Factors Influencing E-business Use: A Study on Malaysian Exporters SMEs

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Abstract

Purpose: This research investigates factors influencing adoption of e-business technology among SME exporters in Malaysia within the context of the Technology-Organization-Environment (TOE) framework. Additionally, it explores potential moderating effect of sectoral differences, specifically focusing on the manufacturing, service, and agriculture sectors.

Design/Methodology/Approach: Convenient sampling employed to gather responses from SMEs involved in international business, utilizing MATRADE database. Survey, conducted online, garnered 124 valid responses. The questionnaire encompassed 26 items across six latent constructs. Data analysis utilizing SmartPLS, evaluates five direct effect hypotheses and Multigroup Analysis facilitates comparative sectoral analysis.

Findings: The study found, sectoral differences did not moderate the relationship between TOE factors and e-business use, indicating commonality in e-business adoption patterns. Significant direct effects observed for Perceived Benefits, Technology Readiness, Technology Integration, and Competitive Pressure on E-Business Use. However, Trading Partner Collaboration showed no significant direct effect. The model exhibited strong predictability ($R^2 = 0.919$) and predictive relevance ($Q^2 = 0.699$).

Practical Implications: This research offers valuable insights into the factors influencing e-business adoption among Malaysian SME exporters. It underscores the importance of specific determinants and emphasizes the consistency of global technological trends across sectors. Policymakers can leverage these insights to foster broader e-business participation, thereby stimulating economic growth and innovation among SME exporters.

Originality/Value: The originality lies in its unique inclusion of sectoral differences, particularly in the context of manufacturing, service, and agriculture sectors. While past research often focused on e-business adoption in a general context, this study delves into the specific dynamics of these three key sectors. By exploring how sectoral differences may influence e-business adoption, this research provides nuanced insights into e-business adoption patterns, offering a more comprehensive understanding of the diverse factors at play.

Keywords: E-business Adoption, Sectoral Difference, PLS-MGA, Exporters, SMEs, Malaysia

Paper Type: Research Paper

1. Introduction

In recent years, the landscape of international business has undergone a profound transformation. For small and medium-sized enterprises (SMEs), especially those operating

within the export market, this transformation has brought both unprecedented opportunities and complex challenges (Nordin et al., 2023b; Ibbotson & Fahy, 2004; Dethine et al., 2020). Traditionally, venturing into the export business was fraught with risks for SMEs (Pezderka & Sinkovics, 2011; Chanakira, 2009). However, the emergence of e-business technology has reshaped this landscape, offering a potent tool to mitigate risks and open doors to global markets for SMEs worldwide (Pezderka & Sinkovics, 2011; Wirtz, 2019).

Yet, despite the increasing importance of e-business in enhancing the global competitiveness of SMEs, a significant gap exists in our understanding of what factors precisely influence this technology adoption, and how can the adoption factors be leveraged by stakeholder, and authoritative bodies in assisting further use of e-business technology among Malaysian SME involve in export market. While studies have emphasized the benefits of e-business adoption (Chanakira, 2009; Knight, 2000), there remains a lack of research that systematically investigates the factors that drive e-business use within the context of SMEs engaged in export activities in Malaysia.

This gap in the literature is not merely academic; it represents a practical limitation for both SMEs and policymakers in Malaysia involve in export market. Without a nuanced understanding of the unique challenges faced by export-oriented SMEs in adopting e-business practices, informed strategies and policy recommendations are difficult to formulate. The need to bridge this gap is further underscored by the intensified pressure on Malaysian SMEs to expand into international markets (Nordin et al., 2023b). As globalization continues to reshape trade dynamics, SMEs in a small country like Malaysia must not only adapt but thrive on the international stage.

The limitations in the current understanding of e-business adoption among Malaysian SME exporters are evident in the lack of comprehensive models and frameworks that account for sector-specific nuances. E-business, by its very nature, is influenced by a myriad of factors related to technological, organizational, and environmental (TOE), all of which interact differently across various industry sectors (Oliveira & Martins, 2010). Previous research has largely overlooked sectoral differences, resulting in a significant gap in knowledge. Our study seeks to address this gap by not only examining the TOE factors' direct effect on e-business adoption but also investigating how sectoral variations may moderate its effect.

Therefore, this research has two primary objectives. Firstly, it aims to examine the direct effects of TOE factors in influencing e-business use among SME exporters in Malaysia. Secondly, it seeks to investigate how sectoral differences moderate the relationship between these factors and e-business use. By systematically addressing these gaps and limitations, our study intends to offer a comprehensive understanding of the e-business use among Malaysian SME exporters, providing vital insights for both academia and the business community. In this light, this research contribution to the originality and novelty of the field by filling these critical gaps in the current understanding of e-business adoption. This study will not only enhance the TOE model theoretical foundation for e-business research but also provide practical guidance for SMEs and policymakers as they navigate the complex dynamics of international trade in the digital age.

The following sections of this paper provide the background of international business in Malaysia, followed by an in-depth exploration of these objectives, starting with the TOE theoretical framework underpinning e-business use. Subsequently, it delves into the methodology employed for data collection and analysis, present the finding's implications, addressing the limitations of study, and suggestion for future research for e-business use among SME exporters. Lastly, the conclusion section will encapsulate the key findings and their significance, paving the way for a comprehensive understanding of this vital aspect of international business.

2. Background of Study

2.1 Exporting Challenges and Opportunities

Exporting, the process of selling goods and services across international borders, has long been a cornerstone of global trade and commerce. It encompasses a wide array of products, ranging from physical goods like manufactured items and agricultural commodities to intangible services such as consulting, software development, and tourism. However, the path to successful international trade is fraught with complexities.

Exporting entails navigating customs regulations, managing documentation, coordinating logistics, and ensuring compliance with the importing country's standards. Despite these challenges, successful exporting is not only a catalyst for economic growth but also a means of creating employment opportunities and fostering international trade relationships between nations. For Small and Medium-sized Enterprises (SMEs), especially those with limited resources, venturing into international markets is particularly challenging (Chanakira, 2009; Knight, 2000).

Nevertheless, the rewards for SMEs that embark on this international journey are substantial. It exposes them to new ICT related technologies (Raymond et al., 2016), global best practices, and international trends, fostering innovation and enhancing overall competitiveness. Beyond that, exporting opens doors to strategic partnerships, collaborations, and knowledge-sharing opportunities with international counterparts, further fuelling business growth and development (Goncalves & Smith, 2019). In essence, exporting not only broadens market horizons by reaching international customers but also minimizes the costs associated with establishing operations in foreign countries. These benefits collectively contribute to internationalisation, business expansion, increased market share, improved competitiveness, and enhanced profitability.

2.2 Malaysian Exporters' SMEs

Within the context of Malaysia, the contributions of SMEs to the country's Gross Domestic Product (GDP) are significant. Based on SME Corp. Malaysia Annual Report in 2019, SME exports accounted for 17.3 percent of Malaysia's overall GDP. This contribution spans across diverse sectors, with services at 8.7 percent, manufacturing at 8.2 percent, and agriculture at 0.4 percent. Malaysia's strengths lie in the service and manufacturing sectors, although agriculture has been gaining traction in recent years.

Despite these achievements, Malaysian exporters SMEs, like their counterparts worldwide, face their share of challenges. Notably, the Covid-19 pandemic, which led to lengthy interstate travel bans from March 2020 to October 2021, severely disrupted export activities across all sectors in Malaysia. This extended travel restriction period is among the longest in Southeast Asia, impacted supply chains and business operations significantly, resulting in the closure of some SMEs and substantial disruptions in supply chains for export.

Nonetheless, agencies such as the Malaysia External Trade Development Corporation (MATRADE) have been instrumental in supporting Malaysian SMEs' efforts to engage in exporting. Throughout the pandemic, online training programs and initiatives have bolstered exporters' skills and knowledge. These online endeavours, including the Going Export (GoEx), Galakan Eksport Bumiputera (GEB), and Strengthen Export Agri-Based Distributors programs, have continued to provide valuable support for export-ready SMEs.

While manufacturing and services sectors have been relatively robust, the agriculture sector faces unique challenges due to the perishable nature of its produce. The Strengthen Export Agri-Based Distributors program, administered by the Federal Agriculture Marketing Authority (FAMA), has played a pivotal role in assisting agriculture SMEs. However, compared to other sectors, agriculture is generally characterized by lower technology adoption.

This brings us to an essential aspect that remains relatively unexplored in the context of e-business adoption, that is differences between sectors might be present. While manufacturing and services sectors have made significant strides in technology adoption, agriculture sector might be lagged behind. The issues of technology readiness and integration into the business activities of agricultural exporters represent a critical yet under-discussed facet of e-business use within this sector (Molla et al., 2010). Hence, it is imperative to investigate the moderating influence of multi-sector group effects on e-business adoption.

2.3 Digital Technology Adoption among SMEs

The utilization of digital technology, especially e-business, has been identified as a critical performance factor for small and medium-sized enterprises (SMEs) (Mohamed & Marthandan, 2019). Within the context of Malaysia, digital technology, including e-business, has been shown to exert a significant influence on SMEs' productivity and employment growth (Lee et al., 2023; Mohamed & Marthandan, 2019; Siti-Nabiha et al., 2020). These findings underscore the paramount importance of embracing digital technology, particularly leveraging e-business practices, for SMEs in Malaysia to enhance operational efficiency and stimulate economic growth.

In Malaysia, scholarly attention to e-business adoption has been rapidly increasing over the last few decades (Zailani et al., 2009; Ahmad et al., 2015; Kim & Amran, 2018; Mohamed & Marthandan, 2019; Munikrishnan et al., 2018). These studies have contributed to our understanding of the factors that influence technology adoption within organizations mostly used TOE framework. Zailani et al. (2009) is among the pioneers in the study of e-business adoption in Malaysia, however the study is in the context of supply chain functions. Their work shed light on the significance of e-business in facilitating various business activities and processes, including financial transactions, customer service, internal communications, operations, marketing strategies, and overall business sustainability. Importantly, Zailani et al. (2009) emphasized the critical role of high-speed internet availability in driving e-business integration in Malaysia.

While there has been a remarkable surge in the adoption of information and communication technology (ICT) among SMEs in Malaysia (SME Annual Report, 2018), the year 2020 brought unprecedented challenges with the onset of the Covid-19 pandemic. This pandemic posed substantial threats to the survival and growth of SMEs, emphasizing the critical role of digital technology in their resilience and adaptability. Regardless of these challenges, the extensive adoption of e-commerce and e-marketplace platforms in Malaysia reflects SMEs' positive reception and acceptance of e-business integration, signalling their active participation in the digital economy. Particularly noteworthy is the fact that approximately 17.8 percent of SMEs engaged in online business also participate in exporting their products and services online. These online exports contribute significantly, accounting for 20.0 percent of their total online sales and 15.0 percent of their overall business sales.

However, the Covid-19 pandemic forced many companies to limit their financial capital utilization for business infrastructure upgrades. Consequently, technology adoption among SMEs, especially advanced technologies such as Cloud services and Internet of Things (IoT), remained relatively lower compared to larger corporations. Survey findings from the SME Annual Report reveal that only about 35.0 percent of SME respondents utilized IoT in their businesses, primarily for security and surveillance as well as fleet management.

Despite the widespread adoption of digital technology by SMEs in Malaysia, persistent issues with the country's internet services remain. Challenges such as poor internet connection, high subscription costs, and low internet speeds in certain areas persist. These challenges are particularly detrimental to SMEs located in rural regions, where the lack of reliable and high-

speed internet access hampers their digitalization efforts. Survey findings indicate that fixed broadband providers like Streamyx, Unifi, and Time are the preferred channels for internet services across all regions in Malaysia. However, not all areas have access to these services (Wahab et al., 2019). Therefore, it is imperative for both the government and service providers to invest in improving the infrastructure for fibre-optic internet and broadband, ensuring better and more accessible high-speed internet connectivity for SMEs in Malaysia.

Furthermore, addressing the limited adoption of e-business technology among SMEs necessitates consideration of the three contextual factors: technological, organizational, and environmental (Chatzoglou & Chatzoudes, 2016; Ifinedo, 2011; Kyriakou, & Loukis, 2019; Mohamed & Marthandan, 2019). These contexts play a significant role in shaping the decision-making process and outcomes related to e-business integration. To ensure the study's replicability, this study primarily draw on the well-established Technology-Organization-Environment (TOE) framework, which offers a holistic perspective on the factors influencing e-business use. By examining key determinants such as perceived benefits, technology readiness, technology integration, competitive pressure, trading partnerships, and sector-specific characteristics, this study aims to fill the research gap by exploring these factors in the context of SME exporters.

3. Theoretical Background
3.1 TOE Framework
The Technology-Organization-Environment (TOE) framework, introduced by Tornatzky and Fleischer in 1990, has been widely adopted as a comprehensive analytical tool to understand the multifaceted factors influencing technology adoption within organizations (Baker, 2012; Zailani et al., 2009; Ahmad et al., 2015; Kim & Amran, 2018; Siti-Nabiha et al., 2020). While originally designed to study the adoption of general technologies, it has found widespread application across specific domains, including e-business adoption (Oliveira & Martins, 2010; Thaha et al., 2022; Gomez et al., 2022; Mohamed & Marthandan, 2019).

In Malaysia, Ahmad et al. (2015) utilized the TOE framework to investigate e-commerce adoption among SMEs. It is worth noting that their study encompassed all sectors and did not specifically target exporting SMEs. Moreover, their research was geographically constrained to the Klang Valley area, potentially limiting the generalizability of their findings. They identified only two significant organizational context factors as influential, namely, knowledge and expertise, and management attitude. More recently, Siti-Nabiha et al. (2020) employed the TOE model to explore the adoption of automation technologies in Malaysian manufacturing SMEs, utilizing a case study approach. Their results underscored the crucial role of top management commitment in driving technology adoption initiatives.

Cross-country comparisons, such as those conducted by Grandon and Pearson (2004) in the United States and Saffu et al. (2008) among Ghana's SMEs, have revealed variations in the factors influencing e-business adoption. In the U.S., all TOE factors significantly influenced e-business adoption except for technology readiness, whereas in Ghana, technology readiness emerged as a significant factor. These cross-country differences emphasize the importance of considering the unique contexts in which SMEs operate.

Turning to Indonesia, two studies have investigated e-business adoption and the TOE model within the context of SMEs (Putra & Santoso, 2020; Thaha et al., 2022). However, a noticeable gap in the existing literature is the lack of empirical research specifically focusing on the adoption of e-business practices among SMEs operating within an international business context, particularly in the context of export markets (Chanakira, 2009). This area presents an intriguing avenue for future research to fill this knowledge gap and contribute to our understanding of TOE framework applicability in diverse business environments.

3.2 TOE Framework Research and the Endogeneity Issue

Despite the wealth of research on TOE framework for technology adoption, there is a lack of consensus on whether the TOE model's effects on technology adoption are consistent across all sectors or groups of samples. There are four studies found that incorporating analysis of multi-sectors, or multi-groups samples data into TOE model, these studies was carried out in Malaysia, Cameroon, Vietnam, and Europe, but these number are relatively very limited (Ahmad et al., 2022; Kala Kamdjoug et al., 2021; Ngo et al., 2023; Oliveira & Martins, 2010). In other word, most studies related to TOE model effects on technology adoption tend to focus on SMEs in general or on one specific domain but, missing the evaluation of the difference between industry, or sector. Hence, leaving a gap in studying the interaction effect of multi-group on TOE model. As a result, the actual state of technology adoption in different sectors of SMEs, such as manufacturing, services, and agriculture, remains unexplored.

From methodological perspective, this will cause endogeneity problem, a situation whereby the relationship between two variables of interest is confounded by unobserved factors i.e., multi-sectors difference, or what is known as heterogeneity issue inherent within the samples (Boccia et al., 2022; Ahmad et al., 2020; Lu et al., 2018; Jean et al., 2016). Endogeneity is the result of omitting important variables (such as multi-group) from the model of research. That means, an important variable is not included in the proposed model, hence affecting both the independent and dependent variables. Studies by Fakhreldin & Anis (2021) and Oliveira & Martins (2010) are examples that includes unobserved organizational characteristics such as cultural competence difference, and industries difference in the model of e-business use. Since this study involves multiple sectors or different groups of samples attributed to industry (e.g., manufacturing, services, agriculture), there is an opportunity to perform multi-group SEM analysis (PLS-MGA). Hence, allowing for the assessment on whether the structural relationships in the TOE model differ across groups, and can help account for sector-specific endogeneity.

3.3 Research Framework and Hypotheses Development

In this research, the TOE framework is the underlying theory to support the proposed model, because it offers a structured approach that accounts for three pivotal dimensions: Technology (T), Organization (O), and Environment (E). The technological dimension directs our focus towards the characteristics of the e-business technology itself. It probes into factor such as how SMEs perceive the technology's benefits for expanding the business, entering new markets, catching up with competitors and reduces costs of running the e-business. In the technological dimension, this research employs a construct known as "Perceived Benefits".

Moving on to the organizational dimension, this study delve into internal factors within the organization that wield influence over e-business adoption (Gracia-Moreno et al., 2018). Here, exploring elements such as readiness for change and the compatibility of existing process to adopt e-business is done by considering the organization's internal resources, including its information technology capabilities, and human capital. Moreover, this dimension also includes the management support and commitment to e-business initiatives, as these factors play a pivotal role in determining adoption success (Gracia-Moreno et al., 2018). In the organizational dimension, this research employs two constructs known as "Technology Readiness" and "Technology Integration".

The environmental dimension encompassing external factors that comes from competitors from three segments: competition pressure from in local area, within Malaysia, and competitors worldwide. This sphere delves into understanding the nuances of competitive pressure exert on e-business adoption. It also considers the influence of external stakeholders, such as suppliers, customers, and trading partners, on the organization's decision-making process regarding e-

business adoption. In the environmental dimension, this research employs two constructs known as "Competitive Pressure" and "Trading Partner Collaboration".

Due to the comprehensive nature of the TOE framework, this research aims to examine the direct effect of these five factors (Perceived Benefits, Technology Readiness, Technology Integration, Competitive Pressure and Trading Partner Collaboration) on the e-business use (also known as, e-business adoption). The proposed model is illustrated in figure 1. Moreover, the framework also suggests that business sectors act as moderator in this study.
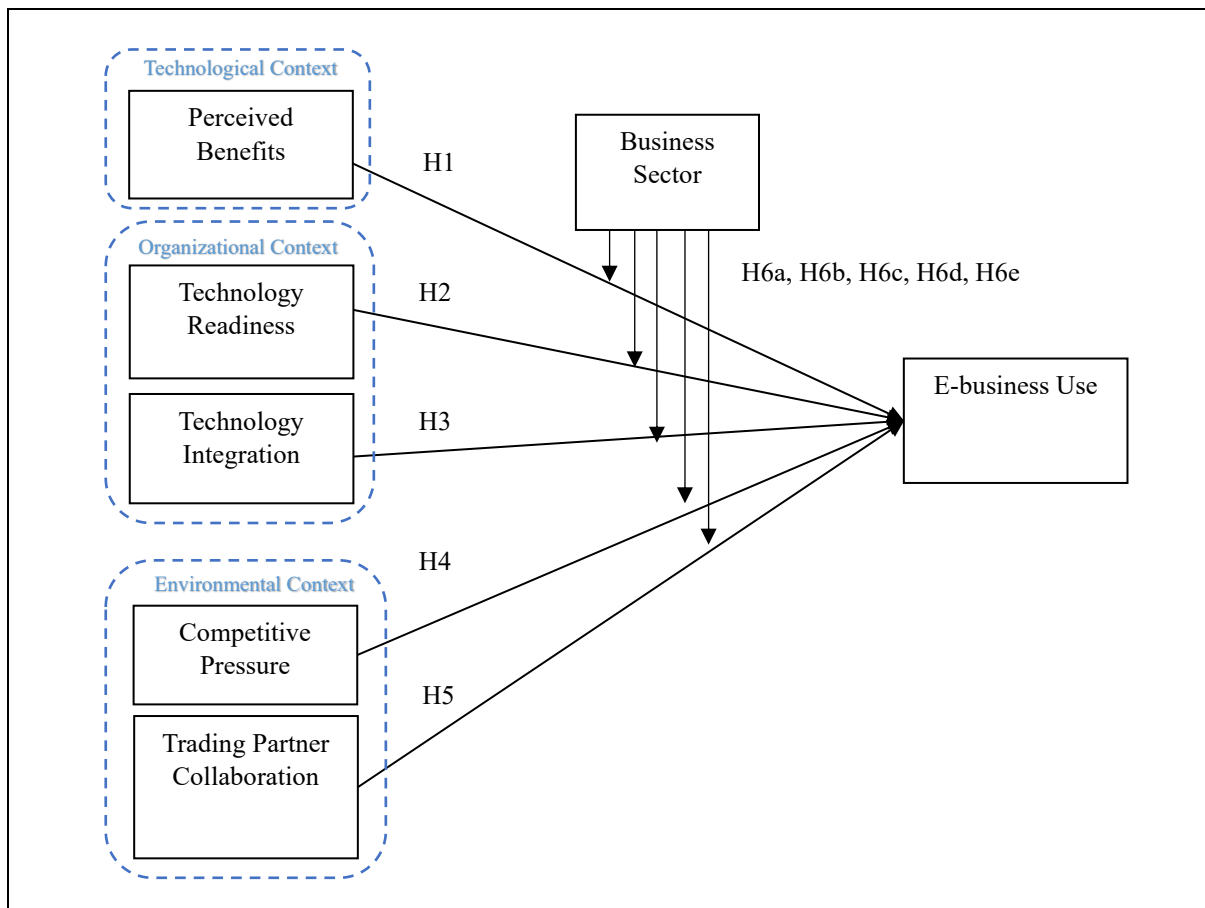

Figure 1: Theoretical Framework of Study

3.4 Variables of the Research and Research Hypotheses
3.4.1 E-business Use
E-business use refers to the utilization of online methodologies and technologies by businesses to facilitate various aspects of their operations and transactions conducted over the internet (Gomez et al., 2022; Wirtz, 2019). It encompasses the application of digital tools and platforms to enable the implementation of electronic business solutions. In the context of international trade and supply chain activities, e-business use plays a vital role in streamlining and enhancing the efficiency of business processes. It enables organizations to conduct electronic transactions, share information, and collaborate with trading partners in a secure and seamless manner. Through e-business use, businesses can leverage the power of digital technology to automate tasks, improve communication, and optimize their overall business performance (Boccia et al., 2022; Siti-Nabiha et al., 2020; Siti-Nabiha et al., 2021). E-business technology in the international trade activity such as the supply chain transactions are used for generating electronic invoice, purchase order, ship notice and many more (Goncalves & Smith, 2019;

Ifinedo, 2011). By embracing e-business technology, firms can expand their market reach, enhance customer experiences, and gain a competitive edge in the increasingly digitalized global marketplace (Ibbotson & Fahy, 2004; Amit & Zott, 2001; Wirtz, 2019). In this study, e-business use is an endogenous construct, meaning it is determined by the exogenous constructs or called factors under investigation (i.e., perceived benefits, technology readiness, technology integration, competitive pressure, and trading partner collaboration). The explanation on how each factors influence e-business use are discussed in the next section.

3.4.2 Perceived Benefits and E-business Use
Perceived benefits are defined as the extent to which e-business is seen as an improvement over previous business system. These benefits are subjective evaluations made by the organizations regarding the advantages and positive outcomes they expect from adopting e-business technologies and practices. Common anticipated benefits include enhanced business processes, increased efficiency, improved productivity, and cost reduction. SMEs are motivated to explore e-business technology due to the potential advantages it offers, such as improved business performance and new opportunities like increased productivity and reduced lead times (Siti-Nabiha et al., 2020). Research suggests that SMEs are more inclined to adopt e-business if it provides them with a relative advantage in their operations.

This study hypothesizes a positive correlation between perceived benefits and e-business usage, implying that SMEs' expectations of benefits are key determinants of their e-business adoption decisions. This hypothesis aligns with Zailani et al. (2009) findings that perceived benefits significantly influence the adoption of information systems in the context of supply chain and logistics in Malaysia. However, there are contrasting views, as Rowe et al. (2012) reported that perceived relative advantages do not play a crucial role in SMEs' e-business adoption in Vietnam. Ahmad et al. (2015) suggested that e-business is seen as advantageous only by adopters, with non-adopters viewing it as non-advantageous for their organizations. In light of these considerations, the following hypothesis is proposed:

H1: Perceived benefits positively influence e-business adoption among SMEs in Malaysia.

3.4.3 Technology Readiness and E-business Use
Technology readiness refers to an assessment of companies' state of preparedness and willingness to effectively utilize e-business technologies. It encompasses the evaluation of how adept SMEs are in integrating electronic methodologies into their operations, with key dimensions encompassing managerial aspects, the IT expertise among employees, and the internal flow of information concerning the adoption of e-business solutions. In essence, technology readiness can be characterized as the propensity of an SME to embrace and effectively employ new technologies, encompassing both technology infrastructure and the human resources skilled in information technology. The technology infrastructure serves as the foundational underpinning for internet technologies and e-business operations, while IT human resources supply the essential expertise required for web application development (Zhu & Kraemer, 2005). To facilitate the seamless integration of e-business into the value chain, SMEs must possess requisite levels of technology readiness, which encompass both the presence of adequate infrastructure and the possession of technical skills. It is noteworthy that firms lacking in either technology infrastructure or IT expertise may exhibit hesitancy in adopting e-business practices, underscoring that entities with higher technology readiness are better poised for e-business adoption. A substantial body of empirical research underscores the pivotal role of technological readiness in influencing e-business adoption (Armstrong & Sambamurthy, 1999;

Hong & Zhu, 2006; Iacovou et al., 1995; Kwon & Zmud, 1987; Pan & Jang, 2008; Zhu et al., 2006; Zhu & Kraemer, 2005). Therefore, we posit the following hypothesis:

H2. Technology readiness has a positive influence on e-business adoption among SMEs in Malaysia

3.4.4 Technology Integration and E-business Use
Technology integration refers to the use of e-business to enhance and support the export business environment. Technology integration in export trading can also support SMEs business process completion online rather than traditional working papers or piece-meal job process. The winning factor for e-business use is whether it can enhance and support the existing process. Therefore, technology integration is an important factor that influence e-business use for SMEs.

Nowadays, it is understandable that before joining any intervention programs by the government agencies such as the Digital Free Trade Zone (DFTZ), SMEs in Malaysia has been using various other technology and systems to manage their business processes online. However, the technology is piece-meal and not integrated. But, with the e-business solutions, SMEs has to be able to transfer their existing documents, systems or databases into the new technologies. The technology integration offers seamless operations, reduced error and cost, hence improved efficiencies and performance (Adhiatma et al., 2023). Technology integration that is perceived as being consistent with existing technology infrastructure, culture, values and working practise are key factors to e-business use (Ahmad et al., 2015; Ghobakhloo et al., 2011; Rowe et al., 2012; Rahayu & Day, 2015; Winklhofer et al., 2006; Zailani et al., 2009). It is therefore postulating the following:

H3. Technology integration is a positive predictor of e-business use among SMEs in Malaysia.

3.4.5 Competitive Pressure and E-business Use
Competitive rivalry among existing firms is one of the motivations to be successful in the competitive international trade. Competitive pressure often drives the organization to adopt e-business to maintain its competitive advantages (Ahmad et al., 2015; Ghobakhloo et al., 2011; Zailani et al., 2009). Competitive pressures forced an organization to look for new opportunity by adopt information system that could improve customers experience (more convenient and less waiting time) resulting in more sales and increased customer loyalty (Ahmad et al., 2015; Ghobakhloo et al., 2011; Rowe et al., 2012; Lim & Trakulmaykee, 2018; Oliveira & Martins, 2010).

In this research, competitive pressure refers to the degree of pressure felt by the firm from competitors within the industry in their local area, within the country and competitors worldwide. Based on the past empirical evidence, competitive pressure is a powerful driver of new technology adoption and innovation diffusion (Azeem & Haq, 2012; Al-Qirim, 2007; Battisti et al., 2007; Dholakia and Kshetri, 2004; Gibbs and Kraemer, 2004; Grandon and Pearson, 2004; Hollenstein, 2004; Iacovou et al.,1995; Lai et al., 2007; Zhu et al., 2006). We therefore postulate the following:

H4: Competitive pressure does significantly influence the adoption of e-business use among SMEs in Malaysia.

3.4.6 Trading Partner Collaboration and E-business Use

Organizations that send or receive documents between each other are referred to as trading partner. In the international trade environment, trading partners agree on the specific information to be transmitted and how it should be used. Hence, for e-business use context, trading partner collaboration motivates SMEs to integrate e-business into their firm. For example, when the trading partner has already used Electronic Data Interchange (EDI) for e-procurement the firm will follow suit, to ensure compatibility. Hence, trading partner collaboration is an important factor for e-business use because the value of e-business can be maximized only when many trading partners are using it (Iacovou et al., 1995). As suggested by empirical evidence, the success of e-business depends on the trading partners' readiness to jointly use the internet to perform value chain activities (Barua et al., 2004). In a trading community with greater partner readiness, individual adopters reveal higher levels of e-business usage due to network effects (Nordin et al., 2023a; Shapiro & Varian, 1999). Some empirical research suggest that trading partner is an important determinant for e-business (Iacovou et al., 1995; Lai et al., 2007; Lin & Lin, 2008; Soares-Aguiar & Palma-Dos-Reis, 2008; Zhu et al., 2006). Thus, we hypothesised that:

H5: Trading partner collaboration has a positive effect on e-business use among SMEs in Malaysia.

3.4.7 Interaction Effect of Sector

In studying the factors influencing e-business adoption, it is essential to consider the moderating effect of a multi-sector environment (Oliveira & Martins, 2010; Boccia et al., 2022). Just as the e-business adoption levels may vary across diverse sectors (manufacturing, service, and agriculture) the perceived benefits, readiness, integration ability, pressure from competitor and collaborator can also differ based on the distinct sectors in which they operate (Oliveira & Martins, 2010). Research has consistently shown that the way businesses conduct their operations is significantly influenced by the prevailing sector-specific context (Fakhreldin & Anis, 2021).

This idea is further supported by findings in the e-business literature, where the moderating effect of a multi-sector context, particularly concerning specific market conditions and government policies within various sectors, has been evident in comparative studies conducted across industries in European countries (Oliveira & Martins, 2010). Therefore, it is imperative to consider the diverse e-business landscapes of different sectors when exploring e-business adoption (Boccia et al., 2022).

Parallel to the tenets of contingency theory, which posit that businesses' decisions and actions are moulded by their perceptions of the most apt strategies within a given sector-specific milieu, the concept of businesses' technology readiness and adaptability to e-business technologies is intricately interwoven with the distinctive conditions prevailing in their respective sectors of operation (Entrialgo et al., 2001). Scholarly investigations underscore that rapidly evolving business environments, propelled by technological advancements, necessitate a continual adaptation of strategies and practices to accommodate e-business adoption. Therefore, it becomes imperative to recognize that businesses' perceived benefits, technology readiness, technology integration ability, pressure from competitor and collaborator may vary in accordance with the different sectors in which they operate, influenced by sector-specific attributes. Therefore, it is hypothesized that:

H6a: The effect of perceived benefits on e-business use is moderated by sectors of the SMEs.
H6b: The effect of technology readiness on e-business use is moderated by sectors of the SMEs.

H6c: The effect of technology integration on e-business use is moderated by sectors of the SMEs.

H6d: The effect of competitive pressure on e-business use is moderated by sectors of the SMEs.

H6e: The effect of trading partner collaboration on e-business use is moderated by sectors of the SMEs.

4. Methodology

4.1 Data Collection

To establish the research context within the domain of Malaysian SMEs engaged in international trade, data collection was carried out using the database maintained by the Malaysia External Trade Development Corporation (MATRADE). An online survey questionnaire served as the chosen method for data collection. Convenient sampling, a form of non-probability sampling, was employed to gather responses from SME owners and founders actively involved in international business. This sampling approach was selected for its practicality, time efficiency, and cost-effectiveness.

The quantitative survey questionnaire consisted of 26 items distributed across six latent constructs: e-business use, perceived benefits, technology readiness, technology integration, competitive pressure, and trading partner collaboration. These constructs were chosen to comprehensively evaluate various dimensions of e-business adoption within the context of exporting SMEs.

The survey questions utilized in this study were adapted from previous research and employed a five-point Likert scale, ranging from 'strongly disagree' (1) to 'strongly agree' (5). Additionally, demographic information about the participating organizations, including their sector classification (manufacturing, service, or agriculture), was collected to enrich the analysis.

The survey was conducted online, and participation was entirely voluntary. The target population comprised Malaysian SMEs registered with the Companies Commission Malaysia (SSM). Contact information for the respondents was obtained from MATRADE. The data collection phase spanned one month, yielding a total of 124 valid survey responses, which formed the basis for subsequent analysis.

4.2 Common Method Bias

Prior to running the data analysis, the study ensured for the non-existence of the common method bias. Common method bias (CMB) refers to potential bias arising from the method or instrument used to collect data, leading to spurious relationships among variables. This research adopted Harman's one factor test to investigate the existence of CMB. In this test, all items in the model are combined into a single factor. SmartPLS allows the creation of a composite variable from all the items and examine the variance explained by this single factor. In this study, the level of Harman's one factor was 26.7%. This value is consistent with the rule of thumb which is less than 50 per cent (Podsakoff et al., 2003). The result indicated that no CMB problem exist in this research and not likely to contaminate the results.

4.3 Data Analysis

In this study, SmartPLS software was employed to analyse survey data using partial least squares (PLS) analysis. The data analysis process encompassed several key stages. First, the measurement model was assessed by scrutinizing the factor loadings of indicators on their respective latent constructs. Ideal factor loadings equal or exceed 0.7, indicating the effectiveness of chosen indicators in capturing the underlying constructs. Convergent validity was assessed by calculating the average variance extracted (AVE) for each construct, with an

AVE value above 0.5 demonstrating that over half of the variance in indicators could be attributed to the latent construct they represent. Composite reliability of each construct was also computed, with the aim of achieving values above 0.7 to assess reliability. While Cronbach's alpha was calculated as an internal consistency measure, more reliance was placed on Composite Reliability in PLS-SEM due to its compatibility with reflective constructs. Discriminant validity, a critical aspect, ensured that each construct distinctiveness by assessing the Heterotrait-Monotrait ratio (HTMT). These steps collectively established the validity, reliability, and discriminant validity of the measurement model.

Subsequently, data analysis turned to the structural model assessment, with the aim of addressing research questions and testing both direct and moderation effects. The PLS bootstrapping techniques was applied to compute path coefficients and determine the significance of the proposed hypotheses. Investigation of the structural model's paths was conducted using PLS Bootstrapping with 5,000 subsamples. Additionally, Permutation-based Multigroup Analysis (MGA) was conducted to perform comparative analysis between sectors. This technique is particularly useful in situations where non-parametric analysis is assumed, as it makes fewer distributional assumptions about the data, can handle small sample sizes and non-normal data, and is robust against violations of homogeneity of variance assumptions. Prior to MGA assessment, the three steps of the MICOM (measurement invariance of the composite model) procedure were implemented to address measurement invariance issues (Henseler et al., 2016).

5. Findings

To gain a more comprehensive insight into the characteristics of the exporter SMEs, the collected responses have been summarized in Table 1, presenting a profile overview. The analysis of the profiles unveiled that the majority of SMEs represented in the sample belonged to the manufacturing sector, constituting 60 percent of the total respondents. Additionally, a significant proportion of these firms were situated in the central region of Peninsula Malaysia, accounting for 55 percent of the total. Notably, a considerable number of the participating firms boasted over two decades of experience in international trade. This data yields valuable insights into the composition and experience levels of the surveyed firms.

Table 1: Profile of Firms (n=124)

Respondent profile	Details	Frequency
Sector of the firm	Manufacturing	74
	Services	25
	Agriculture	25
Export rate of the firm based on the last year	25 percent	6
	50 percent	37
	75 percent	25
	100 percent	56
Years of firm's operation in export market	1-5 years	25
	6-10 years	19
	11-15 years	25
	16-20 years	6
	More than 20 years	49

Respondent profile	Details	Frequency
Location of the firm	West Malaysia North Region (Perlis, Kedah, Penang, Perak)	18
	West Malaysia Central Region (Selangor, Kuala Lumpur, Putrajaya)	70
	West Malaysia Southern Region (Negeri Sembilan, Melaka, Johor)	25
	East Malaysia (Sabah, Sarawak, Labuan)	12

5.1 Measurement Model Assessment

Multiple items were employed to assess the latent variables, namely e-business use, perceived benefits, technology readiness, technology integration, competitive pressure, and trading partner collaboration. Convergent validity and discriminant validity of the measurement model were rigorously evaluated.

In this study, the measurement model met the established criteria for construct validity and reliability. Specifically, it adhered to the stipulated conditions of Factor Loadings exceeding or equal to 0.70, Composite Reliability surpassing or equal to 0.70, and Average Variance Extracted (AVE) exceeding 0.5. For a comprehensive assessment of the measurement model, please refer to Table 2, which provides a detailed overview of the evaluation results. Notably, all items met the criteria, except for four items—EU2, EU4, EU7, and TR2. Consequently, these four items were excluded from the measurement model and are denoted with asterisks (*) in Table 2.

Table 2: Assessment results of the measurement model

Constructs	Code	Items	FL	CR	AVE
Perceived Benefits	PB1	E-business expands our firm's market for existing product/services	0.770	0.898	0.688
	PB2	E-business helps our firm to enter new businesses or markets	0.806		
	PB3	E-business helps our firm to catch up with major competitors that are online	0.904		
	PB4	E-business reduces costs.	0.831		
Technology Readiness	TR1	Our management are prepared for e-business	0.828	0.875	0.637
	TR2	Our employees are ready for e-business use at our firm	0.637*		
	TR3	Our information technology (IT) is capable to functions with e-business	0.867		
	TR4	Our firm's technology is coordinated with e-business	0.761		
	TR5	Rich information flows about e-business adoption in our firm	0.729		

Constructs	Code	Items	FL	CR	AVE
Technology WIntegration	TI1	The current technology in our firm can synchronize with e-business	0.909	0.939	0.794
	TI2	Internet protocols are adequate to support secure electronic ordering and payments.	0.886		
	TI3	E-business is compatible with my customers' behaviour	0.858		
	TI4	E-business is compatible with my suppliers' behaviour	0.910		
Competitive Pressure	CP1	Competitors in your local area	0.868		
	CP2	Competitors inside your country	0.887	0.920	0.794
	CP3	Competitors worldwide	0.917		
Trading Partner Collaboration	TPC1	Trading partner demand for e-business use	0.784	0.873	0.698
	TPC2	The decision to use e-business is to improve coordination with suppliers and customers	0.875		
	TPC3	Suppliers require e-business use from our firm	0.844		
E-business Use	EU1	Our firm use e-business for marketing/advertisements	0.912		
	EU2	Our firm use e-business for making sales	0.623*		
	EU3	Our firm use e-business for after-sales customer service and support	0.940		
	EU4	Our firm use e-business for making purchases	0.596*	0.933	0.778
	EU5	Our firm use e-business for data exchange with suppliers or cooperation partners	0.776		
	EU6	Our firm use e-business for data exchange with customers	0.891		
	EU7	Our firm use e-business for joint business processes with suppliers or cooperation partners	0.061*		

To further ensure the discriminant validity of the constructs, the Heterotrait-Monotrait (HTMT) ratio was examined. Discriminant validity is affirmed when HTMT values are below the recommended threshold values of 0.85 or 0.90. As depicted in Table 3, all HTMT values fell below 0.90, firmly establishing the discriminant validity of the constructs.

Table 3: HTMT $_{(0.90)}$

Constructs	CP	EU	PB	TI	TPC	TR
CP						
EU	0.678					
PB	0.596	0.880				
TI	0.610	0.574	0.639			
TPC	0.800	0.639	0.323	0.461		
TR	0.560	0.117	0.128	0.153	0.183	

Note: CP = Competitive Pressure; EU = E-business Use; PB = Perceived Benefits; TI = Technology Integration; TPC = Trading Partner Collaboration; TR = Technology Readiness

5.2 Measurement Invariance Assessment Using MICOM

Measurement invariance must be confirmed so that group differences in model estimates are not due to distinctive meanings or different interpretations of the latent variables across groups, and therefore, ensure the validity of the results and conclusions. Conversely, if the measurement invariance is not established, then the validity of the group differences is questionable. Therefore, an invariance test using MICOM is used in this study. The results of the MICOM procedure established partial measurement invariance, indicating a feasibility of testing the Multi-Group Analysis (MGA) for detecting sector-specific differences in PLS-SEM findings. These findings are systematically presented in Table 4 for reference.

Table 4: Assessment of Measurement Invariance using permutation

Country	Construct	Configural Invariance	Compositional Invariance c=1	Confidence Interval	Partial Measurement Invariance Established	Equal Mean Value Differences	Confidence Interval	Equal Variances Differences	Confidence Interval	Full Measurement Variance Established
Manufacturing vs Service	PB	Yes	0.996	[0.980; 1]	Yes	-0.014*	[-0.248; 0.263]	-0.032*	[-0.936; 0.851]	Yes
	TR	Yes	0.997	[0.990; 1]	Yes	0.338	[-0.248; 0.248]	-0.053*	[-0.627; 0.594]	Yes
	TI	Yes	1.000	[1; 0.997]	Yes	0.223*	[-0.256; 0.267]	-0.102*	[-0.726; 0.641]	Yes
	CP	Yes	0.995	[0.993; 1]	Yes	0.499	[-0.263; 0.251]	-0.141*	[-0.597; 0.582]	Yes
	TPC	Yes	1.000	[1.000; 1]	Yes	-0.154	[-0.164; 0.167]	0.439	[-0.280; 0.286]	No
Manufacturing vs Agriculture	PB	Yes	0.995	[0.994; 1]	Yes	0.304	[-0.242; 0.251]	-0.700*	[-0.737; 0.706]	Yes
	TR	Yes	0.953	[0.995; 1]	Yes	0.621	[-0.252; 0.248]	-0.710	[-0.421; 0.428]	No
	TI	Yes	0.992	[0.992; 1]	Yes	0.582	[-0.255; 0.258]	-0.349*	[-0.443; 0.387]	Yes
	CP	Yes	0.975	[0.993; 1]	Yes	0.948	[-0.244; 0.277]	-0.557	[-0.351; 0.338]	No
	TPC	Yes	0.996	[0.992;1]	Yes	0.093	[-0.163; 0.174]	0.080	[-0.353; 0.353]	Yes
Service vs Agriculture	PB	Yes	0.973	[0.933; 1]	Yes	0.306	[-0.236; 0.250]	-0.633*	[-0.686; 0.704]	Yes
	TR	Yes	0.916	[0.963; 1]	Yes	0.379	[-0.250; 0.242]	-0.658	[-0.441; 0.394]	No
	TI	Yes	0.986	[0.983; 1]	Yes	0.361	[-0.262; 0.2.67]	-0.235*	[-0.434; 0.407]	Yes
	CP	Yes	0.965	[0.983; 1]	Yes	0.579	[-0.257; 0.260]	-0.391*	[-0.420; 0.380]	Yes
	TPC	Yes	0.999	[0.999; 1]	Yes	-0.154	[-0.164; 0.167]	0.439	[-0.280; 0.286]	No

5.3 Muti-Sector Group Analysis Result

Multi-Group Analysis (MGA) was conducted, incorporating datasets from three distinct sectors: manufacturing, service, and agriculture. The primary aim of MGA was to compare findings across these sectors, utilizing the Comparisons Permutation Test, a methodology previously outlined in studies by Cheah et al. (2023) and Henseler et al. (2016). Within the framework of MGA, we estimated the differences in path coefficients, and subsequent analysis indicated that these differences were not statistically significant. The detailed explanations for each sectoral difference are presented in the following subsections and Table 5.

5.3.1 Sectors' Comparison on Relationship between Perceived Benefits on E-business Use

The path coefficients representing the sectoral differences in Perceived Benefits towards E-Business Use were analysed by examining the differences in all paths (Manufacturing vs. Service, Manufacturing vs. Agriculture, and Service vs. Agriculture). The results indicated that none of these differences were statistically significant. Consequently, we do not find support for hypothesis 6a, which suggests that the moderation effect of the sector is not statistically significant in relation to Perceived Benefits towards E-Business Use.

5.3.2 Sectors' Comparison on Relationship between Technology Readiness on E-business Use

Regarding the path coefficient of Technology Readiness towards E-Business Use, we conducted an analysis to assess the differences in all paths (Manufacturing vs. Service, Manufacturing vs. Agriculture, and Service vs. Agriculture). The results revealed that none of these differences were statistically significant. Consequently, hypothesis 6b, which posits that the moderation effect of the sector is not statistically significant in relation to Technology Readiness towards E-Business Use, is not supported.

5.3.3 Sectors' Comparison on Relationship between Technology Integration on E-business Use

Regarding the path coefficient of Technology Integration towards E-Business Use, our analysis encompassed all paths, including Manufacturing vs. Service, Manufacturing vs. Agriculture, and Service vs. Agriculture. The findings indicate that none of these differences reached statistical significance. Consequently, we do not find support for hypothesis 6c, suggesting that the moderation effect of the sector is not statistically significant concerning Technology Integration towards E-Business Use.

5.3.4 Sectors' Comparison on Relationship between Competitive Pressure on E-business Use

In examining the path coefficient of Competitive Pressure towards E-Business Use, our analysis encompassed all possible paths, which included Manufacturing vs. Service, Manufacturing vs. Agriculture, and Service vs. Agriculture. The findings indicate that none of these path differences reached statistical significance. Consequently, hypothesis 6d, which postulates that the moderation effect of the sector is not statistically significant in relation to Competitive Pressure towards E-Business Use, is not supported.

5.3.5 Sectors' Comparison on Relationship between Trading Partner Collaboration on E-business Use

In the evaluation of the path coefficient of Trading Partner Collaboration towards E-Business Use, our analysis encompassed all possible paths, including Manufacturing vs. Service, Manufacturing vs. Agriculture, and Service vs. Agriculture. The results indicate that none of these path differences reached statistical significance. Consequently, hypothesis 6e, which

posits that the moderation effect of the sector is not statistically significant in relation to Trading Partner Collaboration towards E-Business Use, is not supported.

Table 5: Comparisons Permutation Test Results

Multigroup Hypothesis	Path	Comparisons Permutation Test			
		Manufacturing vs Service	Manufacturing vs Agriculture	Service vs Agriculture	Significant Difference Supported?
		Difference	Difference	Difference	
H6a	PB*Sector→EU	-0.053	-0.710	-0.658	No
H6b	TR*Sector→EU	-0.102	-0.349	-0.235	No
H6c	TI*Sector→EU	-0.032	-0.700	-0.633	No
H6d	CP*Sector→EU	-0.053	-0.710	-0.658	No
H6e	TPC*Sector→EU	-0.102	-0.349	-0.235	No

All differences are not significant at $p < 0.05, 0.001$.

5.4 Structural Model Assessment
5.4.1 Direct Effect Result
Given the findings from the previous sections, which were derived from the Multigroup Analysis (MGA), it is evident that the moderation effect of these predictions did not varies significantly across different sectors. Therefore, the subsequent discussions in this structural model assessment centres on combined datasets in the structural model. For the combined datasets result, the direct effect of Perceived Benefits, Technology Readiness, Technology Integration, and Competitive Pressure on e-business use are significant, thus these supporting Hypothesis 1, 2, 3 and Hypothesis 4 claims. However, there is no significant direct effect evidence for Trading Partner Collaboration on e-business use. Therefore, Hypothesis 5 is not supported. Table 6 summaries these results.

Table 6: Structural Model Parameter Estimates

Direct Effect Hypothesis	Path	Beta Coefficient	T-statistics	P Values	Decision
H1	PB→EU	0.477**	12.886	0.001	Supported
H2	TR→EU	0.028**	3.619	0.001	Supported
H3	TI→EU	0.401**	7.319	0.001	Supported
H4	CP→EU	0.170**	4.948	0.001	Supported
H5	TPC→EU	0.055^{ns}	1.317	0.094	Not supported

5.4.2 E-Business Use Model Predictive Relevance
In the structural model, the coefficient of determination, R^2, plays a crucial role. It quantifies the proportion of the variance in e-business use that can be predicted by the five latent constructs (PB, TR, TI, CP, and TPC). R^2 is a key metric used to assess the predictive power of the model, shedding light on the extent to which the model explains the variance in the construct under examination. In the context of R^2 values, they are categorized as strong, moderate, or weak predictors when they surpass threshold values of 0.67, 0.33, or 0.19, respectively (Chin et al., 2008). Additionally, we also consider the Q^2 value, which serves as a criterion for predictive relevance alongside R^2. A Q^2 value greater than 0 indicates that the model holds predictive relevance, while a value less than 0 suggests a lack of predictive relevance.

For the overall dataset model regarding e-business use, the explanatory power is reflected in its R^2 value, which stands at 0.919. This value signifies a robust explanation, falling into the strong category. Furthermore, the Q^2 for E-business adoption model stands at 0.699, confirming the model's predictive relevance. To conclude, the structural model exhibits strong predictability.

5.4.3 Effect Size

Interpreting the effect size values in this context provides valuable insights into the practical significance of the relationships between the latent constructs and E-Business Use. The following are the result of effect size analysis. Firstly, the effect size for the relationship between Perceived Benefits to E-Business Use is notably large ($f^2 = 0.635$). This suggests that changes in perceived benefits have a substantial impact on E-Business Use, signifying a robust and practically significant connection. Secondly, the relationship between Technology Integration and E-Business Use exhibits a medium effect size ($f^2 = 0.584$). It suggests that variations in technology integration have a moderate impact on E-Business Use, underscoring its practical significance. Thirdly, the effect size of Technology Readiness on E-Business Use ($f^2 = 0.120$), and Competitive Pressure to E-Business Use ($f^2 = 0.050$) are relatively small. While there is an effect, it is of a lesser magnitude, indicating that changes in Technology Readiness and Competitive Pressure have a smaller, albeit discernible, influence on E-Business Use. However, the relationship between Trading Partner Collaboration on E-Business Use demonstrates a no effect ($f^2 = 0.018$). It suggests that alterations in Trading Partner Collaboration have very trivial impact on E-Business Use, though the practical significance of this effect is relatively non-exist. Table 6 present the results of R^2, Q^2 values and effect size.

Table 7: Summary Results of Structural Model's beta, f^2, R^2, and Q^2 values

Hypothesised Path	Beta	f^2	R^2	Q^2	Result
Perceived Benefits→E-Business Use	0.477**	0.635			Significant relationship, large effect size
Technology Readiness→E-Business Use	0.028**	0.120			Significant relationship, small effect size
Technology Integration→E-Business Use	0.401**	0.584			Significant relationship, medium effect size
Competitive Pressure→E-Business Use	0.170**	0.050			Significant relationship, small effect size
Trading Partner Collaboration→E-Business Use	0.055^{ns}	0.018			Relationship is not significant, no effect size
Endogenous Construct E-Business Use			0.919	0.699	Model has strong explanatory power & predictability

6. Discussion

While extensive research exists on e-business technology adoption across various industries, a notable gap remains in understanding its adoption within Small and Medium-sized Enterprises (SMEs), especially those engaged in international trade. Furthermore, specific industry sectors such as manufacturing, service, and agriculture have received insufficient attention in relation to e-business adoption.

This study aims to address this gap by investigating the factors influencing SMEs involved in international trade, across different industry sectors, to adopt e-business technology. It seeks to comprehend the determinants of SME owners' decisions regarding e-business technology adoption in the context of international trade. Additionally, this research provides valuable insights for making strategic decisions about technology investments and enhancing satisfaction levels derived from e-business use.

While previous research, particularly in the domain of international business, has often relied on the Technology-Organization-Environment (TOE) framework, this study takes a novel approach by examining the interaction effect of industry sectors on e-business adoption. This novel perspective contributes significantly to the existing body of knowledge, shedding light on the role of sectors in shaping e-business utilization patterns.

The study's overall results support all hypotheses except those related to trading partner collaboration in e-business use. Perceived benefits, technology readiness, technology integration, and competitive pressure were found to significantly influence e-business use. Specifically, perceived benefits (Beta=0.477, p<0.001), technology integration (Beta=0.401, p<0.001), competitive pressure (Beta=0.170, p<0.001), and technology readiness (Beta=0.028, p<0.001) were identified as significant predictors.

While our study found that trading partner collaboration does not significantly predict e-business use, this outcome aligns with the research conducted by Kala Kamdjoug et al. (2021), which examined ICT adoption among women-led SMEs in Cameroon. Nevertheless, our findings stand in contrast to the results of prior studies conducted by Iacovou et al. (1995), Barua et al. (2004), Lai et al. (2007), and Lin & Lin (2008).

Conversely, our analysis revealed that the moderating effect of sectoral differences was not statistically significant, which contradicts the findings of Oliveira & Martins (2010) and Boccia et al. (2022). Oliveira & Martins (2010) conducted their research in the context of e-business adoption in European countries, while Boccia et al. (2022) focused on the Italian province. These disparities highlight the need for further exploration of sectoral influences on e-business adoption in Malaysia.

6.1 Theoretical Implications

This study enriches the existing knowledge related to SMEs' e-business use, particularly in the context of exporters. It proposed to extend the TOE framework by including contextual factors related to the features of e-business use in different sectors: manufacturing, service, and agriculture. Based on the findings, theoretically this study supports all the direct effect of TOE factors on e-business use, except for trading partner collaboration.

Thus, the TOE model has consistently proven its utility in understanding e-business use among SMEs. It highlights the significance of perceived benefits, technology readiness, technology integration, and competitive pressure as predictors of e-business use among Malaysian exporters. Only four independent variables—perceived benefits, technology readiness, technology integration, and trading partner collaboration—were statistically significant predictors of e-business use.

Surprisingly, the results do not support the hypothesis that sectors moderate the relationship between factors onto e-business adoption. Therefore, despite the evident of characteristics

difference attributed to sectoral difference, our initial hypotheses such as manufacturing sector might exhibit higher e-business use compared to lower-tech sectors like agriculture, the difference is not significant. This finding suggests that the sectoral context does not significantly influence e-business use among Malaysian exporters. But these findings can be further tested in future studies.

6.2 Practical Implications
Perceived benefits and technology integration emerge as powerful drivers, technology readiness and competitive pressure exert milder yet noticeable influences. On the other hand, trading partner collaboration appears to have minimal to no practical significance in influencing E-Business Use. These findings collectively illuminate the multifaceted dynamics that underlie the adoption and utilization of E-Business technology in the context of export-oriented SMEs, offering valuable guidance for both researchers and practitioners in this domain. The practical implication of this study is discussed following subsections.

6.2.1 Perceived Benefits Effects on E-business Use
The relationship between Perceived Benefits and E-Business Use stands out with a notably large effect size. This suggests that changes in perceived benefits have a substantial and robust impact on E-Business Use. In essence, it signifies a connection of practical significance, highlighting that when SME owners perceive significant benefits in employing E-Business, they are more likely to embrace and utilize it to a greater extent. This finding underscores the pivotal role of perceived advantages as a driving force behind E-Business adoption and implementation within the Malaysian export SME landscape. This finding is consistent with Abid et al. (2011) in Australian SME suppliers, Beheshti & Salehi-Sangari (2007) in Swedish SMEs and Abou-Shouk et al. (2013) study among Egyptian travel agents SMEs.

To promote the adoption of e-business among SME exporters, government agencies like the Malaysia External Trade Development Corporation (MATRADE) and SME Corporation Malaysia should persist in their efforts to promote the advantages of e-business through training initiatives. Emphasizing benefits such as streamlined business processes in online transactions and electronic marketing can effectively boost the utilization of e-business among Malaysian exporters. Priority should be given to practical, hands-on training programs aimed at enhancing the confidence and expertise of SMEs in utilizing e-business.

6.2.2 Technology Integration Effects on E-business Use
The link between Technology Integration and E-Business Use demonstrates a medium effect size, implying that variations in technology integration have a moderate but practical impact on E-Business Use. This underscores the importance of seamlessly incorporating E-Business technology into existing business processes for SMEs. While the effect is not as pronounced as perceived benefits, it remains of practical significance. Organizations that effectively integrate E-Business technology into their operations are more likely to experience increased utilization of E-Business tools. The study confirms that integrating e-business technology into existing business processes significantly impacts exporters. This underscores the importance of overcoming technical barriers, as technical proficiency is vital for success in international trade, and this is consistent with finding of Nham & Bao (2023) in their empirical studies in European countries and Bokolo (2022) in virtual enterprise interoperability study in Norway, and Kumaran & Jeyachandran (2022) in e-supply chain management study in Indian MSMEs.

6.2.3 Technology Readiness and Competitive Pressure Effects on E-business Use

In contrast, the relationships between Technology Readiness and E-Business Use, as well as Competitive Pressure and E-Business Use, show relatively modest effects. This suggests that changes in technology readiness and competitive pressure have a discernible but less pronounced influence on E-Business Use compared to perceived benefits or technology integration. However, these effects should not be underestimated. SMEs that are technologically prepared and responsive to competitive pressures are better positioned for E-Business, albeit to a somewhat lesser extent than other factors, as found in previous studies by Vize et al. (2013), Oyekunle & Tiamiyu (2022), Simic et al. (2019), and Alabbadi & Al-Masaeed (2020).

Nevertheless, enhancing technology readiness remains crucial. Promoting a positive outlook on technology within SMEs can lead to greater adaptability and willingness to adopt new technologies. Talent management, including recruiting tech-savvy employees, plays a pivotal role in sustaining e-business use. Firm leadership should actively support technological innovation for continued progress. Competitive pressure acts as a catalyst for SME exporters to innovate and expand their market presence through technology. The study underscores the importance of recognizing and responding to competitive pressures, both locally and globally, to drive e-business adoption.

6.2.4 Trading Partner Collaboration

The relationship between Trading Partner Collaboration and E-Business Use exhibits a negligible effect size, and the estimated path coefficient is also not deemed significant. This indicates that changes in trading partner collaboration have a very minimal impact on E-Business Use, with virtually no practical significance. Essentially, this factor does not substantially influence the extent to which SMEs adopt E-Business technology in the context of export activities. It's worth noting that this finding contradicts the results of Oliveira & Martins (2010), Kumar & Pradhan (2016), Barac et al. (2017), and Lu & Al-Hakim (2016).

6.2.5 Sectoral Difference in E-Business Use Model

The research reveals that sectoral differences do not significantly moderate the relationship between TOE factors and e-business use. This suggests that technological advancements and global factors have contributed to uniformity in e-business adoption patterns across various sectors in Malaysia. Nevertheless, it is important to note that this finding contrasts with the results of Oliveira & Martins (2010) and Boccia et al. (2022), and Salah et al. (2021).

Additionally, it underscores the role of consistent regulatory frameworks governing e-business practices, which influence adoption strategies across sectors. This regulatory uniformity simplifies compliance efforts for companies, allowing them to apply similar approaches to meet legal requirements related to e-business. Consequently, organizations from diverse sectors can draw inspiration and insights from one another's e-business strategies, leading to more efficient and effective adoption.

In today's interconnected and technology-driven world, this research highlights that businesses across different sectors are exposed to similar trends and opportunities in e-business. Whether in manufacturing, services, or agriculture, the imperative to embrace e-business technologies arises from the need to stay competitive in a digital marketplace and enhance operational efficiencies. This practical insight has significant implications for businesses and policymakers alike.

For instance, manufacturers can learn from service-oriented companies about engaging customers online, while agricultural businesses may find inspiration in supply chain optimization techniques from the manufacturing sector. Such cross-sectoral learning can

facilitate more streamlined and effective e-business adoption strategies. It is worth noting that this finding aligns with the research by Basso et al. (2023), which also found no heterogeneous impact of sectoral differences, albeit in the context of labour economics.

6.3 Contributions of the Study

This study contributes both theoretically and practically to the understanding of e-business use among Malaysian exporter SMEs. It advances the use of the TOE framework in a novel context, providing insights that can guide more effective strategies and interventions. This study also highlights the need in recognizing sectoral contextual nuances, because it is crucial for tailoring approaches to specific circumstances and addressing unique challenges. However, the findings did not concur with some of the hypotheses. It might be attributed to the limitation of the study's methodology used.

7. Limitations of the Study

While the TOE framework provides valuable insights into technology adoption, this study has several limitations that should be acknowledged. Firstly, one significant limitation lies in the sample. Sampling method utilized in this study is convenient sampling, which may need extra caution when it comes to generalizing the study's finding. Moreover, there is limitation in the total sample size and sample size for each sector group. The number of samples within each sector group was relatively small, which may hinder the detection of subtle differences among sectors. This limits the generalizability of the findings to a broader range of SMEs in different sectors. For future research, a larger and more diverse sample would have allowed for a more robust analysis of sectoral differences and their impact on e-business use. Finally, the methodology employed in this study, while suitable for the research objectives, is not without limitations. The use of Partial Least Squares Structural Equation Modeling (PLS-SEM) and Partial Least Squares Multi-Group Analysis (PLS-MGA) allowed for the examination of the hypothesized relationships. However, like any statistical approach, it comes with certain assumptions and limitations. These include potential issues related to model fit, measurement error, and assumptions of normality. Researchers should be aware of these methodological considerations when interpreting the study's results.

While this study contributes valuable insights within the context of Malaysian SME exporters, the findings may not be directly transferable to other geographical regions or industries with distinct characteristics. The unique business environment, regulatory landscape, and cultural factors in Malaysia may limit the generalizability of the results. Researchers should exercise caution when applying these findings to different contexts and consider conducting similar studies in diverse settings. Despite these limitations, this study contributes valuable insights into e-business adoption among SME exporters. Future research could build upon this foundation by addressing the identified limitations, such as increasing sample sizes, incorporating human factors into the model, and exploring the generalizability of the findings to different contexts. These efforts would further enhance our understanding of technology adoption processes among SMEs.

8. Conclusion

In conclusion, this study has illuminated the factors influencing e-business use among SME exporters in Malaysia, guided by the TOE framework. The findings underscore the significance of perceived benefits, technology readiness, technology integration, and competitive pressure in driving e-business adoption within this context. Furthermore, the research reveals that sectoral differences did not significantly impact e-business use, suggesting that global

technological trends and regulatory consistency have led to similarities in e-business adoption patterns across different sectors.

These insights contribute to the body of knowledge related to e-business use in SME exporters. They advance our understanding of how specific factors influence the adoption of e-business technology in the international trade business landscape. While sectoral differences did not emerge as significant influencers in this study, they shed light on the broader trends in e-business adoption. In summary, this study enhances our comprehension of e-business utilization in the realm of SME exporters. It offers valuable insights into the specific factors that drive adoption while highlighting the broader context of e-business trends.

Acknowledgement

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