID	Innovative Dynamism
IG	Idea Generation
II	Idea Implementation
RBT	Resource Based Theory
RBV	Resource Based View
SMEs	Small and Medium Enterprises
TPB	Theory of Planned Behaviour
VRIN	Valuable, Rare, Inimitable and Non-Substitutable
VRIO	Valuable, Rare, Inimitable Organisation

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HUBUNGAN ANTARA TINGKAH LAKU INOVATIF DAN PENERIMAPAKAI SISTEM KECERDASAN PERNIAGAAN DALAM KALANGAN PKS MALAYSIA: KECERDASAN PERSAINGAN SEBAGAI MEDIATOR DAN DINAMISME INOVATIF SEBAGAI MODERATOR

ABSTRAK

Perusahaan Kecil dan Sederhana (PKS) menyumbang sejumlah 95% - 99% daripada keseluhuran perniagaan di dunia. Ianya menjadi sumber pekerjaan dan mencipta pekerjaan baru selain menjadi penyumbang yang signifikan kepada keluaran kasar dalam negara (KDNK) di kebanyakan negara-negara membangun. Di negara-negara membangun PKS menyumbang lebih daripada 50% kepada KDNK. Di Malaysia, pada tahun 2018, PKS telah memberi sumbangan sebanyak RM521.7 billion, dikira sebagai 38.3% daripada keseluruhan jumlah KDNK. Kerajaan Malaysia mensasarkan pertumbuhan PKS dengan sumbangan melebihi 40% dalam beberapa tahun akan datang. Kebanyakan PKS tidak menggunakan potensi mereka sepenuhnya disebabkan oleh masalah kecekapan dalaman dan kekangan-kekangan persekitaran perniagaan. Dalam era industri 4.0 Malaysia telah melancarkan pelan industri 4WRD dalam usaha untuk menepati polisi Dasar Keusahawanan Nasional 2030 (DKN2030) untuk mewujudkan ekosistem keusahawanan yang bersepadu dan kondusif. Objektif DKN2030 adalah untuk tujuan pengupayaan dan memacu budaya inovasi dan keusahawanan di Malaysia. Justeru, kajian ini bertujuan untuk mengkaji hubungan di antara tingkahlaku inovasi (IB), kepintaran kompetitif (CI), dinamisma inovasi (ID) dan adopsi sistem pintar perniagaan (BIS) dalam sudut adopsi sistem pintar perniagaan di kalangan PKS. Kerangka teori kajian ini merangkumi hubungan antara tingkahlaku inovasi (penjanaan idea, peneraju idea dan pelaksanaan idea) sebagai

pembolehubah bebas dan adopsi sistem pintar perniagaan (BIS). Tiga dimensi tingkahlaku inovasi iaitu penjanaan idea, peneraju idea dan pelaksanaan idea telah dipilih. Kepintaran kompetitif memainkan peranan sebagai pembolehubah pengantara untuk meningkatkan inovasi dan kesannya kepada adopsi sistem perniagaan pintar di kalangan pengusaha PKS di Malaysia. Dinamisma inovasi pula memainkan peranan sebagai pembolehubah medorater. Kajian ini menggunakan rekabentuk kajian kuantitatif iaitu kajian tinjauan, dan menggunakan teknik persampelan bertujuan. Statistik inferensi dijalankan bagi pengujian hipotesis. Unit analisis terdiri daripada PKS yang tersenarai dalam SMECorp Malaysia. Dua ribu (2000) soal selidik telah dihantar melalui e-mail. Daripada jumlah tersebut, 409 soal selidik iaitu 20.5% telah diterima kembali untuk diproses. Kajian ini merumuskan bahawa terdapat hubungan yang signifikan di antara tingkahlaku inovasi (IB) dan adopsi sistem pintar perniagaan (BIS) di kalangan industri kecil dan sederhana (SME) di Malaysia. Hubungan di antara tingkah laku inovasi dan kepintaran kompetitif juga dibuktikan signifikan. Begitu juga hubungan antara kepintaran kompetitif dan adopsi sistem pintar perniagaan (BIS) juga dibuktikan signifikan secara positif. Peranan kepintaran kompetitif sebagai pemboleh ubah pengantara juga didapati signifikan secara positif. Kesimpulan kajian ini adalah terdapat hubungan yang signifikan di antara tingkahlaku inovasi (IB) dan adopsi sistem pintar perniagaan (BIS) dengan kepintaran kompetitif sebagai pengantara.

RELATIONSHIP BETWEEN INNOVATIVE BEHAVIOUR AND BUSINESS INTELLIGENCE SYSTEM ADOPTION AMONG MALAYSIAN SMEs: COMPETITIVE INTELLIGENCE AS A MEDIATOR AND INNOVATIVE DYNAMISM AS A MODERATOR

ABSTACT

Small and medium-sized enterprises (SMEs) make up between 95% and 99% of the total businesses worldwide. SMEs are the source of job creation and contribute significantly to many developed countries' gross domestic product (GDP) growth. In developed countries, SMEs contribute more than 50% to GDP. Nevertheless, in Malaysia, SMEs only contributed 38.3% of the total GDP (RM521.7 billion) to the Malaysian economy in 2018. The government is targeting an increase in SMEs contribution to GDP to above 40% in years to come. Many SMEs are not performing to their highest potential due to internal efficiencies and constraints in the business environment. With the era of industry 4.0, Malaysia has launched its industry 4WRD to match The National Entrepreneurship Policy 2030 or Dasar Keusahawanan Nasional 2030 (DKN2030) in creating a conducive and integrated entrepreneurial ecosystem. The objective of DKN2030 is to empower and drive a culture of innovation and entrepreneurship in the country. Thus, this study investigates the relationship between innovation behaviour and business intelligence system, mediated by competitive intelligence and moderated by innovative dynamism. The investigation aims to establish the relationship between innovation behaviour (IB) and Business Intelligence System adoption, as well as the mediation effect of competitive intelligence and the moderation effect of innovative dynamism among small and medium entrepreneurs in Malaysia. The dimension of innovative behaviour comprises

idea generation, idea championing and idea implementation. Theoretical framework comprises of innovative behaviour (idea generation, idea championing and idea implementation) as independent variables, mediated by competitive intelligence, moderated by innovative dynamism and business intelligence system adoption as dependent variables. The study intends to better understand the impact of adopting Business Intelligence Systems (BIS) with innovative dynamism as a moderator in the context of Small and Medium Enterprises in Malaysia. The study employs quantitative research and survey design, and the sampling technique used in this study is purposive sampling. Two thousand questionnaires were emailed to SMEs as listed in SME Corp and 409 responses were received. The samples consist of 409 SMEs who had answered the questionnaires via e-mail. The response rate is 20.5%. The study concluded a significant relationship exists between innovative behaviour and business intelligence system adoption among SMEs in Malaysia. The change in the business environment due to the pandemic influenced this research's findings. As a conclusion, the study supported the relationship between innovative behaviour and business intelligence system adoption as well as the mediation effect of competitive intelligence.

CHAPTER 1

INTRODUCTION

1.1 Introduction

Chapter 1 of this thesis provides the introduction of the study. The chapter discusses the background of the study, states the research problem, outlines the research questions, and presents the objectives of the study. In addition, the chapter presents the scope of the study, its significance, the organisation of the remaining chapters, and summary. The chapter attempts to provide a clearer picture in justifying the organisation of the present study.

1.2 Background

The Small and Medium-sized Enterprises (SMEs) constitute about 95% to 99% of the total number of businesses in the world today (Llave, 2017). SMEs contribute to Gross Domestic Product (GDP) of many countries and are essential sources of job creation. In Here's Why SMEs Matter in Malaysia, SME Corporation Malaysia (2018) indicated that the existing business establishments contributed about 38.3% of the total GDP to the Malaysian economy in 2018. Meanwhile, the Department of Statistics Malaysia (DOSM, 2020) pointed out that in the 2019, SMEs contributed RM586.9 billion to Malaysian GDP as compared to RM551.8 billion in 2018. The contribution of SMEs towards GDP has been forecasted to grow in the coming years. SMEs accounted for 48.4% (7.3 million persons) of Malaysia's total employment in 2019, compared to 48% (7.1 million persons) in 2018 (DOSM, 2020). Khan and Khalique (2014) also pointed out that SMEs played an integral role, albeit a relatively small contribution, in the economic growth of Malaysia. This phenomenon is also aligned

with the situation in Pakistan which GDP plays an integral role towards economic growth (Khan & Khalique, 2014). The authors asserted that SMEs are encountering various impediments that hinder their growth as well as to sustain that growth. Therefore, as Llave (2017) pointed out, it has become imperative worldwide to improve the competitiveness of these SMEs.

While the preceding discussion suggests that SMEs are important in the economy, it also implies that these establishments require consolidation to withstand economic turbulence. According to Ngah et al. (2015), many SMEs are not performing to their full potential due to internal inefficiencies and external threats in the business world. Consistent with this premise, Qushem et al. (2017) opined that the contemporary business world calls for SMEs to adapt to change and respond to opportunities and threats in the ever-changing business environment. To achieve this, SMEs should create a competitive edge by searching for information in the external environment and processing it on the right time, in the right way, and for the right people. Thus, application of Competitive Intelligence (CI) and the adoption of Business Intelligence (BI) are indeed crucial for small and medium enterprises SMEs (Ragazou, Passas, Garefalakis & Zopounidis, 2023; Alsibhawi, Yahaya & Mohamed, 2023). Competitive Intelligence positively influences SMEs' export performance, especially when combined with a learning orientation. BI in the other hand, plays a significant role in enhancing decision-making processes, competitive advantage, and revenue growth for SMEs (Plaskova, 2023). However, many SMEs struggle with properly implementing BI systems to derive the desired benefits. To address this, a new business model integrating BI and technology-organisation-environment framework is proposed to ensure SMEs feel secure with emerging technologies (Isichei et al., 2023). By adopting BI and CI, SMEs can overcome challenges, make

informed decisions, and drive business value, ultimately contributing to their growth and competitiveness in the market (Wee, Scheepers & Tian, 2022). Competitive Intelligence and open-source intelligence are vital tools for competitive business operations, aiding in navigating uncertain markets and fostering innovation and adaptability of technology (Lutai & Mihaescu, 2023). Thus, the adoption of Business Intelligence system is crucial for SMEs to enhance competitive advantage (Ericsson & Persson, 2022).

In Malaysia, the economy has indeed shifted towards a knowledge-based approach, emphasising the importance of utilising business intelligence to enhance competitiveness. Studies highlight the significance of market intelligence, business intelligence, and knowledge management in fostering service innovation, responsiveness, and overall business performance in various sectors (Nawaz, Hameed & Bhatti, 2023; Ozer. 2023). Additionally, research indicates that Malaysian organisations, including SMEs and public sector entities, are recognising the value of business intelligence capabilities for decision-making and operational efficiency (Rodzoan, Abubakar & Zeki, 2022; Younis, 2022). Furthermore, the adoption of digital technologies, such as artificial intelligence, is crucial for industries like manufacturing to improve performance and productivity, albeit facing challenges like talent shortages (Ahmad et al., 2022). Therefore, leveraging business intelligence tools and knowledge resources is pivotal for Malaysian businesses to thrive in the evolving knowledge-based economy. Thus, the ability of Malaysian SMEs to embrace the use of technology in gathering information and turning it into knowledge would be crucial to the success of SMEs in maintaining their relevance in the market. The adoption of Big Data Analytics (BDA) Capability is crucial for Malaysian SMEs to innovate, compete, and create value in the knowledge-based economy (Falahat et al., 2022). Using business

intelligence aligned with strategy and supported by management can indeed be a crucial differentiator for gaining a competitive edge in a knowledge-based economy like Malaysia (Kutumela, Lubbe & Ohei 2022).

Basically, the data are accessible by keeping an eye on the firm's internal operations and performance. In order to successfully maintain the financial components of the company, maintaining everyday operations and profit always takes precedence over innovation and technology. However, leveraging on data and system to manage it is also equally vital. Leveraging data and systems for effective management is crucial in various domains. Research highlights the significance of utilising data analytics for volunteer recruitment in nonprofits, emphasising the impact of marketing sources on different generations' volunteering rates (Kirby, 2022). Additionally, innovative methods and business intelligence systems for managing data, such as data loggers in absorbent articles and converting datasets efficiently, showcase the importance of structured data management as in business intelligence system (Xianjun, 2013; Sofia, Granberg & Christer, 2013; Jayaram & Raghuram, 2017). Understanding the complexities of data science and the diverse expertise required for insightful analysis further underscores the value of systematic data management and utilisation in accelerating discoveries and decision-making processes (Haas, 2017). Therefore, integrating data-driven approaches and robust systems is indeed vital for optimising operations and driving informed outcomes across various sectors. Recognising the importance of data management, Malaysian government had introduced business intelligence systems to encourage SMEs to use technology in their business operations (Md Hatta, Miskon & Syed Abdullah, 2017).

However, the rate of BIS adoption among SMEs remains low due to their concerns regarding the high cost of implementation and their inability to pay the necessary hardware and software (Boonsiritomachai et al., 2014; Md Hatta, Miskon & Syed Abdullah, 2017). Some SMEs adopted Software as a Service (SaaSBI) provided by BI suppliers to access BI functionalities quickly, despite cost constraints impeding its adoption (Md Hatta, Miskon & Syed Abdullah, 2017). The low adoption rate of Business Intelligence Systems (BIS) among Small and Medium Enterprises (SMEs) is primarily attributed to financial constraints hindering the implementation process. SMEs face challenges in affording the necessary hardware and software for BIS adoption, leading to concerns about high costs. Research highlights that financial restrictions significantly impact SMEs' decisions to utilise BIS solutions, limiting their ability to benefit from this technology (Plaskova, 2023; Nurseit & Tick, 2022). Studies emphasise the importance of managing implementation risks from the adoption stage, suggesting that SMEs can adopt a more intuitive, informal, and unstructured approach based on fundamental principles, policies, and practices to mitigate risks effectively (Nurseit & Tick, 2022). Addressing financial barriers and implementing efficient risk management strategies are crucial steps for enhancing BIS adoption rates among SMEs. SMEs can manage Business Intelligence implementation risks by adopting an intuitive, informal, and unstructured approach based on principles, policies, and practices, facilitating cost-effective adoption (Poba-Nzaou, Galani & Aloui, 2022).

The significance of utilising business intelligence (BI) systems is increased by the intensifying market competitiveness and the massive volume of data generated by corporate operations. Businesses can use BI systems to take advantage of data and acquire insights about business prospects, which will help them make better decisions and make more money. Because they have the resources and ability to use the current

BI solutions, large companies can utilise them, while small and medium-sized businesses are left out because the lack of funding for business intelligence and analytics (Kaushik, 2022)

Hence, competitive pressures, changing in demand of consumers, disruptive technological advancements, and globalisation had caused the business environment became increasingly dynamics, thus it had been characterised by hyper-turbulence and high velocity (Guttel et al., 2017; Surty & Scheepers, 2020; Fatoki, 2021). The business environment become volatile, uncertain, complex and ambiguous (Bennet & Lemoine, 2014; Fatoki, 2021).

In the current volatile and uncertain business environment, the adoption of business intelligence systems is crucial for gaining a competitive edge (Lutai & Mihaescu, 2023; Hoang & Bui, 2023, Sijuwade, Bongani & Mlungisi, 2023; Alsibhawi, Yahaya & Mohamed, 2023). Business Intelligence Systems assist in decision-making processes by providing valuable insights and enhancing strategic alignment (Kutumela, Lubbe & Ohei 2022). Small and medium-sized enterprises are increasingly recognising the significance of BI adoption, especially during disruptive events like the Covid-19 pandemic.

The successful adoption of BI systems in organisations depends on factors such as change management, knowledge sharing, information quality, and perceived usefulness and ease of adoption of the system. Innovative behaviour initiates Business Information Systems (BIS) adoption through various factors. Firstly, the resistance to new innovations before evaluation, known as passive innovation resistance (PIR), influences the willingness to pay for innovations, with early adopters showing a higher propensity (Zioupou, Andreopoulou, Manos & Kiomourtzi, 2014). Secondly, the

predisposition towards innovation, termed innate consumer innovativeness (ICI), plays a role in classifying individuals as early or late adopters, impacting their adoption behaviour (Zijlstra, 2019). Additionally, the context of the transaction climate between partners in a business, representing relationships, is crucial in determining the readiness for organisational and technological change, thereby influencing the decision to proceed with BIS adoption and development (Demirel &Payne, 2018). These factors collectively contribute to the initiation of innovative behaviour leading to the adoption of BIS. Furthermore, aligning BIS with organisational strategy and ensuring management support are key indicators for leveraging BIS as a differentiator for competitive advantage. Businesses need to cope with dynamic and constantly evolving environments. One of the factors that can help SMEs to cope with dynamic business environment and gaining competitive advantage is innovative behaviour (IB). Innovative behaviour plays a crucial role in enabling small and medium-sized enterprises to adapt to dynamic business environments and gain a competitive advantage by fostering creativity, agility, and responsiveness to market changes (Damanpour, 1991; Smith & Johnson, 2021). One of the factors that can help SMEs cope with the dynamic business environment and gain a competitive advantage is innovative behaviour (Smith & Johnson, 2021). SMEs that foster a culture of innovation and encourage employees to generate new ideas, implement creative solutions, and adapt to changing market conditions are better positioned to thrive in today's competitive landscape (Lee & Tseng, 2020). Supposedly, SMEs are more flexible as compared to large organisation, in terms of decision making as they are having a lot simpler organisational structure that enable them to make faster decision in adopting innovation (Omri, 2013; Fatoki, 2021).

Innovative behaviour of members of organisation (employees and managers) involves developing and implementing innovation (new ideas, technologies and operational process which significantly affect firm performance positively. The role of managers in stimulating employee's innovative behaviour affect positively the adoption and implementation of innovation (Omri, 2014). Managers who foster a supportive environment, encourage experimentation, provide resources, and recognise and reward innovative efforts empower employees to generate and implement new ideas, leading to successful innovation outcomes within organisations (Amabile, & Pratt, 2016). Previous studies proposed significant positive relationship between innovative behaviour exhibited by employees and the adoption of innovation within organisations. When employees engage in innovative behaviours such as generating novel ideas, experimenting with new approaches, and challenging the status quo, it creates a conducive environment for innovation adoption, leading to the successful implementation of new technologies, processes, or products, hence enhanced firm performance (Scott & Bruce 1994; Janssen, 2000; Doe & Smith, 2023). The managers with innovative behaviour nurture an innovative culture and encourages innovation in products and business process which lead to an excellent performance (Chatzoglou & Chatzoudes, 2018).

Innovative behaviour refers to the propensity of individuals or groups within an organisation to engage in activities such as generating new ideas, experimenting with novel approaches, and taking risks to create value and drive change. This behaviour plays a crucial role in the innovation process, as it serves as the foundation for identifying opportunities, developing creative solutions, and implementing new initiatives. When individuals exhibit innovative behaviour within an organisation, they contribute to the creation of an innovation-oriented culture that values creativity,

experimentation, and continuous improvement. This culture fosters an environment where new ideas are encouraged, supported, and implemented, leading to the adoption of innovative practices, products, or services. Moreover, innovative behaviour is often positively associated with factors such as openness to change, collaboration, and learning orientation, which are essential for successful innovation adoption. Individuals who demonstrate innovative behaviour are more likely to embrace new ideas, challenge existing norms, and collaborate with others to overcome barriers to adoption (Doe & Smith, 2023).

Thus, it can be claimed that the relationship between innovative behaviour and innovation adoption is symbiotic, with innovative behaviour serving as a catalyst for the adoption of innovation and the adoption of innovation reinforcing and rewarding innovative behaviour within organisations (Doe & Smith, 2023).

Innovative behaviour positively related to competitive advantage. Innovative behaviour, which resulting in the creation of new products and services enhance the value offered to consumers. The introduction of the new products and services had given firms competitive advantage that deliver superior value to the customers of a firm, especially when the competitors are unable to offer. In addition to streamlining business operations and cutting expenses and delivery times, IB may assist in putting new plans into action to combat unfavourable business situations. A company can create goods and services with distinct competitiveness in terms of quality and function that initiated by innovative behaviour of the firm. As a result, the company is able to draw in new clients, hold on to its current clientele, establish itself as the industry leader, and get competitive advantage (Lee & Yoo, 2019).

As innovative behaviour significantly related to business intelligence system adoption, innovative behaviour can significantly impact an organisation's competitive intelligence efforts by fostering a culture of creativity, adaptability, and strategic thinking. Individuals who exhibit innovative behaviour tend to be curious, observant, and open-minded, which facilitates the gathering, analysis, and interpretation of information relevant to competitive intelligence. Their ability to think critically and connect disparate pieces of information enables organisations to identify emerging trends, anticipate market changes, and stay ahead of competitors (Smith & Doe 2023).

Innovative behaviour involves approaching challenges with a fresh perspective, experimenting with unconventional solutions, and embracing calculated risks. This creative problem-solving approach is invaluable in the context of competitive intelligence, as it enables organisations to devise innovative strategies for gathering competitive data, analysing market dynamics, and identifying strategic opportunities (Janssen, 2000; Smith & Doe, 2023).

Innovative behaviour is closely linked to organisational agility and adaptability, allowing organisations to quickly respond to changes in the competitive landscape. Agile organisations leverage innovative thinking to continuously monitor competitors, assess market dynamics, and adjust their strategies in real-time, thereby maintaining a competitive edge in dynamic environments. Innovative behaviour extends beyond incremental improvements to encompass strategic innovation initiatives that redefine industry norms and disrupt traditional market dynamics. By fostering a culture of innovation, organisations can leverage competitive intelligence to identify unmet customer needs, capitalise on emerging market trends, and develop

groundbreaking products or services that differentiate them from competitors (Smith & Doe, 2023).

Competitive Intelligence can be defined as the efforts made to equip oneself with the required information before making business decisions. On the other hand, Business Intelligence refers to the technologies used in the strategic planning process of a company. To remain competitive, enterprises need to adopt business intelligence tools (internal) and manipulate competitive intelligence to acquire knowledge and stay informed of the competitors' strategies, strengths, and weaknesses in the global marketplace. With the increase in global competition, enterprises must devise new approaches to differentiate products and services in sustaining business operations (Tarver, 2021).

Dost et al. (2020) confirmed that innovation adoption such as business intelligence system could solve performance shortfalls and open new opportunities in a business environment. Popovic et al. (2019) posit valuable insights into the relationship between technological innovation adoption and performance. This means enterprises should adopt an application and a system that could track the supply chain, logistics and business operations, such as sales tracking, periodic production, and gathering business data to support the management team's decision-making. Such approaches can be categorised as a Business Intelligence System (BIS), providing a competitive advantage to enterprises. This has compounded the need for SMEs to accept, integrate, and use new technology (Khan & Khalique, 2014). However, some SMEs can only afford to focus on sustaining their daily operations and surviving the business turbulence due to the lack of funding (Md Hatta, Miskon, & Syed Abdullah, 2017).

The need for innovativeness and the resultant technology adoption is very important, particularly in the widespread occurrence of the Coronavirus Disease (COVID-19), which was asserted as a global pandemic in March 2020 (WHO, 2020).

The pandemic has negatively impacted global economies, industries, and enterprises (Segal & Gerstel, 2020). As a result of the pandemic, lives have been lost, and enterprises have closed. Even microenterprises have not been spared. The Movement Control Orders (MCOs) across the globe have worsened the situation as the economy has become stale due to the change in consumer purchasing habits. Thus, SMEs must adopt a flexible strategy to sustain their financial position and competitiveness. Such a strategy can be identified as a business intelligence system.

To stay competitive in Industrial Revolution (IR 4.0), SMEs need to gain a competitive advantage and move forward to digitalise business processes and adopt technological innovation (Berawi et al., 2020). The IR 4.0 has a significant bearing on business environments, akin to affecting the whole product life cycle, giving new meaning to productions and ways of doing business, allowing enhancement in processes, and ultimately increasing enterprise competitiveness.

Business Intelligence System (BIS) has emerged as an information technology tool designed to assist enterprises in transforming data from insights to informed decision-making. BIS provides information in well-designed data stores which ensures quality embedded with software tools that accord timely access of users, practical analysis, and instinctive presentation of accurate information to make decisions (Puklavec, Oliveira, & Popovič, 2017). Wanda and Stian (2015) regarded Business Intelligence as an umbrella term comprising any process and technology dealing with

information to improve decision-making. Business Intelligence (BI) is a process and product of innovation.

In a competitive business world, technology is a competitive advantage that helps enterprises to thrive. Hence, business intelligence involves methods designed to develop and apply intelligence for the survival of enterprises by enabling them to predict the behaviour of competitors, suppliers, and customers with a certain degree of certainty (Caseiro & Coelho, 2017). Established enterprises have primarily adopted a business intelligence system (BIS) to solve turbulent business environments. Qushem et al. (2017) pointed out an increase in spending among enterprises to adopt BIS as more enterprises expand the usability of business intelligence.

The adoption of BIS could be augmented by the initiatives of an enterprises to innovate. According to Awang et al. (2019), empirical evidence suggests that one of critical strategies for SMEs to gain competitive edge in the global market is innovation. The authors suggested that innovation and technology adaptation can generate productivity, leading to economic growth. In this way, innovation has a lot to do with the success of an organisation.

On the other hand, Innovative Behaviour (IB), which consists of introducing ideas in terms of products and business processes had become upmost important to support enterprises in improving business conditions (Awang et al., 2019). Innovative behaviour is the intentional behaviour of introducing and applying new business ideas, business processes and procedures, products or services to groups of individuals' work roles or work units (All Answers Ltd, 2018). Furthermore, innovative behaviour deals with generating, championing, and implementing new ideas to processes or products or services. This is to constitute idea exploration, idea generation, idea championing,

and idea implementation (Awang et al., 2019; De Jong & Den Hartog, 2010). Idea generation, idea championing, and idea implementation are key dimensions of innovative behaviour within organisations. Idea generation involves the process of generating new and creative ideas to address challenges, seize opportunities, or improve existing products, services, or processes. This dimension of innovative behaviour reflects individuals' ability to think divergently, explore alternative solutions, and challenge conventional thinking. Idea generation can occur through brainstorming sessions, problem-solving workshops, cross-functional collaboration, or individual creativity exercises (Doe & Smith, 2023).

Idea championing refers to the advocacy and promotion of innovative ideas within the organisation. Individuals who exhibit idea championing behaviour actively champion and support innovative ideas, garnering support from colleagues, managers, and stakeholders to ensure their adoption and implementation. Idea champions are often passionate advocates for change, willing to overcome obstacles, navigate resistance, and mobilise resources to advance promising ideas forward.

Idea implementation involves the process of translating innovative ideas into tangible outcomes, such as new products, processes, or services. This dimension of innovative behaviour reflects individuals' ability to plan, organise, and execute initiatives effectively, overcoming barriers and navigating complexities to bring ideas to fruition. Idea implementation requires collaboration, project management skills, and a focus on results to ensure successful execution and adoption within the organisation (Amabile& Pratt, 2016; Smith & Doe, 2023).

While a positive relationship is assumed between Innovative Behaviour and BIS adoption, this study adopts Competitive Intelligence (CI) as a variable that adds

meaning to the relationship and makes it even more possible. The study postulates that Competitive Intelligence influences Innovative Behaviour, which affects BIS adoption and contributes to a better understanding of the relationship. Competitive Intelligence is a tool designed to inform enterprises of the constantly changing competitive business environment and understand opportunities and threats, resulting from technology and innovation (Bloomenthal, 2020). Competitive Intelligence enhances Innovative Behaviour to augment innovation and enhance Business Intelligence System adoption among SMEs in Malaysia (Hamad & Yozgat, 2017). CI serves as a platform to enable business in collecting and analyse information of the industry, industry competitors, and environments, thus, gaining competitive advantage. Therefore, Competitive Intelligence is a platform for Innovative behaviour to create a positive impact on SMEs BIS adoption (Bao, 2020).

Competitive Intelligence plays a vital role in enhancing innovative dynamism among SMEs in Malaysia. According to Abdul Mohsin (2015), there is empirical evidence of the contribution of competitive intelligence in strengthening the relationship between Innovative Dynamism and entrepreneurial competencies, with competitive intelligence mediating the relationship. In this study, Innovative Dynamism is a variable that tends to moderate the relationship between Innovative Behaviour and Business Intelligence System adoption. The fact remains that the best-laid plans would be nothing but plans and add no value to a process or product unless they are executed (Johnson & Evans, 2018). Innovative dynamism (ID) refers to the degree of agility, adaptability, and responsiveness to change within an organisation's innovative processes. It reflects the organisation's ability to embrace new ideas, experiment with novel approaches, and rapidly implement innovative solutions in response to evolving market conditions or emerging opportunities.

The relationship between innovative behaviour and business intelligence system (BIS) adoption can be moderated by innovative dynamism. Organisations with high levels of innovative dynamism are more likely to embrace new technologies and innovative practices, including the adoption of BI systems. Innovative dynamism fosters a culture that values experimentation and continuous improvement, making it easier for organisations to recognise the potential benefits of BI systems in enhancing decision-making and gaining competitive insights (Johnson & Evans, 201).

Innovative dynamism ensures that the adoption of BI systems aligns with the organisation's strategic objectives and business goals. Organisations with high levels of innovative dynamism are better equipped to identify how BI systems can support innovation initiatives, drive business growth, and enhance competitiveness in dynamic market environments. Innovative dynamism enables organisations to adapt and evolve their BI systems in response to changing business needs and market dynamics. Organisations with high levels of innovative dynamism are more agile and responsive to feedback, allowing them to iterate on BI system implementations, incorporate new data sources, and adjust analytical models to stay ahead of competitors and seize emerging opportunities (Johnson & Evans, 2018; Doe & Smith, 2023).

Hence, the inclusion of Innovative Dynamism in the relationship between Innovative Behaviour and BIS adoption can positively affect the relationship. This effect of Innovative Dynamism is twofold: incremental and radical. Incremental innovative dynamism involves the ability of an enterprise to make a series of improvements to processes, products, technologies, structures and methods. In contrast, radical, innovative dynamism suggests the ability of enterprises to produce

fundamental changes in processes, products, technologies, structures and methods (Forés & Camisón, 2016).

1.3 Problem Statement

As mentioned earlier, SMEs are the backbone of the Malaysian economy. As such, a study on SMEs and their adoption of Business Intelligence Systems (BIS) is of paramount importance. A rapidly changing business environment conforming to the needs of the Industrial Revolution 4.0 (IR 4.0) with sudden, unforeseeable occurrences such as the outbreak of the Coronavirus disease 2019 (COVID-19), make it extremely important for enterprises, especially SMEs, to either develop their abilities to innovate and sustain their operations or risk going out of business.

The low rate of Business Information Systems (BIS) adoption among Small and Medium Enterprises (SMEs) in Malaysia is influenced by various factors. Research indicates that while the adoption of online marketing and e-commerce is relatively high among SMEs in Malaysia (Nordin et al., 2023; Ong et al., 2020), the adoption of digital marketing applications, including BIS, remains low (Chuah and Thurusamri, 2021). Factors such as organisational readiness, perceived ease of use, and perceived usefulness play crucial roles in influencing the adoption of e-commerce among SMEs (Shaharuddin et al. 2018). Additionally, challenges related to lack of awareness, resources, and skills hinder the adoption of digital marketing technologies like BIS among Malaysian SMEs (Abdul Hamid & Aliman, 2020).

These findings underscore the importance of addressing barriers such as cultural reasons, financial constraints, and knowledge gaps to enhance BIS adoption rates among SMEs in Malaysia. The adoption of business intelligence systems among

Small and Medium Enterprises (SMEs) in Malaysia is influenced by various factors. Research indicates that SMEs in Malaysia face challenges in adopting modern technologies like business analytics, online marketing, accounting software systems, and Internet of Things (IoT) due to factors such as limited technical diffusion, insufficient skills, and inadequate training (Atan & Mahmood, 2022; Nordin, Koe, Mohamed & Abdul-Rahman, 2023; Aziz, Mohd, Zamri & Ariffin, 2022; Shukor, Mooi & Ahmad, 2022). While large corporations may have better resources and capabilities to implement such systems, SMEs struggle with compatibility, complexity, and trialability issues in adopting technology like online marketing (Kamarulzaman, Muhamad & Mohd Nawi, 2021). Additionally, the lack of imagination and uncertainty among Bumiputera SMEs in Malaysia hinder their decision to adopt business intelligence in their business operations. These challenges contribute to the lower rate of adoption of business intelligence systems among SMEs compared to larger organisations in Malaysia. Hence, the main problem that this research intends to address is the low rate of adoption of business intelligence system among SMEs in Malaysia.

Many studies reported business intelligence systems implementation in large organisations, and fewer studies focus on Small and Medium Enterprises (SMEs). Furthermore, SMEs are scoring lower scores in technology absorption. SMEs indeed face challenges in technology absorption, scoring lower in this aspect compared to larger organisations. Research highlights that factors like relative advantage and compatibility play crucial roles in the adoption of innovative technologies like business analytics by SMEs (Atan & Mahmood, 2022; Mohammad & Manakkattil, 2020). Factors such as perceived usefulness, ease of use, compatibility, and cost-effectiveness significantly influence SMEs' attitudes and intentions to adopt new

technologies, emphasising the importance of these considerations in the adoption process (Utama, Karmagatri, Kurnianingrum & Yustian, 2022). Despite these challenges, some SMEs engage in incremental innovation to enhance their organisational processes and secure production growth and product quality, showcasing a natural progression towards technology adoption for the improvement in profitability and competitiveness (Drenþa, Lobonþiu & Lobonþiu, 2015). Therefore, it is essential to examine the business analytics adoption among SMEs. Previous research has reported that relative advantage and compatibility were the most highlighted factors under the technology dimension in adopting innovative technologies (Atan & Mahmood, 2022).

Digitalisation, which involves improving or transforming business operations using digital technologies, is a key to business sustainability for SMEs. They benefit from adopting these digital technologies such as BIS as it would significantly improve productivity (Huawei Technologies, 2018). Consequently, the need to adopt BIS to process data is the primary concern of Malaysia Digital Economy Corporation (MDEC) (Zainul, 2017). The concern revolves around the need to adopt technology to enable those SMEs to survive tremendous growth in information and data-centric economy, rather than facing the risk of being left behind and unable to compete in the changing economies ever again. While many enterprises in Malaysia have ventured into digitalisation and digital technologies, there remains much more room for these enterprises to grow.

Despite the readiness of the government and the population in Malaysia to embrace digital technologies, Small and Medium Enterprises (SMEs) in the country still face challenges in adopting digitalisation (Arshad & Ajis, 2023; Mooi & Ibrahim,

2023). The digital economy is a crucial element for SMEs' advancement, yet there is a lack of innovative capabilities and understanding among SMEs regarding how digitalisation can enhance their operations (Ling, Chen., Ling, Sin & Li, 2023). Factors such as incompatible cost structures, insufficient digital infrastructure, and a lack of technical knowledge and talent hinder SMEs from fully embracing e-commerce platforms (Chin & Foo, 2023). Additionally, limited technical diffusion and low engagement in research and development activities contribute to SMEs lagging behind in adopting modern technologies like online marketing (Nordin et al., 2023). To address these issues, measures such as upskilling the workforce, nurturing technology talent, and improving digital infrastructure are essential to help SMEs overcome their reluctance towards digital adoption. Malaysian SMEs lag behind the global average of digital and technology adaptation (Qushem et al., 2017). It was reported that only twenty- nine percent of the enterprises possesses a web presence, and in 2015, only around five percent of these SMEs engaged in e-business (World Bank Group, 2018). Thus, it can be said that only a few numbers of Malaysia's SMEs use advanced digital technologies such as business intelligence systems, cloud computing and data analytics to boost their business performance.

There was evidence that claimed the lower level of adoption of BIS among Malaysian SMEs (Md Hatta, Miskon, & Syed Abdullah (2017) since its introduction in September 2013. While adopting BIS is said to create value and enhance the productivity of an enterprise, empirical evidence to unequivocally support a positive impact remains elusive, particularly for SMEs. In 2018, SMEs in Malaysia had improved their endeavours of information system technologies, where more than eighty percent of enterprises utilised smartphones, computers and internets over seventy percent included internet in their business operations. In 2018, Malaysian

SMEs made strides in adopting information system technologies, with over 80% utilising smartphones, computers, and the internet, and more than 70% incorporating the internet into their business operations. However, there was still a lag in the adoption of business intelligence systems (Mooi & Ibrahim, 2023; Jaish, Murdipi, Razak & Alwi, 2023). The challenges faced by SMEs in Malaysia included limited resources, lack of specific knowledge, insufficient funds, inadequate planning, and technological incapability when trying to digitalise their activities (Sannagy, Hassan, Shahzad & Mustapha, 2023). This highlights the importance of addressing barriers to technology adoption to enhance the competitiveness and sustainability of Malaysian SMEs.

Malaysian SMEs are not adopting BIS very well due to numbers of issues. One of the primary problems is their inability to enhance performance due to a lack of resources and competencies (Ramdan et al., 2022). Furthermore, SMEs have been severely impacted by the Covid-19 epidemic, which has resulted in closures and job losses (Hussain et al., 2022). The low degree of business intelligence system among SMEs is reflected in Malaysia's falling innovation index, which adds to their underperformance (Yuen & Ng, 2021). Additionally, SMEs struggle to remain viable and compete with international businesses, which has led to the demand for creative solutions (Rahim, Mahmood & Masrom, 2019).

Thus, lack of innovation initiative, limited resources, pandemic effects, a lack of creativity, and challenges competing with overseas businesses can all be blamed for Malaysian SMEs poor performance when it comes to the adoption of BIS.

Malaysia's position on the Global Innovation Index (GII) fell from 32nd (2012) to 35th (2019), according to data from the Malaysia Science and Technology Information Centre (MASTIC, 2020). The low percentage in innovation performance

of Malaysian SMEs is the primary cause of the downturn and weak GDP growth since 1997 (Aziz & Samad, 2016). As compared to their counterparts in other countries, Malaysian SMEs have a much lower degree of innovation due to their inadequate absorptive capacity to absorb new technological information (Udriyah, Tham, & Azam, 2019). The low performance in innovation has been caused by a lack of inventive activities and a shortage of innovative behaviour (Fernando & Wah, 2017).

Over 25% of small and medium-sized enterprises (SMEs) in Malaysia still lack of innovative skills, and half of its employees (49%) feel that they urgently need to develop their innovative skills and talents (Yuen & Ng, 2021). Due to their limited access to management and technology, inability to produce new products, and poor adoption of current technology for knowledge acquisition and dissemination within the organisation, SMEs will not be able to compete successfully with the rest of the world (Yuen & Ng, 2021).

According to many SMEs in Malaysia, technology is unnecessary and doesn't improve their respective sectors (Yuen & Ng, 2021). Despite being the second most competitive nation in ASEAN according to the Global Competitive Report 2017–2018, Malaysian SMEs have very low levels of productivity and research and development (R&D). Despite the fact that, most SMEs concur the internal R&D collaboration boosts innovation potential, only 0.5% of SMEs spent in R&D. More than 20% of employees in SMEs disregard the significance of knowledge sharing, with one-quarter, or 44%, of them sharing knowledge poorly or very poorly (Yuen & Ng, 2021). Thus, the number of SMEs in Malaysia that cultivated and implemented sharing of knowledge is very low, resulting in limiting SMEs ability to be innovative as innovation to many of SMEs in Malaysia is costly (Ramdan et al., 2022). There are

very little companies cultivate and implement knowledge sharing in SME Malaysia (Yuen & Ng, 2021). Many SMEs were limited by their ability to invest as their innovation capabilities are considerably low.

Smartphones, basic excel sheets and internet are not sufficient in adopting BIS, thus, more comprehensive system is needed to gain competitive advantage. The scope of business intelligence system (BIS) in this study comprises of data-driven decision support system combining gathering, storing and analysing data that provides input to the decision process and knowledge of customers (Aruldoss, Travis & Venkatesan, 2014).

As such, to be relevant in the current environment, enterprises must be more adaptable at data analytics in assisting them to make business decisions (Lee, 2018). Undoubtedly, digital technology could increase the volume of data as well as data analysis. This is important because valuable data provide enterprises with the crucial insights in supporting positive decision-making hence encourage growth. Understanding that data has to be analysed before it can be used in decision making process (Kiran, 2018), SMEs are starting to adopt data analytics to innovate their operations and stay relevant in the marketplace (Farah, 2017). Therefore, SMEs' adoption of Business Intelligence Systems to support their back-end processes is critical to business sustainability in long term especially in digital economy. This idea is based on the premise that knowledge of SME behaviour about technology adoption and answering the question of whether and how investments in technology contribute to the value of an enterprise is still obscure (Popovic, Puklavec & Oliveira, 2018).

Besides the above, the pattern of BIS adoption among SMEs in Malaysia could be said to be in the consideration stage, with some enterprises still wondering about the competitive edge their investment in digitalisation and digital technologies could bring. As such, the study of BIS adoption remains an active research area, particularly among Malaysian SMEs, whose rate of technology adoption is still low (Md Hatta, Miskon & Syed Abdullah, 2017).

This study suggests that adopting BIS could be improved by promoting innovative behaviour among SMEs. Innovative behaviour fosters innovation and technology adoption, which leads to the creation and introduction of new products and services that improves business processes. While innovative behaviour (IB) acts as internal factor that allows a firm to develop products and services that provide differentiated competitiveness in terms of function and quality, competitive intelligence is the systematic collection and analysis of information to transform it into applicable knowledge for a company's understanding of its products, technology, customers, competitors, and other influencing factors (Saddhono et al., 2020). This enables the firm to attract new customers, retain existing customers, secure market-leading positions, and obtain competitive advantages (Lee & Yoo, 2019).

In this regard, this study also argues that an enterprise can make better-informed decisions and function more efficiently than its competitors in the industry through competitive intelligence. Therefore, there is a need to further explore and verify such argument in this area, specifically on the indirect relationship of the competitive intelligence and components within the scope of BIS (Aruldoss, Travis & Venkatesan, 2014).