

Antecedents Of Business-To-Business E-Commerce Adoption Among Manufacturing Small and Medium-Sized Enterprises in Malaysia

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Abstract

E-Commerce research in Malaysia is developing, particularly among manufacturing SMEs, as it includes issues on business-to-business (B2B) e-commerce adoption. In general, manufacturing SMEs play a significant part in the SMEs gross domestic products (GDP) and nation's export. Past scholars had performed many related studies on developed countries as compared to developing countries, especially Malaysia. The elements of Technology-Organisation-Environment (TOE) were measured as determinants for B2B e-commerce adoption. The study acquired the respondents' details through the 49th edition of the Federation of Malaysian Manufacturers (FMM) Directory of Malaysian Industries. A total of 381 manufacturing SMEs across Malaysia had participated in this study. The data were collected using online survey method and were analysed using the Smart Partial Least Square Analysis (SmartPLS) under the Structural Equation Model (SEM). This study demonstrated that relative advantage, complexity, compatibility, and technology readiness were identified as TOE determinants, which influenced the B2B e-commerce adoption. The study brought some new determinants into the TOE framework, such as perceived risk, innovativeness, normative pressure, and mimetic pressure.

Keywords: *Technology-organisation-environment, B2B e-commerce adoption, manufacturing SMEs*

1. Introduction

Small and medium-sized enterprises (SMEs) are equally crucial to the economic development and gross domestic product (GDP), particularly in developing countries like Malaysia, Singapore, Indonesia, Vietnam, Thailand, and Myanmar. The World Bank (2015) assessed that 600 million positions were needed to satisfy the developing worldwide labour force in the following 15 years, and SMEs will, in general, benefit these worldwide labour force obliges by opening more positions in Asia and Sub-Saharan Africa. Notwithstanding, 90% of organisations had addressed SMEs from which over half of the business opportunities worldwide were offered. SMEs have additionally offered four out of five new positions in the developing business sector for formal functions. In the Organisation for Economic Co-operation and Development (OECD) nations, many business substance registrants fall under SME category, thus add to countless open positions. Since SMEs contribute a large number of open positions, it is important to ensure and oversee that they are able to minimise the country's unemployment rate. SMEs are likewise a significant specialty unit in contributing towards the country's GDP (Department of Statistics Malaysia, 2020). SMEs

in Malaysia were considered the backbone of the country's economy since 98.5% of the absolute registrants of business elements were SMEs (Hassan and Almubarak, 2016).

Therefore, the Malaysian SMEs contributed 37.8% to the country's GDP, 57.5% to the nation's employment, and 19% to the nation's export (SME Annual Report, 2018/2019). Nonetheless, the GDP commitment ascended to 38.3% in 2018. Despite that, the actual SME execution was still lacking, while the development of small retail enterprises in 2017 reduced from 3.7% to 2.2% (The Star, 2018). In 2017, private companies encountered a significant issue of work cost increase amidst decreasing buying powers (The Star, 2018). The significance of SMEs commitment to GDP is similar to the commitment of enormous firms. The Malaysian government begins to look at SMEs during the 10th and 11th Malaysia Economic Plan. The National SME Development Council (NSDC) foundation is a venturing stone to help and arrange the SMEs through connected services and organisations. The authorities' intention to foster SMEs to improve business performance had been clarified in the 10th Malaysia Economic Plan.

Consequently, organisations in the manufacturing sector are adding to Malaysia's GDP. The gross yield had expanded to RM1,275.8 billion which contrasted with 2015 at RM1,142 billion (Department of Statistics Malaysia, 2019). The manufacturing business had likewise improved to RM294 billion in 2017, which contrasted with around RM257.1 billion in 2015. Three primary subsectors had contributed a huge gross yield according to the Annual Economic Survey (2018). The subsectors were electrical, electronic, and optical items representing RM361.8 billion, trailed by oil, compound, plastics, and plastic-related subsectors with RM340.4 billion. The final subsector was vegetable and non-vegetable oils and processed food with RM214 billion. These subsectors comprise the manufacturing SMEs. The leader of the Federal of Malaysian Manufactures (FMM) demonstrated that the development in the Malaysian manufacturing organisations relied on private area speculation just as their purchasing power. In any case, most of the manufacturing organisations in Malaysia are unprepared to face the challenges in investing resources into their business due to the improvement of external factors, such as political conditions and the United States (US)-China trade war (Malay Mail, 2019).

Likewise, FMM expressed that the COVID-19 pandemic is another enormous challenge to the manufacturing industry, and this predicament had proceeded until September 2020 (The Edge, 2020). Subsequently, the supply chain may have been affected. The manufacturing business confronted challenges to acquire basic materials, particularly merchandise imported from the US and China. Although the Malaysian government had taken actions, namely giving salary subsidy to every workers in the private sector, the manufacturing business would confront a considerable cost. The FMM president expressed that most of the manufacturing organisations were encountering negative income and would reduce expenses to sustain.

The SME businesses in Malaysia are overwhelmed by the service and manufacturing sectors. Consequently, this study aimed to focus on the Malaysian manufacturing SMEs sector. The development of manufacturing SMEs sector had expanded from 2016 to 2017 by 4.8% to 6.8%. SMEs manufacturing sector is significant for export, which contributed 48.3% to export in 2018, and these incorporated beverages and tobacco, synthetics, handmade products, and miscellaneous manufactured raw materials. The Malaysian manufacturing SMEs exported their items to three countries in 2017, namely Singapore (18.6%), China (8.9%), and the US (7.9%) (Department of Statistics Malaysia, 2019).

2. Business-to-Business E-Commerce

The characteristics of business-to-business (B2B) e-commerce are the Internet-empowered B2B technology utilised by firms to purchase and sell directly as well as exchange information with their production network accomplices (Sila, 2013, 2015). By and large, the B2B e-commerce business market is more practically contrasted with business-to-customer (B2C) e-commerce because the volume of B2B e-commerce is

multiple times higher than the B2C e-commerce (Unctad, 2015). As indicated by the United States Census Bureau (2015), the US B2B e-commerce technologies were high in esteem at USD5.8 trillion, as estimated, and covered 91% of the absolute e-commerce value. In the Republic of Korea, B2B e-commerce showed a similar rate as the US, that was 91% out of the total e-commerce value and 58% in the Russian Federation (Unctad, 2015).

Sila (2013) additionally demonstrated that China and India were rising economies which showed inspirational outlook projection for their future B2B e-commerce. This information sums up that the B2B e-commerce business is grounded and profited by developed countries instead of developing countries. For instance, only 2.5% of the absolute B2B e-commerce occurred in the Middle East and Africa. Unctad (2015) once more underlined that around more than three-quarters of fundamental online B2B e-commerce trading occurred in developed countries like the US (36%), the United Kingdom (18%), Japan (14%), and China (10%).

Many developing nations are still slacking, compared to developed countries that appreciate and expand B2B e-commerce (Alsaad et al., 2018). The World Trade Organisation (WTO) stated that B2B e-commerce adoption in developed countries is more advanced than developing countries (Alsaad et al., 2015; Gibbs et al., 2003; Kshetri and Dholakia, 2002).

3. Factors Affecting B2B E-Commerce Adoption

Although B2B e-commerce adoption is increasing for organisations, the elements that may influence B2B e-commerce adoption need to be analysed, and in the past these elements were inspected in e-commerce concentrates. Nevertheless, further examination needs to be done on B2B e-commerce. Typical antecedents from past studies will be reused in the current research. A few antecedents influence B2B e-commerce adoption (Ghobakhloo et al., 2011; Molla and Licker, 2005) and SMEs (Quaddus and Hofmeyer, 2017; Hu et al., 2019). The antecedents that impact B2B e-commerce adoption fall under technology, organisation, and environment. Past research had identified the determinants of B2B e-commerce adoption in different enterprises structure by the technology group, organisation, and environment under the research theory of technology-organisation-environment (TOE) (Tornatzky and Fleischer, 1990). Relative advantage, complexity, compatibility, and security are the determinants with regards to technology. Company size, top management support, technology readiness, cost, development, IT capacities, and perceived risks are the determinants for the organisational context. At prolonged last, competitive pressure, governing support, and external computing support as the determinants for the environmental context are distinguished.

Among this study framework, B2B e-commerce adoption determinants should be analysed as the essential elements. In the technological context, relative advantage, compatibility, and complexity assume a prevailing part in B2B e-commerce adoption (Mohtaramzadeh et al., 2018; Ocloo et al., 2018; Alsaad et al., 2017, 2018). Notwithstanding, for the organisational context, top management support, innovation, technology readiness, and perceived risks are classified as the elements of B2B e-commerce adoption (Ocloo et al., 2018; Alsaad et al., 2017, 2018). Subsequently, normative and mimetic pressures, as significant components in the environmental context was identified (Ocloo et al., 2018; Alsaad et al., 2017, 2018).

4. Past Studies on B2B E-Commerce Adoption on SMEs

B2B e-commerce requires development as highlighted by experts in the field (Sila, 2013, 2015). B2B e-commerce can uphold SMEs by acquiring various mixtures of competitive advantage and refining them to huge rival organisations globally (Elbeltagi et al., 2016). B2B e-commerce adoption is an excellent approach to help the e-commerce movement among SMEs in developed countries (Elbeltagi et al., 2016) and developing countries, like Malaysia.

There were various practical studies conducted to uncover B2B e-commerce adoption among SMEs in Malaysia and globally. Hu et al. (2019) indicated that it was fundamental to examine issues from various points; for example, technological, organisational, and environmental contexts to the adoption of B2B e-commerce. The exploration assisted by recognising viable development among SMEs. Ghobakhloo et al. (2011) investigated manufacturing SMEs in Iran and gathered relative advantage, compatibility, information intensity, management innovativeness, the purchaser/provider pressure, technology vendors' support, and rivalry that affected SMEs' initial adoption of e-commerce.

Lip-Sam and Hock Eam (2011) applied the idea of TOE to examine its effect on B2B e-commerce adoption on Malaysian SMEs. The analysts identified that external support and manager characteristics significantly impacted Malaysian SMEs on B2B e-commerce adoption. Simultaneously, the owners and supervisors were significant people to guarantee the accomplishment of the adoption. The study of the Chinese SMEs uncovered several principal models for their prosperity. These are data technology/system facilities performance, top management support and responsibility, data perceptibility, effective client relationship, worldwide rivalry, social thought, government support, accountability, security, and trust (Chong et al., 2011). Halaweh (2011) led a comparable exploration which recognised that the security factor assumed a predominant part towards the non-adoption of e-commerce among Jordanian organisations. Awiagah et al. (2016) featured that TOE elements, government, and management support essentially influenced e-commerce adoption among SMEs.

Mohtaramzadeh et al. (2018) investigated B2B e-commerce adoption in Iran manufacturing organisations. They discovered that components, such as cost of adoption, top management support, competitive pressure, and government support affected the adoption. In any case, the organisation culture directly affected top management support and B2B e-commerce adoption. The input of this research was the use of organisational culture towards B2B e-commerce adoption. On the other hand, Mohtaramzadeh et al. (2018) and Alsaad et al. (2018) had utilised resource dependency as a moderator to analyse the aim to adopt B2B e-commerce. The study's outcome demonstrated that innovation was spread into the market when the supply chain advisory group comprehended the significance of reliance. Besides that, Quaddus and Hofmeyer (2017) tracked down that external motivation built mindfulness innovations among small companies in Western Australia. One of the signs of external stimuli is uplifting the positive behaviour, which prompts the aim to adopt B2B e-commerce into their organisations. Besides, different factors like trust, contextual, and control function as an agent that creates optimistic behaviour to improve B2B trade exchange

Previous scholars explored different features that impact the B2B e-commerce adoption. Alsaad et al. (2017) uncovered that trust as a moderator could impact B2B e-commerce adoption among companies in Jordan. Notwithstanding, the investigation found that trust did not moderate the effect of organisational and environmental factors. Furthermore, Alsaad et al. (2017) clarified that their trading partners' connection was not flexible enough to acknowledge any new technology for their business activities. Henceforth, trust was not an issue, and this implied that they had a good understanding and belief among their trading partners for any new technologies. Ocloo et al. (2018) examined the elements influencing B2B e-commerce adoption among manufacturing SMEs in a developing country, Ghana. The research tracked down that distinctive degree of adoption influenced the adoption level of e-commerce. Moreover, relative advantage and concentration competition were two essential factors that impacted B2B e-commerce adoption among Ghanaian manufacturing SMEs.

Kabanda and Brown (2017) expressed that external environmental factors were essential and significantly affected the adoption of new technology, specifically B2B e-commerce. Chwelos et al. (2001) followed this by incorporating competitive pressure, external pressure, trading partner support, and technology readiness on electronic information trade adoption. Quaddus and Hofmeyer (2017) and Premkumar and Roberts

(1999), likewise, analysed the effect of external elements on the adoption of exchanging trade. The recognised factors were competitive pressure, provider support, and government support.

5. B2B E-Commerce Adoption Model

Previous researchers had applied exploration models, such as the technology acceptance model (TAM), unified theory of acceptance and use of technology (UTAUT), diffusion of innovation theory (DOI), transaction cost theory (TCT), TOE system, institutional theory, resource dependence theory (RDT), and network effect theory (NET). The determination of an examination theory relies upon the goal of the investigation. Therefore, Alsaad et al. (2014), Fichman and Carroll (2004), and Robey et al. (2008) expressed that the theories decisions in B2B e-commerce research were conducted using balanced and institutional tactics. There is a use of more than a single theory in B2B e-commerce-related research. Among all approaches, DOI, institutional theory, and TOE were often used in B2B e-commerce literature. For instance, Al-Qirim (2007) and Zhu and Kraemer (2006) applied DOI theory to forecast B2B e-commerce adoption.

Notwithstanding, DOI and institutional theories have restrictions contrasted with TOE. DOI theory emphasises the technology viewpoint, covering only relative advantage, compatibility, complexity, trialability, and observability. Institutional theory inspects environmental factors, like mimetic, normative, and coercive pressures in the organisations' technology adoption. TOE overcame these constraints by adding the technology segment from DOI. Likewise, the environmental element from institutional theory added the organisational feature.

Consequently, TOE is a strong and the most used approach that fulfilled any organisation's technology-based cycle. According to Duan et al. (2012), TOE is the most pertinent theory to be utilised for any related studies about B2B e-commerce since it covered three parts of technology adoption. Ocloo et al. (2018) expressed that most studies used the TOE theory related to technology adoption among SMEs. Kuan and Chau (2001) inspected electronic data interchange (EDI) adoption, e-business adoption by Oliveira and Martins (2010) and Zhu and Kraemer (2006), information systems adoption and use by Thong (1999), enterprise resource planning adoption by Pan and Jang (2008), and business-to-business adoption by Kurnia et al. (2015). Meanwhile, Sila (2013) utilised TOE to foster their research framework and supported TOE as a significant theory to explore technology adoption among SMEs. Table 1 summarises the utilisation of approaches in technology adoption studies.

Table 1: Previous Studies in Technology Adoption

		1	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
	TOE in Overall IT Adoption	Al-Hakim & Wu (2017)	Olufemi (2018)	Harif & Hoe (2017)	Araujo & Ziber (2016)	Ahmed, Ammar, Lzahi & Said Ali (2016)	Ewe, Yap & Lee (2015)	Awa, Ojibo & Ukoho (2017)	Awa, Ukoho & Igwe (2017)	Kaibachi & Obeid (2016)	Ramanathan & Krishnan (2015)	Al Ismaili, Li, He & Shen (2016)	Maman, Nordin & Rafik-Galea (2017)	Maikiti, Mpinganjira & Robert-Lombard (2018)	Alomar & Visscher (2017)	Khan, Haq, Ghouri, Rezaq & Moiz (2017)	Pashaepoor, Ashktorab, Rassouli and Alavi-Majd (2016)	Setowari, Haroyo, Daryanto & Arifin (2015)	Chandra & Kumar (2018)	Ahmad, Bakar, Fazliharudean & Mohamad Zaki (2015)	Wu & Liu (2015)	Gholami, Abdekoda & Gavani (2018)	Alziady & H. Emayah (2019)	Bozan, Davey and Parker (2015)	Krell et al., (2016)	Nurudin, Stokdale, Scheepers (2017)	Ogan (2015)
	Respondents	B	B	A	C	C	C	B	B	C	C	B	C	B	B	C	C	B	C	A	C	C	B	C	C	C	B
	Methodology	D	E	E	D	D	D	D	D	D	D	E	D	D	D	D	D	D	D	D	D	D	D	D	D	E	D
	Analysis	H	H	H	G	G	H	H	H	H	G	H	H	H	H	H	H	H	G	H	H	H	G	G	G	H	G
	Other Theory Incorporated	LK	LK	LK		I	I	J,L	J	LK	I	L	I	K	LK	I	I	I			LK	LK		J			
	Technology Context																										
1	Relative Advantage	M		M	M		M			M		M			O		M	O	M	M		N					
2	Complexity	M		M			M			M		O	O				M	M		O		N					
3	Compatibility	M		M	M		M	N	N	M		M	M				O	O		M	O	M					
	Organisation Context																										
4	Top Management		M	M		M		M	M		M	M		M					M			M					
5	Innovativeness			M	M							M				M	M	M									
6	Perceived Risk									M																	
7	Technology Readiness													M													
	Environment Context																										
8	Normative Pressure							M	M														M		M		O
9	Mimetic Pressure							M	M														M	M	M		M
	Indicators	Respondent - SME Malaysia	B	Respondent - SME Non-Malaysia	C	Respondent - Others	D	Methodology - Quantitative																			
		Methodology - Qualitative	F	Methodology - Mix Method	G	Analysis - PLS	H	Analysis - Others																			
		Other Theory	J	Other Theory	K	Other Theory	L	Other Theory Incorporated -																			
		Influence -	N	Influence - Negative	O	Non-Directional		Supported Hypothesis																			

6. Conceptual Framework and Hypotheses Development

Past scholars concentrated on various aspects from technology, organisational, and environmental perspectives. These aspects were collective with the TOE framework to examine the antecedents of B2B e-commerce adoption. Components in the TOE framework that were recognised as determinants incorporated technological context, such as perceived relative advantage, perceived cost, complexity, perceived desirability, and IT competency. The organisational context included top management support, IT facilities and abilities, organisational readiness, staff's IT knowledge, IT refinement, financial resources, data power, CEO information systems knowledge, innovativeness, business size, management attitude, and security. The environmental context included competitive pressure, trading partner pressure, government support, legal facilities, the intensity of competition, technological support from sellers, and external supplier.

From the technological context, Alsaad et al. (2017) and Hussein and Baharuddin (2017) nearly used the antecedents by testing four hypotheses in a similar context. It was shown that most of the analysts (Ocloo et al., 2018; Alsaad et al., 2017; Hussein and Baharuddin, 2017; Lim et al., 2017; Ismail et al., 2017; Ahmad et al., 2015; Arhsad et al., 2018) identified a significant positive connection between perceived relative advantage and acknowledged the hypotheses, aside from Mohtaramzadeh et al. (2018). Although most

examination showed a negative relationship between complexity and B2B e-commerce adoption, they did not acknowledge the views. Notwithstanding, a study by Alsaad et al. (2018) showed that there was a substantial positive relationship.

For organisational context, top management support is a more significant occurrence determinant in B2B e-commerce adoption concentrates, as confirmed by past researchers. The majority of the past investigations tracked down a vast positive correlation between top management support and B2B e-commerce adoption (Mohtaramzadeh et al., 2018; Ocloo et al., 2018; Alsaad et al., 2018; Lim et al., 2017; Arshad et al., 2018). Past researchers analysed organisation readiness, and the outcomes varied (Ocloo et al., 2018; Alsaad et al., 2018; Lim et al., 2017). Although the study on innovativeness in past research is scarce, it is a significant determinant in technology adoption studies, particularly for B2B e-commerce adoption. In the sense of absenteeism of innovativeness and SMEs who are hesitant to acknowledge new technologies, technology adoption of any sort will fail. Subsequently, innovativeness assumes a predominant part in technologies adoption studies. Aside from the factors of organisational antecedents, perceived risk is considered a significant factor in technology adoption research. Perceived risk is known as trust in past research (Arshad et al., 2018). Although there is absence of studies that analyse the effects of perceived risk in B2B e-commerce adoption, various studies have examined this sort of relationship in other technology adoption-based studies (Kaabachi and Obeid, 2016; Raut et al., 2018; Al Khater et al., 2018; Ali et al., 2015; Loukis et al., 2017; Schneider and Sunyaev, 2016).

Past researchers inspected a number of antecedents as B2B e-commerce adoption variables under the TOE framework and environmental context (Mohtaramzadeh et al., 2018; Ocloo et al., 2018; Alsaad et al., 2017, 2018; Lim et al., 2017; Ismail et al., 2017; Ahmad et al., 2015). All research findings were consistent for competitive pressure, except for Ahmad et al. (2015), and trading partner pressure accomplished comparable reports from similar authors. Krell et al. (2016) indicated that the competitive pressure factor is known as normative pressure, while trading partner pressure is known as mimetic pressure. This pressure does uphold in institutional theory.

Since the majority of the researchers have studied determinants, such as relative advantage, compatibility, and complexity on the B2B e-commerce adoption, this examination likewise expects to utilise these three antecedents under technological context. Nonetheless, for the organisational context, the antecedents included top management support, technology readiness, perceived risk, and innovativeness. The effect of environmental context on B2B e-commerce adoption utilised normative and mimetic pressures. Subsequently, these three contexts proposed for TOE structure will be explored further in the following subtopics.

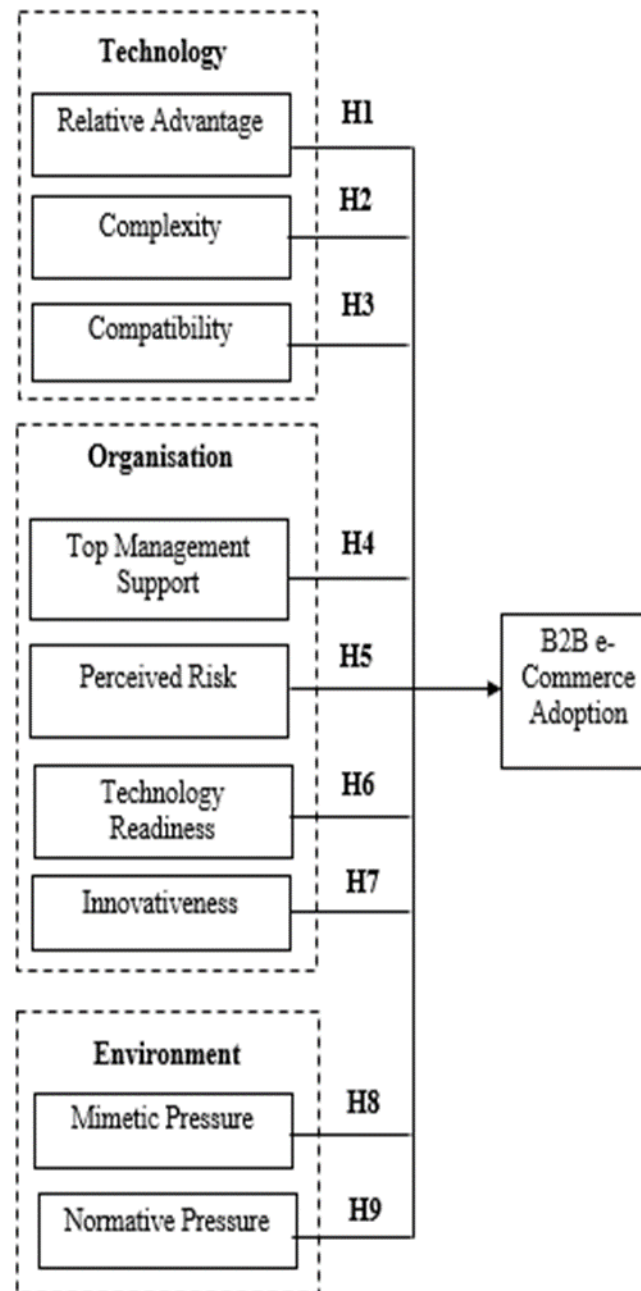


Figure 1: Research Framework

6.1 Technological Factors and B2B E-Commerce Adoption

Relative Advantage

The characteristic of relative advantage is how new technology adoption prompts benefit to the firm whenever contrasted and their present technology practices (Roger, 1995). At any point when the organisation understands that B2B e-commerce can profit them and fulfill their necessities, they will adopt it (Alsaad et al., 2017). E-commerce adoption gives a relative advantage to the organisations to enhance turnover, improve consumer loyalty, and improve attractiveness (Oluyinka et al., 2014; Poorangi et al.,

2013; Rahayu and Day, 2015; Kit and Mun, 2020; Maryani et al., 2020; Oktora et al., 2020; Effendi et al., 2020). Aside from that, the business considers new technology; for example, B2B e-commerce that forms their certainty on improving the firm's performance (Alsaad et al., 2018). According to Ocloo et al. (2018), manufacturing SMEs knew that B2B e-commerce adoption could profit the company when acknowledging technology progression, and relative advantage would consistently be factors for B2B e-commerce adoption. Strangely, Mohtramzadeh et al. (2017) tracked down that the overall benefit did not influence B2B e-commerce adoption, although it could speed up the business performance and improve authoritative execution. Therefore, the examination speculated that:

H1: Relative advantage has a positive effect on B2B e-commerce adoption.

Complexity

Roger (1995) characterised complexity as the level of difficulty to adopt new technology. The technology highlights were exceptionally best in class and required a true master in the field. According to Alsaad et al. (2017), Teo et al. (2003), Oktora et al. (2020), and Effendi et al. (2020), B2B e-commerce adoption could flop if the individual in control discovered that it was difficult to apply and learn. Complexity does not affect B2B e-commerce adoption and has continually exhibited a negative relationship (Alsaad et al., 2018). The companies did not discover any difficulty on B2B e-commerce adoption since they understood the advantages of adopting the technology. In any case, Ocloo et al. (2018) tracked down that immaterial impact existed among complexity and B2B e-commerce adoption among the SMEs manufacturing. Besides that, numerous previous examinations had tracked down a negative relationship between complexity and B2B e-commerce adoption (Le et al., 2012; Maryeni et al., 2014). Therefore, the examination hypothesised that:

H2: Complexity has a negative effect on B2B e-commerce adoption.

Compatibility

The compatibility characteristics select new technology that meets the organisation's regular activities (Roger, 1995). As indicated by Alsaad et al. (2017) and Choshin and Ghaffari (2017), compatibility additionally alluded to the arrangement between experience and existing technologies in the organisations. On B2B e-commerce adoption, the company could resolve any issues ensured in the past by receiving this technology. The companies' compatibility on B2B e-commerce adoption is vital when it includes technological advancement. Besides, the adopted technology should satisfy the companies' objectives and routine activities. Numerous previous researchers had tracked down a positive effect on B2B e-commerce adoption and utilisation among SMEs (Ahmad et al., 2015; Aziz and Jamali, 2013; Maryani, et al., 2020; Oktora et al., 2020; Effendi et al., 2020). Therefore, the investigation estimated that:

H3: Compatibility has a positive effect on B2B e-commerce adoption.

6.2 Organisational Factors and B2B E-Commerce Adoption

Top Management Support

Top management support alludes to the level of consideration by the organisation's authority on the significance and advantages of technology adoption and support to the organisational system later on (Hwang and Schmidt, 2011; Jitpaiboon et al., 2010; Yoon and George, 2013; Maryani et al., 2020; Oktora et al., 2020; Effendi et al., 2020). Alsaad et al. (2018) indicated that top management support was pivotal for B2B e-commerce adoption in organisations. In SMEs, the owners and managers are considered top management, and they are the decision-makers for B2B e-commerce adoption, as well as considering

factors like expenses, resource constraints, and IT systems. The supervisors of the organisations can likewise inspire and urge representatives to receive technology (Alsaad et al., 2018). Mohtaramzadeh et al. (2017) tracked down that the top management support to adopt B2B e-commerce was entirely reliant upon top management choice since they were the decision makers. This finding was similar to Al-Somali et al. (2011), Ramdani et al. (2013), Ghobakloo et al. (2011), Ifinedo (2011), Al-Qirim (2007), Sila and Dobni (2012), Thatcher et al. (2006), and Ocloo et al. (2018). Therefore, the investigation hypothesised that:

H4: Top management support has a positive effect on B2B e-commerce adoption.

Perceived Risk

Perceived risk alludes to organisation's insight on the haphazard that may have incurred by adopting new technology (Kaabachi and Obied, 2016; Maryani et al., 2020; Oktora et al., 2020). However, perceived risk does not impact technology adoption. In fact, they were proven to have a negative relationship in a study conducted by Kaabachi and Obied (2016). Many organisations had adopted B2B e-commerce, such as web utilisation, internet banking, and online supply chain. By executing B2B e-commerce, online sellers can direct business activities. For the manufacturing SMEs, B2B e-commerce adoption is not new. Not many past researchers have additionally tracked down that perceived risk has a negative impact on e-commerce adoption in business (Gerrard and Cunningham, 2003). Subsequently, the investigation estimated that:

H5: Perceived risk has a negative effect on B2B e-commerce adoption.

Technology Readiness

Technology readiness status alludes to the degree of organisations resources set up and preparedness to adopt new technologies (Makame et al., 2014; Kit and Mun, 2020). Organisations invest resources into advanced technology to develop, acclimatise, and interface IT into their business activity (Grandon and Pearson, 2004; Ifinedo, 2012). Musawa and Wahab (2012) indicated that financial resource assumed a prevailing part to adopt B2B e-commerce into the organisations. B2B e-commerce adoption needs advanced technology features, like site utilisation and observation systems. Therefore, the organisations should be well-prepared to contribute to this technology. Technology readiness needs the employees to change their attitudes, learn, and adjust to better business activity approaches to improve their training level (Lee et al., 2012). Besides, this new change could improve the business performance. Therefore, the investigation hypothesised that:

H6: Technology readiness has a positive effect on B2B e-commerce adoption.

Innovativeness

Innovativeness alludes to the selection of advancement or new technology before another competitor in a similar industry (Roger and Shoemaker, 1971; Alshamaila and Papagiannidis, 2012; Kurniawati et al., 2020). According to Lee (2004), firms' innovativeness impacted B2B e-commerce adoption instead of top management support. As clarified before, since B2B e-commerce adoption includes some advanced technology highlights, such as website usage, internet banking, online queries, and transactions, firms should be creative rather than constantly doing things. Besides, firms should comprehend that their clients and suppliers have effectively adopted B2B e-commerce, and they need to follow the trend to keep up with their norms. In SMEs, the owners' choice to advance the business activity leads to the firm's achievement and improves the organisation's performance, and B2B e-commerce positively impacts innovative decision making (Al-Qirim, 2007). Thong and Yap (1995) and Ghobakhloo et al. (2011) had also tracked down that the owners' choice to improve the business cycle consistently helped smoothen IT adoption in the organisations. Therefore, the investigation hypothesised that:

H7: Innovativeness has a positive effect on B2B e-commerce adoption.

6.3 Environmental Factors and B2B E-Commerce Adoption

Mimetic Pressure

Mimetic pressure factor alludes to behavioural organisations that are less assured with their own decision, and they will, in general, impersonate effective organisations conduct to improve the company's performance (Krell et al., 2016; Oktora et al., 2020). To keep up with competitiveness in the business environment, organisations made mimetic actions. In B2B e-commerce adoption, companies need to compete enough to attract their clients and sellers. If they refuse to do so, the competitors will take advantage, thus mirroring effective organisations' activity is mandatory. Oliveira and Martins (2011), Pang and Jang (2008), Gibbs and Kraemer (2003), Awa, Ukoha, and Emecheta (2016), and Awa et al. (2017) suggested that organisations imitate effective and successful activity in the technology adoption territory. Some organisations copy another decisive patent if both are close and sharing stakeholders (Coffey et al., 2013). Notwithstanding, Krell et al. (2016) suggested that organisations copy critical thinking methods on technology adoption from influential firms. Therefore, the investigation estimated that:

H8: Mimetic pressure has a positive effect on B2B e-commerce adoption.

Normative Pressure

Normative pressure alludes to a norm or common pressure factor from expert and industry affiliations (Krell et al., 2016; Oktora et al., 2020). The authority does not implement this pressure factor and thus companies do not have to follow it. As indicated by Deng and Ji (2015), normative pressure will be set up at any point in organisations whereby they will have to re-collaborate with their trading partner and supplier. When the organisation's partner and supplier effectively use B2B e-commerce in daily business tasks, there is a high tendency to adopt B2B e-commerce. Deephouse (1996), Landsbergen and Wolken (2002), Akbulut (2002), and Krell et al. (2016) affirmed that normative pressure impacts technology adoption in organisations. Therefore, the examination estimated that:

H9: Normative pressure has a positive effect on B2B e-commerce adoption.

7. Research Methodology

7.1 Sample and Data Collection

The target respondents for this study covered all manufacturing SMEs in Malaysia. The SMEs population that enrolled into the Small and Medium Enterprises Corporation Malaysia (SME Corp. Malaysia) for 2018/2019 was 907,065 in various areas, such as services, manufacturing, development, farming, mining, and quarrying. Out of this number, 5.3% businesses were registered as manufacturing SMEs—roughly 48,074 organisations. Since the result was excessively enormous, the study utilised Krejcie and Morgan's (1970) sampling method. A minimum sample size of 381 organisations were selected out of the 48,074 enlisted manufacturing SMEs. Since this study deployed an online survey method for data collection, the online data collection was circulated to the example size, increased by four times to confirm an adequate number of samples (Nulty, 2008). Accordingly, 381 manufacturing SMEs were increased by four times and thus equalled to 1,524. Next, the unit of analysis of this study was organisations, which alluded to manufacturing SMEs in Malaysia. The targeted respondents who addressed the overview were owners, managers, and senior managers from manufacturing SMEs. The criteria to select respondents were: anyone who held administrative/dynamic positions, strategy developers, investment planners for their organisations,, and involved in IT.

The manufacturing SMEs were a prominent contributor to B2B e-commerce and thus were selected in this study. Manufacturing SMEs were effectively associated with B2B e-commerce adoption (Ocloo et al., 2018; Mohtaramzadeh et al., 2018). The purposive sampling method decides the sample that meets the criteria and falls into this category (Singh, 2006). Only the SMEs that adopt B2B e-commerce were considered for further analysis. The SMEs were chosen based on their number of employees and business turnover. The data from the FMM directory portrayed the general manufacturing organisations enlisted in Malaysia and from small to large-scale organisations. SMEs have their characteristics, like the number of employees and turnover; these turned into the selection criteria for respondents. The purposive sampling strategy was reasonable since this examination forced precise requirements and emphasis to control and draw the sample for the investigation (Singh, 2006).

7.2 Measurement Development

There were eleven questions that best depicted the background of their organisations. The respondents were asked a question on timeline-based adoption. Then, the respondents were asked a question on the B2B e-commerce adoption phase which was presently engaged with their organisations. The respondents were required to address an inquiry on the number of years their organisations have adopted B2B e-commerce.

There were seven questions on B2B e-commerce adoption. The degree of adoption of B2B e-commerce estimated these questions. The questions used a five-point Likert scale with classifications: (1) not at all, (2) to some extent, (3) to a moderate extent, (4) to a great extent, and (5) to a very great extent. The nine constructs measuring the antecedents of B2B e-commerce adoption were: relative advantage, complexity, compatibility, top management support, technology readiness, perceived risk, innovativeness, normative pressure, and mimetic pressure. The operationalised construct utilised a five-point Likert scale with classifications: (1) strongly disagree, (2) disagree, (3) neither agree nor disagree, (4) agree, and (5) strongly agree. However, normative pressure measured the limit of B2B e-commerce that reflected their organisations using a five-point Likert scale with classifications: (1) not at all, (2) low, (3) moderate, (4) high, and (5) very high. Table 2 shows the summary of measurement items.

Table 2: Summary of Measurement Items

Constructs	No/ Items	Source
B2B E-Commerce Adoption	7	Gibbs and Kraemer (2003); Popa et al., (2016)
Relative advantage	5	Premkumar and Roberts (1999)
Complexity	5	Lian, Yen and Wang, (2013)
Compatibility	3	Lian et al., (2013)
Top Management Support	5	Mothramzadeh et al., (2018)
Technology Readiness	5	Tan et al., (2007)
Perceived Risk	5	Benlian and Hess (2011)
Innovativeness	4	Mothramzadeh et al., (2018)
Normative Pressure	4	Krell et al., (2016)
Mimetic Pressure	4	Krell et al., (2016)

7.3 Survey Administration

The online link to the questionnaire was emailed to the respondents. The respondents' email addresses were obtained through the 49th edition of the FMM Directory of Malaysian Industries. Follow ups with respondents who did not respond to the online survey invitation were carried out through email and phone calls. A filter question approach was used to determine their B2B e-commerce adoption status. The respondents had to indicate their B2B e-commerce adoption level before they can continue to participate in

this study. Notwithstanding, respondents who demonstrated that they did not use B2B e-commerce were considered non-adopters and excluded from this study.

7.4 Data Analysis Method

Gathered data were analysed using Statistical Package for Social Sciences (SPSS) and Smart-Partial Least Squares (SmartPLS) software package. Most of the studies in IT adoption, e-commerce, and B2B e-commerce utilised structural models with statistical software, like Smart-PLS (Alraujo and Zilber, 2016; Ahmed et al., 2016; Ramanathan and Krishnan, 2015; Ramdani et al., 2013; Chandra and Kumar, 2018; Mohtaramzadeh et al., 2018; Quaddus and Hofmeyer, 2017; Alsaad et al., 2018; Hu et al., 2019). There are two elements in data analysis, which are the descriptive and inferential statistics. All items underwent convergent and discriminant validity assessments to fulfill the requirements. Both of these measurements fall under confirmatory factor analysis (CFA) to check the validity and reliability of the items as indicated by the construct. Convergent validity examined factor loadings and average variance extracted (AVE). Meanwhile, for the discriminant validity, the study utilised the Fornell-Larcker criterion, cross loadings, and heterotrait-monotrait ratio of correlations (HTMT). Hypothesis testing was directed by evaluating the structural model.

8. Results

8.1 Demographic

The survey data gathering required about two and half months, and the collection process began in December 2019 and completed towards the end of February 2020. The study gathered an aggregate of 268 responses and this recognised a response rate of 17.6%. However, among the 268 responses, only 193 were considered valid responses, as the 71 excess respondents had not adopted any B2B e-commerce. Therefore, the respondents' adoption rate for B2B e-commerce was 72%, as shown in Table 3. Table 4 indicates the demographic information, while Table 5 shows the B2B e-commerce adoption stages.

Table 3: Summary of Respondents

Questionnaire distributed	Responded	Questionnaire Response Rate
1,524	268	17.6%

B2B e-Commerce Adopter	B2B e-Commerce Adoption Rate
193	72%

Table 4: Demographic Information

Demographic Items	Categories	Frequency	Percentage (%)	Mean	Standard Deviation
Nature of Business	Chemical and Petrochemical Products	11	5.7		
	Electrical & Electronics Inc.	17	8.8		
	Telecommunications				

	Food & Beverages	52	26.9	
	Machinery Engineering	14	7.3	
	Manufacturing Related Services	18	9.3	
	Pharmaceutical Products	16	8.3	
	Supporting Products & Activities	15	7.8	
	Logistics	17	8.8	
	Manufacturing Professionals, Medical, Scientific and Measuring Device/ Part	12	6.2	
	Metal Products	12	6.2	
	Non-Metallic Mineral Products	9	4.7	
Business Tenure			4.9	2.1
Number Employee			24.3	12.7
Sales Turnover	RM300,000 to RM1 million	24	12.4	
	RM2 million – RM10 million	50	25.9	
	RM11 million – RM20 million	65	33.7	
	RM21 million – RM30 million	34	17.6	
	RM31 million – RM40 million	15	7.8	
	RM41 million – RM50 million	5	2.6	
Business Branch	1	120	62.2	
	2	54	28.0	
	3	19	9.8	
Information Technology Department / Function	In –House	148	76.7	
	Outsource	45	23.3	

Demographic Variables	Description	Count	Percentage
Gender	Male	95	49.2
	Female	98	50.8
Age	21 – 30	58	30.1
	31 – 40	76	39.4
	41 – 50	34	17.6
	51 – 60	16	8.3
	> 60 above	9	4.6
Year in Business	1	29	15.0
	2	80	41.5
	3	49	25.4
	4	25	13.0
	5	10	5.2
Your Position	Owner	67	34.7
	Senior Manager	84	43.5
	Manager	42	21.8
Education Level	High School and Below	46	23.8
	Certificate / Diploma	126	65.3
	Bachelor Degree	21	10.9

Table 5: B2B E-Commerce Adoption Stages

Variables	Description	Count	Percentage
Stage of B2B e-Commerce adoption	<i>Adoption in progress (e.g. in pilot study)</i>	19	9.8%
	<i>Just adopted</i>	76	39.4%
	<i>Partially adopted</i>	77	39.9%
	<i>Have already adopted</i>	21	10.9%
Years using B2B e-Commerce	< 1 year	22	11.4%
	1 - 2 years	75	38.9%
	3 - 5 years	96	49.7%

8.2 Measurement Model

Reliability and validity are significant components of the structural model. Validity alludes to the examination results that imitate real situations (Saunders et al., 2009). Besides, the collected data need to meet the requirement of convergent validity to evaluate the measurement model. Amin et al. (2016) indicated that convergent validity alluded to more than one item of similar constructs that correlate to each other.

There are some components to measure convergent validity. The details are outer loadings, composite reliability (CR), and average variance extracted (AVE) (Hair et al., 2014). Hair et al. (2014) indicated that the rule of thumb for outer loading was above 0.708. CR value should be above 0.7 to confirm scales and the AVE values should be more than 0.5 to demonstrate the value of convergent validity (Hair et al., 2014). The variance inflator factor (VIF) showed the construct multicollinearity of below 5.0 (Hair et al., 2017), as stated in Table 6.

Table 6: Convergent Validity

Constructs	No/ Items	CR	AVE	VIF
B2B E-Commerce Adoption	7	0.961	0.803	
Relative advantage	5	0.949	0.903	3.645
Complexity	5	0.943	0.846	3.593
Compatibility	3	0.855	0.664	2.692
Top Management Support	5	0.930	0.815	3.596
Technology Readiness	5	0.943	0.845	3.076
Perceived Risk	5	0.814	0.529	2.762
Innovativeness	4	0.895	0.740	2.264
Normative Pressure	4	0.874	0.634	3.099
Mimetic Pressure	4	0.907	0.766	3.279

Nevertheless, the Fornell-Larcker measures might not distinguish the shortfall of discriminant validity. Therefore, HTMT ratio of correlation approach was proposed by Hensler et al. (2015). The HTMT was grounded by multitrait-multimethod matrix to evaluate the discriminant validity. The maximum value of HTMT should be below 0.85 (Kline, 2014) and 0.90 (Gold et al., 2001). Table 7 shows the discriminant validity for all constructs utilising the HTMT rule that had a value of below 0.90. Consequently, this fulfilled the discriminant validity requirement.

Table 7: Heterotrait-Monotrait Validity

	B2B	CM	CX	IN	MP	NP	PR	RA	TM	T R
Business to Business e-commerce adoption (B2B)	0.87									
Compatibility (CM)	3	0.88	0.80							
Complexity (CX)	1	5								
Innovativeness (IN)	0.63	0.60	0.65							
Mimetic Pressure (MP)	7	1	5							
Normative Pressure (NP)	0.76	0.81	0.81	0.81						
Perceived Risk (PR)	7	0	0	0						
Relative Advantage (RA)	0.82	0.77	0.82	0.79	0.84					
Top Management Support (TM)	0	1	2	4	8					
Technology Readiness (TR)	0.69	0.56	0.56	0.67	0.68	0.63				
	3	3	4	4	4	2				
	0.89	0.80	0.87	0.68	0.81	0.82	0.71			
	9	9	6	5	5	6	6			
	0.82	0.80	0.83	0.74	0.85	0.87	0.62	0.82		
	6	8	9	5	9	2	8	0		
	0.73	0.70	0.59	0.62	0.67	0.66	0.89	0.64	0.67	
	5	8	1	5	2	6	6	9	2	

8.3 Structural Model: Hypotheses Testing

After testing the model's strength, it should resolve the t-values and significance level for the model. Hair et al. (2014) indicated that a general guideline for t-values was 1.65 at 10% significance level, 1.96 at 5% significance level, and 2.58 at 1% significance level. This significance level is for a two-tailed test. The study was testing for one-way hypotheses in which the significant value was divided by two and the t-value remained. Figure 2 shows the SmartPLS algorithm results with path coefficient (standard beta) and the t-values of the structural model. Therefore, Hair et al. (2014), hypotheses having t-values of above 1.65 were supported. Table 8 outlines the hypotheses testings.

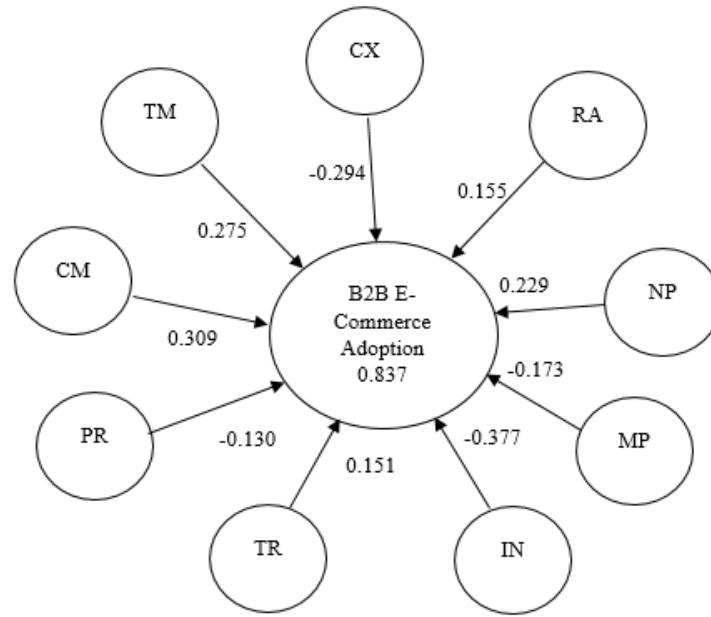


Figure 2: PLS Algorithm Value

Table 8: Hypotheses Testing

Hypothesis	Relationship	Path Coeff. (β)	Std Error	t-value	p-value	Decision
H1	Relative Advantage -> B2B e-Commerce Adoption	0.296	0.068	4.358	0.000	Supported
H2	Complexity -> B2B e-Commerce Adoption	-0.291	0.057	5.103	0.000	Supported
H3	Compatibility -> B2B e-Commerce Adoption	0.198	0.057	3.486	0.000	Supported
H4	Top Management Support -> B2B e-Commerce Adoption	0.083	0.071	1.168	0.122	Not Supported
H5	Perceived Risk -> B2B e-Commerce Adoption	-0.054	0.050	1.086	0.139	Not Supported
H6	Technology Readiness -> B2B e-Commerce Adoption	0.167	0.057	2.918	0.002	Supported
H7	Innovativeness -> B2B e-Commerce Adoption	-0.049	0.050	0.987	0.162	Not Supported
H8	Mimetic Pressure -> B2B e-Commerce Adoption	-0.080	0.065	1.227	0.110	Not Supported
H9	Normative Pressure -> B2B e-Commerce Adoption	0.084	0.060	1.408	0.080	Not Supported

*p-values 0.05

9. Discussion

The study found relative advantage from the technological context to affect B2B e-commerce adoption significantly, and the findings were similar to previous studies (Oluyinka et al., 2014; Poorangi et al., 2013; Rahayu and Day, 2015; Alsaad et al., 2018; Ocloo et al., 2018). The adoption of B2B e-commerce had given advantages to the manufacturing SMEs and made their businesses different from others. Adopting new technology; for example, B2B e-commerce, empowers SMEs to keep up great connections with their partners, particularly the vendors (Tan et al., 2008). Besides, vendors and suppliers who were accustomed to utilising e-commerce in their business operations might consistently upgrade their technology abilities. For instance, a decade ago they used fundamental internet features; for example, email which was later updated to internet business and B2B e-commerce. Henceforth, they also enjoy dealing with any of their accomplices in a similar stream. Subsequently, manufacturing SMEs should receive B2B e-commerce and get this chance to create a competitive advantage to proceed with bolt and keep their stakeholders from changing to various competitive advantages.

When organisations understand that B2B e-commerce benefits their company, they will choose to adopt it (Alsaad et al., 2017). The adoption of B2B e-commerce gives an overall benefit to the organisations by enhancing the company's profit, production expansion, expanding consumers' satisfaction, and improving competitiveness (Oluyinka et al., 2014; Poorangi et al., 2013; Rahayu and Day, 2015). This study demonstrated that B2B e-commerce adoption assisted their company by expanding the benefit, and the findings were also similar with the study conducted by Oluyinka et al. (2014) and Poorangi et al. (2013). Manufacturing SMEs need to acquire their supplies from their vendors or provide supplies to produce final items. SMEs which have their own website could advertise the items via the medium. Subsequently, their clients or vendors could recognise the items offered by the organisations. Superfluous costs; for example, calls or making a trip to visit, could be avoided to improve profits.

The respondents in this study demonstrated good time management skills by adopting B2B e-commerce into their business. The customers virtually visited the vendor's warehouse through the website and made their purchase. Some other companies could undoubtedly review the organisations' websites to continue with business activities. Likewise, they could utilise online tools to make payments, which helped the customer's paying strategy. Since most of the owners and managers in this study were under the age of 40, they were considered the IT proficient younger generation. Subsequently, they like to partake in e-commerce transactions. B2B e-commerce adoption clarified the construct of certainty of enhancement for company execution (Alsaad et al., 2018). The organisations were confident after the latest improvement; for example, the Industry Revolution (IR) 4.0 requirements. If the organisations do not cling to the IR 4.0 requirement, they will become outdated, thus giving away their competitive advantages to their competitors. The impact of relative advantage on B2B e-commerce adoption among manufacturing SMEs was recognised. Relative advantage positively affected the adoption of B2B e-commerce among SMEs in Malaysia.

The study found complexity from the technological context to have a non-significant impact on B2B e-commerce adoption and this outcome was similar to previous research findings (Le et al., 2012; Maryeni et al., 2014). Complexity was not an issue in the adoption of B2B e-commerce among manufacturing SMEs in Malaysia. Most SMEs owners and managers were under 40 years old and had sufficient technical knowledge and abilities. Besides, 76.7% of SMEs had an in-house IT division. Therefore, this demonstrated that SMEs were concerned about the significance of technology and shaping their own IT division. The IT division in the organisation is valuable for IT professional to tackle any specialised issues. A few organisations that were battling advancement issues had re-evaluated, thus increased their expenditure. It is prudent to have their own IT department since the IT department can undoubtedly comprehend business and tailor any headway in advances, steady with the business needs. The IT department could inform on the advantage concerning B2B e-commerce to owners or managers and thus the degree of adoption will be higher.

In this new computerised world, e-commerce is exceptionally typical, and SME owners or managers did not face any difficulty in adopting it (Duckworth, 2014; Walfall, 2014; Tan et al., 2008). In correlation with the highlights of IR 4.0, which is considerably more advanced, B2B e-commerce is standard and straightforward to execute. Some SMEs managed deals globally and were associated with import and export. For this situation, B2B e-commerce helpful to the organisations. The online application makes the business transaction easy and smooth. On the other hand, regarding the respondents' gender, there was no significant contrast between male and female owners or managers, although the number of female was marginally higher. The study tracked down that the respondents did not confront with any challenges to learn B2B e-commerce. Since majority of the respondents for this study were in top management positions, learning the B2B e-commerce was simple for them, thus the chance to adopt was higher. Fundamentally, if the owners or managers find it challenging to assume, that may influence the adoption decisions. The readiness to learn attributes among owners or managers was a welcomed sign for SMEs. The study found that the SMEs faced no difficulties in moving existing B2B e-commerce. The previous designs that they had utilised were not very different from B2B e-commerce, effectively moving or coordinating into B2B e-commerce. Complexity from the technological context had a significant negative effect on B2B e-commerce adoption in the Malaysian manufacturing SMEs.

Compatibility from the technological context affected B2B e-commerce adoption significantly, and this outcome was similar to previous investigations (Ahmad et al., 2015; Aziz and Jamali, 2013). The current technology of manufacturing SME devices or frameworks that tailored with B2B e-commerce adoption had prevented from any resource wastage (Tan et al., 2008). Some technology tools were costly and required a fundamental analysis (Ismaili et al., 2016). Since SMEs do not establish financial resources to contribute to, an investigation that assist with deciding the advantage stream to the organisations was carried out by adopting B2B e-commerce. The adopted technology should meet the business critical and objectives. If there is a differentiation, the investment in B2B e-commerce will not make any competitive advantage. In this study, most respondents concurred that B2B e-commerce adoption was consistent with the goal and objectives of their company. In manufacturing SMEs, all finished goods are stored in warehouses. Typically, the warehouse utilised a technology system to decide on inflow, outflow, and stocks balance. The adopted B2B e-commerce stage figured out how to coordinate with the warehouse systems since it is profoundly viable. In the latter part, at any point, their trading partner accomplice might want to make a request dependent on the site created by the company.

In this study, nearly 72% of manufacturing SMEs had effectively adopted B2B e-commerce. The organisation's previous IT frameworks had handily incorporated B2B e-commerce adoption. This incorporation met the prerequisite and helped to accomplish the organisation's key objectives, and consequently this will prompt a performance improvement. Besides that, the B2B e-commerce is effortlessly coordinated with cell phones and tablets since B2B e-commerce utilised little progression and incomplex instruments. Since Malaysia has a high entrance of cell phones and tablets, the SMEs owners or managers believe that it is simple to utilise B2B e-commerce. In other words, B2B e-commerce is suitable for to the current workspace and living style. Henceforth, B2B e-commerce adoption was feasible with the organisation's contemporary acts. Compatibility from the technological context positively affected B2B e-commerce adoption among SMEs in Malaysia.

The study found that top management support had a non-significant effect on B2B e-commerce adoption among manufacturing SMEs in Malaysia. The finding was similar to previous research (Awa et al., 2016, 2017). Support was not the only required from the top management, but the top management should also have information and experience on any new technology chosen to be adopted. In this unique situation, the top management of Malaysian manufacturing SMEs needs to have knowledge and expertise on B2B e-commerce technology before adopting it. Top management support does not assume a prevailing part on B2B e-commerce adoption into SMEs since owners or managers address the top management of the

organisations. Owners of SMEs contributed the capital and decided on the technological application to be adopted before being carried out into the business tasks (Alshamaila and Papagiannidis, 2013).

Occasionally, the owners or managers did not have adequate IT information and required help from the IT assistant. The study also discovered that they did not wholly supported the B2B e-commerce adoption. However, eventually the IT assistant exhorted the owner or manager on the best IT devices that should be contributed and benefitted by the organisations. For this situation, the IT specialists assume an aberrant part as an ally for technology adoption, particularly B2B e-commerce adoption (Olufemi, 2018). Nonetheless, if this fizzles, owners or managers limit the IT assistant to be autonomous while giving guidance, thus the dynamic force falls on the owners or managers.

According to Chandra and Kumar (2018), top management support was similarly essential to offer ceaseless help on technology adoption. In any case, it is imperative to note that not all top management provide full support for the adoption of new technologies. Any top management that needs enthusiasm and development may not generally invite any new technologies, especially B2B e-commerce adoption, as they are not prepared to bear any risk that may take place. Albeit, top management support is essential for new technology adoption towards manufacturing SMEs, as it is fundamental to company's performance (Ramdani et al., 2013). Notwithstanding, top management that works under five representatives are not mindful of the significance of B2B e-commerce adoption and their commitment towards IR 4.0. The IR 4.0 underlines advanced technology execution into business organisations. Henceforth, top management support assumes a significant part in making this plan effective. At some point, there were some financial compels for SMEs to adopt advanced technology; for example, B2B e-commerce of which the management generally chose not to adopt into their business organisations. Simultaneously, they refused to understand that this choice consistently benefitted the organisations to improve performance. The organisations did not favour with the fact that technology adoption takes a long time, even though it has immediate impact advantage.

As indicated by Awa et al. (2016, 2017), the top management needs to see the value in the uniqueness of advanced technology to assemble a competitive advantage. The top management is not responsible for operating the organisation and leading the heads of the organisations. The top management has to acquire more knowledge on technology adoption instead of relying upon IT division or experts. The top management did not offer their support to adopt B2B e-commerce and they did not urge their subordinates to comprehend. Moreover, top management from the hierarchical setting had insignificant impact on B2B e-commerce adoption in the Malaysian manufacturing SMEs.

The study found that the hypothesis on perceived risk had a non-significant impact on B2B e-commerce adoption among the Malaysian manufacturing SMEs. This outcome was similar to the study by Oliveira et al. (2011), Kaabachi and Obied (2016), and Gerrard and Cunningham (2003). B2B e-commerce is slightly exceptional with e-commerce and is a transaction between one business to another. Since SMEs and the majority of the organisations know about e-commerce, B2B e-commerce selection should not be an issue and risk highlights should not exist.

In light of the review result, most respondents demonstrated that perceived risk did not affect their choice to adopt B2B e-commerce into their business organisations. The SMEs owners and directors understood the significance and advantage of the adoption. Consequently, the risk or security concern was not an issue for them. B2B e-commerce adoption focused on business management on the website whereby trust among them assumed the central part (Kaabachi and Obied, 2016). Risk takes place when there is no trust between colleagues and no certainty to manage the deals online. The perceived risk from the organisational context negatively affected B2B e-commerce adoption in the Malaysian manufacturing SMEs. This consistently enhanced the organisations in making a competitive advantage.

Technology readiness from an organisational context significantly affected B2B e-commerce adoption among the Malaysian manufacturing SMEs. It was similar to previous findings (Grandon and Pearson; 2004; Ifinedo, 2012; Musawa and Wahab, 2012). To ensure that the B2B e-commerce adoption was fruitful, the organisation's availability on readiness was essential. Elements that impacted technology readiness were financial and knowledge. Both components were similarly significant and restricted. Any organisation with no financial compel generally influenced the company's performance by paying little attention to the degree of IT knowledge. Higher technology readiness decided on the degree of technology adoption for their organisations (Marques et al., 2011). The organisations should be prepared to execute the IR 4.0 highlights for their organisations.

In B2B e-commerce adoption, technical resources, such as interactive websites, transactive websites, and incorporated websites are significant highlights that should be included (Sila, 2013). When a trading partner chooses to have a business cooperation, they will examine the vendor's website. From there, the trading partner recognises the strength and capacities of B2B e-commerce of their partner. When an organisation chooses to utilise those resources, its IT experience becomes significant (Ramdani et al., 2013). Albeit, the organisation had solid financial support to put resources into technical or complex new technology. In this study, the utilisation of technical resources; for example, network-based applications, web availability, and the capacity of current systems to coordinate with B2B e-commerce adoption were chosen by the respondents. In addition, 72% of respondents from the manufacturing SMEs expressed that they had effectively adopted B2B e-commerce. It showed that SMEs had both the technical and financial resources for the adoption virtually. The Malaysian Communications and Multimedia Commission (MCMC) had targetted 95% of Internet utilisation in Malaysia, however, at present, it had reached only 81%. Once more, this negated the IR 4.0 goal since the Internet usage in Malaysia was still below the target. However, Internet connectivity to most parts of the nation was given a need over the speed by the Malaysian government to overcome the crisis (Malay Mail Online, 2016).

B2B e-commerce adoption needs progressed highlights technology, like website utilisation and monitoring systems. Therefore, organisations should be prepared for this technology and invest in it. Technology readiness requires employees to change their attitudes in order for them to learn and adapt to better approaches to improve the business activity and training level (Le et al., 2012). Therefore, technology readiness from the organisational context positively affected B2B e-commerce adoption in the Malaysian manufacturing SMEs.

The study found that innovativeness had a non-critical impact on B2B e-commerce adoption among the Malaysian manufacturing SMEs. This finding was exceptionally remarkable since most previous authors discovered that innovativeness correlated with B2B e-commerce adoption positively. The innovativeness impact was more profound than the top management support on B2B e-commerce adoption (Lee, 2004). Top management support was more significant whenever contrasted with innovativeness since the investment in IT stemmed from the owner's consent. Innovativeness is essentially on the close personal attribute of owners or managers, who might not have these attributes since they rely upon the IT division or IT experts. In these circumstances, innovativeness portrays more effect on the organisation's IT experts whereby it serves as counsel to the top management. Subsequently, development straightforwardly impacted the top management to receive B2B e-commerce.

The target of organisations in adopting B2B e-commerce is improving business performance regardless of their innovativeness. As clarified before, since their trading partner had executed e-commerce for their business activities, the SMEs owners likewise had chosen to adopt B2B e-commerce to acquire a competitive advantage as well as challenge competitors. Although Thong and Yap (1995) and Ghobakhloo et al. (2011) tracked down that the owners' choice to innovate the business cycle consistently helped smoothen IT adoption, the organisation had not empowered such decisions. First and foremost, financial obliged the appropriation even though the owners of SMEs had solid and innovative characteristics. For

instance, the SMEs may outsource the specialist to carry out e-commerce and buy a particular software or submit a drawn-out agreement colossal cost. Subsequently, the IT information impacts the selection choices instead of the innovative characteristics among owners or managers. The owner or manager will understand the advantages of adopting B2B e-commerce if they have a strong B2B e-commerce. Most owners and managers of SMEs do not have an IT foundation and the IT expert prompts all IT-related business ideas to make a difference. Consequently, these constraints not only impacted innovation characteristics, but also B2B e-commerce adoption choices. Therefore, innovativeness from the organisational context negatively affected B2B e-commerce adoption in the Malaysian manufacturing SMEs.

Hypothesis on mimetic pressure factor showed a non-significant impact on B2B e-commerce adoption among the Malaysian manufacturing SMEs. This finding negated previous studies, though a dominant part of studies expressed that mimetic pressure factor impacted B2B e-commerce adoption. Oliveira and Martins (2010) and Pang and Jang (2008) indicated that the fundamental mimic activity was followed by the business players with technology adoption. Since innovation in B2B e-commerce had a negative effect, there was no urgent reason to mimic the business player innovation activities on B2B e-commerce adoption, as many SMEs owners may have multiple attributes and mimic their actions that are not productive to the organisations. The SMEs owners or managers have their own strengths to adopt B2B e-commerce. Before the owners choose to mimic their competitors' activities, they need to examine the similitudes and contrasts between organisations, and each SME may contrast in size, assets, and strength. For instance, one should not assume that small-sized organisations follow the activities of medium-sized organisations because cost influences the performance.

Organisations will follow the primary organisational development, which obtains a satisfactory outcome by carrying out specific advanced technology (Deng and Ji, 2015). Not all organisations will make similar progress as the primary organisations since the primary organisations have effectively existed in the market for a more drawn-out period. The key organisations have to maintain their customers and suppliers. Conversely, the customers and suppliers feel great and they do not expect to change their business partners. For this situation, organisations which intend to follow the activities of primary organisations would fail to ultimately gain profit since they need to track down another incredibly convoluted market. At any point, a vital organisation has effectively consumed the business or market.

Businesses should have a novel worth and differentiate from competitors to achieve a competitive advantage. When a supplier finds that their future business partners are distinctive from existing accomplices, they tend to change their partners. As Krell et al. (2016) expressed, mimetic action assisted in providing a solution since some organisations had already implemented the solutions to their problems. Before the organisations decide to imitate similar solutions as the successful organisations, they need to investigate the similitudes and contrasts of their organisations. Therefore, the impact of mimetic pressure on B2B e-commerce adoption among manufacturing SMEs in Malaysia had been distinguished. Mimetic pressure factor from the environmental context negatively affected B2B e-commerce adoption in the Malaysian manufacturing SMEs.

Normative pressure from the environmental context did not significantly affect B2B e-commerce adoption among the Malaysian manufacturing SMEs and was similar to previous investigations (Awa et al., 2016; 2017). The organisations decided to consent with normative pressure to achieve competitiveness for their business. Since the authority did not authorise the normative pressure, the organisation's consent to demonstrate their professionalism attributed in the industry and they tended to disagree with any normative pressure. It could be explained that it added to normative pressure to not fundamentally sway B2B e-commerce adoption in Malaysian manufacturing SMEs. The business did not attract suppliers' business strategies and did not have a B2B e-commerce adoption. Simultaneously, there is a need not to compete with competitors. In normative pressure, the authority does not have any ability to authorise specific standards in coercive pressing factors (Alziady and Enayah, 2019; Awa et al., 2017) and does not have to

follow all self-acknowledgement conventions. In any case, tolerating or dismissing this normative pressure relies upon individual organisation (Krell et al., 2016). Therefore, normative pressure factors from the environmental context negatively affected B2B e-commerce adoption in the Malaysian manufacturing SMEs.

10. Research Contribution

The investigation had contributed significant implications with technology adoption and information technologies. Under the TOE framework, technological, organisational, and environmental antecedents decide the B2B e-commerce adoption. Perceived risk and innovativeness were the new factors proposed in the organisational context of the TOE framework in this investigation. Most previous analysts who conducted a B2B e-commerce adoption study incorporating the TOE framework did not include perceived risk and innovativeness as the factors. After reviewing previous literature, there is an anomaly to look at the impact on perceived risk and innovativeness towards B2B e-commerce adoption. The primary concern of SMEs to adopt B2B Internet business was not only on trust or security issue which is similar to perceived risk. However, the investigation discoveries demonstrated that perceived risk was not a predecessor towards B2B e-commerce adoption. Aside from that, innovativeness is another interest that may impact B2B e-commerce adoption. Similar to perceived risk, innovativeness did not impact B2B e-commerce adoption. It is an incredible discovery that helps future researchers to exclude the two predecessors when using the TOE framework to investigate the impact of B2B e-commerce adoption.

Subsequently, for the environmental context of TOE structure, two new antecedents, namely mimetic and normative pressures were presented. Most previous research incorporated the TOE framework and B2B e-commerce adoption, utilising existing environmental context; for example, market scope, government support, and client's pressure, but very limited on mimetic and normative pressures. Although these two factors are new in the B2B e-commerce adoption, both normative and mimetic pressures did not impact B2B e-commerce adoption. This finding gave an all-encompassing perspective to the organisations when deciding on B2B e-commerce adoption. Consequently, this investigation provided a commitment to the writing on technology adoption at the environmental level.

11. Limitations

There are a few ideas that accommodated future exploration in a similar examination scope. First and foremost, the investigation merely centred around manufacturing SMEs. Albeit the exploration degree is limited to the manufacturing SMEs to address the issue in Malaysia, the SMEs themselves are more extensive. A similar type of study on other SME sectors, such as service and other industries in Malaysia should be conducted in the future. Moreover, the consequence of the investigation should not be summed up to different nations since it focused on the Malaysian climate. Therefore, there is a geographical limitation that is inappropriate for a heterogeneous context. Nevertheless, future exploration can consider leading a similar example of study to reveal the two constraints by focusing on different areas of SMEs (diverse) and cross-country basis.

The study tracked down that both mimetic and normative factors under the environmental context were not indicators for B2B e-commerce adoption by the Malaysian manufacturing SMEs. There is another factor that could be investigated, and it is known as the coercive pressure factor. It underscores that normative, mimetic, and coercive pressures are in the package of institutional theory. Coercive pressure is a requirement pressure by the position or the authority of the nations. Coercive pressure is excluded in this study to underline that the authority does not fix SMEs by law implementation. Interestingly, the authority consistently supports the SMEs by continuously providing particular incentive. It could give the best explanation that the study did not include coercive pressure in this examination.

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