THE IMPACT OF PERCEIVED CHARACTERISTICS ON TECHNOLOGY ADOPTION AMONG MANUFACTURING SMALL AND MEDIUM ENTERPRISES IN MALAYSIA

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Abstract

Technology adoption among SMEs in Malaysia is a crucial issue, and continuous examination needs to be conducted since SMEs play a dominant role in the nation's gross domestic products (GDP). This study aims to examine the impact of perceived characteristics on technology adoption among manufacturing SMEs in Malaysia. Rogers' diffusion of innovation and resource-based-view theory was used to build the research framework and hypothesis for this study. Among the targeted population of 380 respondents from the manufacturing sector, a total of 153 questionnaires were valid to use. In this study, the SPSS software was used to analyse the collected data. The finding shows that the five perceived characteristics, relative advantage, compatibility, complexity, trialability, and observability, positively impact technology adoption. Observability was the most influential element in technology adoption among the five characteristics. The result of this study provides a greater understanding for firms on the importance of technology adoption. At the end of this study, several recommendations and suggestions for further research are discussed.

Keywords: SME Performance, Relative Advantage, Compatibility, Complexity, Trialability, and Observability

Introduction

Technology is the primary key to drive living standards in the current modern world. The primary purpose of technology is to handle or manage data. Therefore, technology is a practical application in the corporate world. Moreover, technology is an essential tool for quality products and expansion of businesses in the global market. Additionally, the study by Chairoel et al. (2015) explained that an organization's performance is beyond implementation and technology usage. This means that an organization's performance would meet more standards with the use of technology. In the current corporate world, technology is one of the most major elements which is hard to ignore in any business. Technology increases an organization's work quality, especially in Small and Medium Enterprises (SMEs). In most countries, SMEs are the central pillar and contribution to economic growth. SMEs can be defined as a business that gains profit with a minimum number of employees and assets. Although manpower and support are at a minimum level, SMEs have high involvement in Gross Domestic Product (GDP). In Indonesia and India, SMEs contribute to the economy with an increase of 50-60%, and the unemployment rate has decreased (Capri, 2019). Hence, it is clearly shown that SMEs not only impact a country's GDP, but also provides job opportunities. SMEs in Malaysia are the strength of Malaysia's economy. The government of Malaysia has focused and worked on the growth of SMEs since 1970. The development of SMEs in Malaysia is very much significant. Therefore, SME Corp. Malaysia has built vision 2020 to become an industrial company. Moreover, to get ahead of the invention, SME Corp. Malaysia had established a master plan (2012-2020) 2012 as a catalyst. As per SME Corp., in Malaysia a total of 98.5% of businesses are SMEs. This data shows that SMEs are the backbone for Malaysia's economic growth. According to Malaysia SME's annual report 2018/19, the

overall GDP increased by 38.3% in 2018 compared to the 2017 report. Moreover, based on sectors, service and manufacturing SMEs are the main contributors to GDP growth.

SMEs are considered as the most significant combined contribution of the manufacturing and service sector with a share of 82.4% (The Star, August 2019). Beyond the classification of the industry, manufacturing is the secondary sector that produces and processes, while service is the tertiary sector. However, the application of technology in the manufacturing industry has limited sources. Malaysian manufacturing SMEs are primarily focused on output technology such as machines but lack management. A total of 82% of SMEs only use technology to issue an invoice (The Star, May 2005). Even though the Malaysian government has given much attention to SMEs, the adoption of technology is one of the significant challenges that Malaysian SMEs are facing (The Star, Dec 2019). This has hampered the growth of SMEs and competitive advantage with large-scale businesses. The level of technology adoption is shallow and fails in data management due to no implementation of technology for future traceability. Technology is a tool that SMEs should adopt to improve their performance and build strength to compete with competitors. Entrepreneurs of SMEs need to understand the benefit or the advantage of technology to drive effective management. On the other hand, it might be a severe challenge for an organization to adopt technology due to barriers such as lack of skill or knowledge of technology, absence of technology awareness, etc. The attempt of this study is to investigate the factors that impact technology adoption among manufacturing SMEs in Malaysia. The primary purpose of this research is to find the barriers that become a significant challenge for manufacturing SMEs on technology adoption. Moreover, this study can deliver the importance and awareness of technology to Malaysian manufacturing SMEs. In the last section of this study, the expected result is to understand the factors toward adopting technology. Furthermore, the owner of manufacturing SMEs will have more knowledge of technology and improve management efficiency. Other than that, this study can help manufacturing SMEs understand that technology implementation can reduce overall operating costs, increase the probability, and sustain the business for the long term.

Literature Review

SMEs Performance
SME performance is defined as the achievement level of organizational goals (Mahmudova & Kovacs, 2018). A study by Danga et al. (2019) concluded that SMEs' performance depends on numerous factors. Still, the success and performance are highly based on how SMEs are capable of managing those factors. Research by Abdullah and Rosli (2015), Mulolli et al. (2015), and Zhang et al. (2017) revealed that human resource and market orientation are the influential factors that have influenced SMEs performance. Besides that, research by Anggadwita and Mustafis (2014) and Hutahayan (2019) investigated the factors influencing SMEs' performance in Indonesia. In contrast, both studies determined that the entrepreneurial factor is highly involved in SMEs' performance than human resources. However, a survey conducted in Indonesia by Chairoel et al. (2015) revealed that Information Communication Technology (ICT) influences SMEs' performance while the result from the study by Anggadwita and Mustafid (2014) showed that IT does not affect SMEs' performance. Entrepreneurial and human resource management can be a factor that affects SMEs but technology is the one that impacts SMEs' performance on a large scale. Additionally, this is supported by Moorthy et al. (2012) that information technology has the most vital positive relationship with SMEs performance, followed by entrepreneurship and human resource management. Nonetheless, numerous studies highlighted technology as the primary key to SMEs' performance. Based on the research by Tarute and Gatautis (2014), Akomea-Bonsu and Sampong (2012), and Birchall and Giambona (2008), technology played a major and positive role in SMEs, leading to increase output, relationship building, personal effectiveness, and operational performance.

Technology adoption
As scientific knowledge, technology is a useful application utilized in a human's daily life and industries. According to Roger (1983), technology is defined as a design for instrumental action that reduces uncertainty in the cause-effect relationship involved in achieving the desired outcome. According to Ahmed et al. (2020), perception and attitude of an individual towards technology leads to acceptance

and adoption of new technology. As Mustafa and Yaakub (2018) explained, for a company to succeed in something new or unique and develop the company's performance, a firm should emphasize on technology adoption. According to Abid et al. (2010), customer service can communicate with their customers regarding complaints through communication technology instead of being dispatched to customers' premises. On the other hand, the study by Attar and Sweis (2010) highlighted that the higher the investment of technology, the higher employees' job satisfaction. However, Pakkanen (2012) argued and explained that employees might not have an idea or knowledge about the accessibility of communication technology in an organization to improve productivity. To overcome this, Niri (2017) recommended that practical training can improve employees' knowledge of technology and increase productivity. Numerous studies have found that technology adoption offers business opportunities and provides a variety of benefits. A study conducted by Schmidt (2017) underlined that firms could obtain and publish information regarding buyers, products, and competitors through marketing intelligence. Moreover, a studied attempt by Widyastuti and Irwansyah (2018) explored SMEs' opinion toward cloud computing benefits in the operation of a business that motivates the adoption. The finding showed the perceived benefits of cloud computing are cost-saving, speed up decision-making, expand the market, and improve communication with the client. Overall, the adoption of technology positively benefits a firm in developing their business.

Relative Advantage
Relative advantage determines the degree of an innovative product or service that seems to be better and advanced than the existing product. Roger (1983) defined relative advantage as the degree to which an innovation is perceived as better than the idea it overtakes. Relative advantage is the main factor in the decision and helps the user to consider IT adoption. A study by Hsiao (2016) and Roach (2009) revealed that relative advantage strongly impacts adoption decisions. Numerous studies have found and concluded that relative advantage is the best predictor of IT adoption. Relative advantage is an initial influential factor to motivate an organization on adoption decisions (Safari et al., 2014; Gangwar et al., 2014; Gutierrez et al., 2015). However, a study by Jon et al. (2001) investigated the factors that affect the adoption of electronic commerce. The finding shows the relative advantage of electronic commerce can reduce a company's expenses and increase the company's revenue. Therefore, it shows that the relative advantage characteristic is the use of technology adoption. Additionally, the study by To and Ngai (2006) indicated that the relative advantage element positively impacts online retailing adoption. Furthermore, Lok (2015) conducted a similar study on adopting smart card-based e-payment systems for the retailing industry in Hong Kong. The result has proven that the relative advantage of this payment method is less difficulties and as a convenient payment process for customers. On the other hand, Ahmad (2015) attempted a study to investigate the relationship between Business Intelligence (BI) software deployment and the sustainable competitive advantage of a telecommunications organization. The finding indicates that the relative advantage of BI has a positive relationship with BI deployment. Hence, IT is a tool that increases the competitive advantage (Sophonthummapharn, 2009). Overall, it shows that the relative advantage characteristic is an initial stage of understanding the benefit and adoption decision.

Compatibility
Compatibility refers to a smooth relationship between innovation and potential users as individuals absorb it mentally into their lives. According to Roger (1983), compatibility is defined as the degree to which an innovation is perceived as consistent with the existing value, experience, and needs of potential adopters. According to Musa et al. (2015), the compatibility of an innovation or technology plays an important role in the adopter's practice. Technology compatibility refers to technology needs to meet a user's perceived belief, value, experience, social culture, and current needs (Cheng, 2018). Moreover, Stocchi et al. (2018) conducted a similar study but in different technology to examine the drive and outcomes of the usage intention of a branded mobile application. The finding indicates compatibility is positively significant on usage intention through perceived ease of use (PEOU). The result conveys that the more compatible the technology, the higher the usage intention will be. According to the findings in the study by Ortega et al. (2007), their result indicates that adoption or acceptance of new technology depends on how great the compatibility of technology is. However,

Gangwar et al. (2014) revealed that although compatibility influences IT adoption, it might challenge organizations that installed many multifaceted applications to change the existing process to meet compatibility. A study by Plewa et al. (2012) stated that a user's positive attitude can only be developed if technology is compatible. On the other hand, the study by Talukder et al. (2018) concluded that an individual might be more mindful of new technology adoption if the individual has a more innovative mindset. In another way, the study by Di Benedetto et al. (2003) underlined that technology compatibility affects the intention to adopt new technology and increases a leader's behavioural intention.

Complexity

Complexity refers to how difficult an innovation or new technology is for the potential user. In the current lifestyle, users prefer ease of use, and not many users are willing to spend their time learning to use an innovation. Roger (1983) defined that complexity is the degree to which an innovation is perceived as relatively difficult to understand and use. Complexity is an important factor in IT adoption decisions as it creates awareness of technology. According to Andersen (2018), Borhani (2016), Stieninger et al. (2017), Shi and Yan (2016), and Hameed and Arachchilage (2017), a lack of understanding in complexity might lead the management in poor decision making while high complexity is the turning key for future success. Poorangi et al. (2013) researched the different e-commerce adoption measurements among SMEs in Malaysia. The finding indicates that complexity does not influence the adoption of e-commerce. The author concluded that a leader should encourage technology adoption by providing training for their employees. It might effectively reduce the complexity of technology use and users can easily understand. Effective training is needed to make users easily understand especially if the application of technology is difficult to use. However, every technology is complex and users can learn or understand it in a short period. Naicker and Merwe (2017) carried out a similar study to examine the factor that affects mobile technology adoption. The finding indicates that complexity is not significant with the adoption of mobile technology. Other than that, Liang and Lu (2012) concluded that a technology application should create more convenience to eliminate the difficulty of use among users. Additionally, the result of the study by Liang and Lu (2012) offers the opportunity to understand users' concerns and helps creators improve the development of the software. The complexity of technology is a major barrier for adoption; however, complexity is also a key for future success. Overall, the complexity of technology is important in the intention to adopt but has to be at a lower level so it will not affect user's intention to adopt.

Trialability

Roger (1983) stated that trialability is the degree to which an innovation may be experimented with on a limited basis. Generally, a potential adopter will adopt more rapidly if innovation or new technology can be tried. According to Liang and Lu (2012), trialability plays an important role in adoption by creating confidence about new technology or innovation. Additionally, a study by Ali and Puah (2017) found that customers consider trialability to contribute to reducing risk and is highly influential in predicting an individual's adoption decision. In contrast, according to Alam et al. (2007), trialability is not useful to predict adoption decisions. However, a study by Alshamaila et al. (2012) indicated that trialability impacted adoption decisions, especially early adopters. The key role of trialability is to motivate an individual on adoption by spreading trust. A similar study was conducted by Hsbollah and Idris (2009) on e-learning adoption. The finding shows a positive relationship between trialability and e-learning adoption. Both results revealed that a trial of technology can increase the adoption rate. It has been proven by Daradkeh (2018) and Wang et al. (2017) that trialability is an important element that influences the adoption rate. Additionally, Zadeh et al. (2017) stated that the trialability characteristic increases the intention of using it and creates an opportunity to explore and understand the benefits of technology. Additionally, Hill (2012) found that most of the respondents faced difficulties in the trial innovation. Therefore, the accessibility of trials needs to be communicated more proficiently about the technology to users or adopters Jo Black et al. (2001). Overall, most of the past studies found trialability as positively related to technology adoption.

Observability

Observability is the noticeable result of a trial or utilizes an innovative product or service. According to

Roger (1983), he defines observability as the degree to which the result of innovation is visible to the user. Observability involves new technology or innovation adoption intentions and a useful predictor among perceived characteristics of innovation (Alam et al., 2007; Ali & Puah, 2017). An innovation that is observable can lead to faster adoption (Ahmad, 2015). In contrast, the finding of Wang et al. (2017) indicated that observability is not significant on user adoption intention. However, Tsai and Ho (2013) clarified that maybe the user has experience with the result of innovation technology previously, so the importance of observability related to technology might decrease. The benefit of innovation will further influence an individual by its visible results (Ahmad, 2015). As in the same vein, Ghavifekr and Rosdy (2015) and Shahid (2018) conducted a study on the effectiveness and adoption of ICT in education. Both findings determined that observation reveals the value of ICT. Chong (2008) supported it, which states that the more visible technology advantages lead SMEs in technology implementation with higher satisfaction. According to Singh et al. (2016), usage attitude of any new technology is beyond user observation and satisfaction level.

Diffusion of Innovation Theory
The Diffusion of Innovation (DOI) Theory is the oldest social science theory created by E.M Roger in 1962. Roger established five adopters: innovators, early adopters, early majority, late majority, and laggards. According to Adeola and Anibaba (2018), to spread new ideas, products, and services, the DOI theory is a useful framework to utilize. This theory is useful for depicting the adoption pattern, clarifying the technology, and help with foreseeing whether and how new technology will be fruitful. Diffusion is a process that makes an innovation communicate through a specific channel over some time among the community of the social system. Additionally, Oliveira and Martins (2011) stated that DOI is a theory of how, why, and at what rate a new technology or innovation spreads through cultures at individual and organization levels. Roger defined the innovation-decision process as the process through which an individual passes from first knowledge of an innovation to forming an attitude toward the innovation, a decision to adopt or reject, the implementation of the new idea, and confirmation of this decision (Roger, 1983). Through this decision process, an individual can be motivated to reduce the insecurity about the benefit and difficulties of new technology. The DOI theory identifies the following five attributes: relative advantage, compatibility, complexity, trialability, and observability, that decide an individual's intention to utilize or adopt an innovation or new technology. Numerous researchers have adopted the DOI model and five attributes to study the adoption or implementation of innovation (Bianchi et al., 2017; Zheng et al., 2018).

Resource-Based View Theory
In 1991, Barney introduced the Resource-Based View (RBV) model to address the strategy for a sustainable competitive advantage. The main objective of this RBV model is to get an organization's position in this competitive business world or overcome the threats and competition. According to Barney (1991), to sustain the competitive advantage and superior performance, an organization's resources need to accomplish the VRIN criteria. VRIN stands for valuable, rare, imperfectly imitable, and non-substitutability. Moreover, the resources can be categorized as tangible and intangible (Barney, 1991; Madhani, 2010). Greco et al. (2013) stated that tangible and intangible resources mostly influence sustainable competitive advantage, and an organization needs to understand. Numerous researchers have used the RBV theory to examine an organization's performance (Ramon et al., 2019; Kamboj et al., 2015; Rose et al., 2010).

Research Framework
Figure 1 represents the developed framework for this research, which was prepared based on the relationship between the literature review's five characteristics and technology adoption.
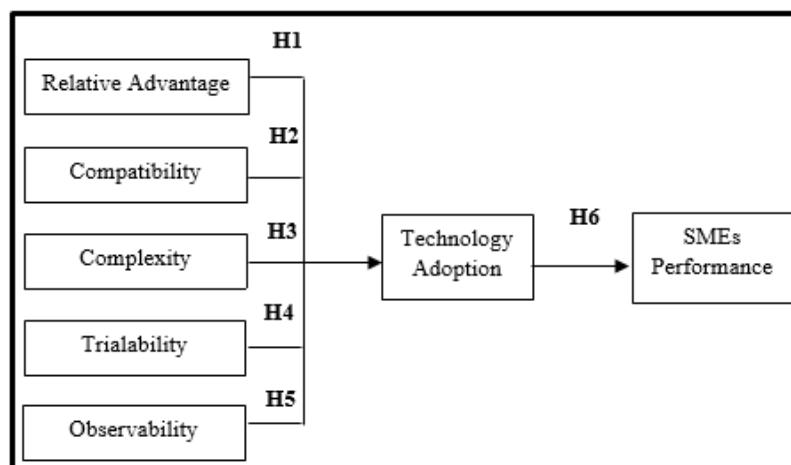
Figure 1. Research Framework

A research framework was developed after analysing theories and past studies by other authors. Roger's five innovation attributes under the persuasion communication channel, relative advantage, compatibility, complexity, trialability, and observability, are utilized as the independent variables. Hence, after determining the five characteristics, there is a situation to decide on adoption or rejection. The channel decision adopted technology adoption as the dependent variable of this study. Besides that, this researcher discussed the RBV theory and adapted it to determine the outcome of SMEs' performance.

Hypothesis Development
Relative advantage is defined as the degree to which a new product or service is greater than the existing one, and it plays a major role in the rate of adoption. According to Roger (1983), the higher relative advantage of the innovation leads to a rapid increase in the adoption rate. Mbizi et al. (2013) found that there is a relationship between innovation and sustainability of SMEs' operations. Other than that, several studies which researched on cloud computing, stated that an organization is able to gain more benefits with cost reduction, business opportunity, increase profit, business extent, and can provide quality service to consumers with the adoption of cloud computing (Pathan, et al., 2017; Senarathna et al., 2018). Technology is an effective tool that should support the adoption for business growth and competitive advantage of SMEs. Therefore, the following hypothesis was proposed;
H1: There is a significant relationship between relative advantage and technology adoption among SMEs' performance in Malaysia.

Compatibility is defined as two or more things that can perform together in a combination without any conflict. In innovation, the adoption rate can be delayed if it is not compatible with the prevalent values (Roger., 1983). The technology adoption rate can accelerate and be easily adopted by an organization when it is compatible with the present system. A compatible technology will help the employee absorb information and develop the information by integrating structure in the enterprise. The decision to utilize new technology or innovation can be affected by the attribute of compatibility since technology requires the foundation to change an organization's current practices and operation to expand the benefits of utilizing the technology (Mndzebele, 2013). This shows the characteristic of compatibility has an impact on the adoption of technology. Therefore, the following hypothesis was proposed;
H2: There is a significant relationship between compatibility and technology adoption among SMEs' performance in Malaysia.

Complexity is defined as complicated to deal with, or in another way, complexity is against simplicity. Roger (1983) stated that the adoption rate rapidly accelerates if the new idea or innovation is simpler to understand and use. Complexity is an effective tool that identifies the difficulty of innovation usage. According to Pathan et al. (2017), a lack of understanding leads most SMEs to refuse to adopt or implement new technology. The trouble in learning and sharing innovation makes the technology

complex and hard to adopt (Mbizi et al. 2013). Technology should not be too complex as it needs to be easy to understand or use to likely adopt (Ahmad et al., 2016; Mndzebele, 2013). This shows the complexity of technology that impacts technology adoption among SMEs. Thus, the following hypothesis was proposed;

H3: There is a significant relationship between complexity and technology adoption among SMEs' performance in Malaysia.

Trialability is defined with a limited basis or time and without commitment, an innovation may be tried. Roger (1983) stated that usually the adoption of an investment plan for innovation is more rapid if the new idea can be tried than not detachable. Kawalek and Ramdani (2007) stated that trialability is an essential stage that a firm expects to adopt as an enterprise system before a complete investment. Trialability is a characteristic that positively impacts managers' confidence level in SMEs and possibly to evaluate the net benefit of technology to continue the adoption process (Poorangi et al., 2013; Vagnani & Volpe, 2017). The study by Murad (2016) stated that one of the respondents from the manufacturing industry explained that they had tested the technology before the technology was installed. Beyond that, they concluded that the adopted technology would benefit their company. This shows trialability affects technology adoption decision. Therefore, the following hypothesis was proposed;

H4: There is a significant relationship between trialability and technology adoption among SMEs performance in Malaysia.

Observability is an effective tool that measures how well technology can be surmised by the information of its output or result. The simpler it is for an individual to see the innovation result, the more motivated they will be to adopt. According to Vagnani and Volpe (2017), the observability characteristic helps assess the positive feature of technology. The diffusion of innovation or technology can be faster if the benefit of innovation is effectively observed and communicated. As Poorangi et al. (2013) stated, a manager of an organization can obtain more information and progressively become familiar with the benefits of web-based business adoption. Additionally, Hameed and Arachchilage (2017) stated that the more observable the use and result of an information system security development, will lead an organization to adopt and implement the technology. This indicates an observability effect on technology adoption decisions. Therefore, the following hypothesis was proposed;

H5: There is a significant relationship between observability and technology adoption among SMEs performance in Malaysia.

Technology is continually developing with new programming and constantly emerging to solve issues or eliminate wasteful aspects that the organization might not know about. The main purpose of technology adoption is to improve an organization's work process with more efficiency and effectiveness (Godoe & Johansen, 2012). According to Nikoloski (2014), an organization's business techniques and IT positively influence organizational performance as Diing (2016), and Anjum (2019) stated that the adoption of technology can lead SMEs' business performance in growth and profitability. Additionally, technology also contributes to economic growth (Al-Mubaraki & Aruna, 2013). Potiwanna and Avakiat (2017) also stated that the competency of technology is to lead and motivate SMEs to successfully achieve competitive advantage. This shows technology adoption's impact on SME performance. Thus, the following hypothesis was proposed;

H6: There is a significant relationship between technology adoption and SME performance in Malaysia.

Methods
Data Collection
In this study, the researcher decided to use a quantitative research design, which is more of a statistical type. A questionnaire survey was used in this study to obtain data from respondents. The total sample size of this study was 380 respondents. However, only 153 valid questionnaires were obtained due to the limit of time, but it met the sample size that was calculated with the GPOWER calculator. The collected questionnaires were analysed for further investigation of this study.

Research Instrument

For this study, the questionnaire was adapted from three past studies by other authors, namely Khong (2009) and Mamun (2017), based on the reliability and validity while Maduekwe and Kamala (2016) were based on the mean value. For example, the study by Mamun (2017) had nine questionnaires for the relative advantage variable, so this researcher chose four questions with high reliability and validity value. Somehow, for Maduekwe and Kamala (2016); and Khong (2009), the reliability and validity table were unable to be found, so the question was selected based on the high mean value. The item for the five characteristics was adopted from Mamun (2017) while technology adoption from Khong (2009) and SME performance from Maduekwe and Kamala (2016). To meet the requirement of this study, the original questionnaire adopted had been modified.

Result and Discussion

Table 1 shows the demographic analysis of this study. Based on the result, the leading respondents of this study are males with 65.4% and followed by females with 34.6%. In terms of age, the majority of the respondents are in the 31- 40 years old age range. Other than that, in terms of academic, most of the respondents are bachelor's degree holders. For experience, most of the respondents are between the group of 5-10 years. In terms of nature, the majority of respondents are from the food and beverage industry.

Table 1. Demographics Analysis

Items	Categories	N	%
Gender	Male	100	65
	Female	53	35
Age	21 below	5	3
	21-30	51	33
	31-40	54	35
	41-50	30	20
	51 and above	13	9
Academic	SPM or Equivalent	13	9
	Diploma	22	14
	Bachelor Degree	85	56
	Master Degree	24	16
	PhD Degree	9	6
Experience	2year below	6	4
	2-5 years	41	27
	5-10 years	62	41
	10-15years	15	10
	15-20 years	24	16
	20 years above	5	3
Nature	Food and Beverage	23	15
	Electronic and Electrical	20	13
	Chemical	17	11
	Steel and Metal	16	11
	Machinery	18	12
	Textiles	17	11
	Furniture	13	9
	Printing and Publish	12	8
	Pharmaceutical	7	5
	Rubber and Plastic	3	2
	Leather	2	1
	Tobacco	0	0
	Transportation	5	3

The correlation value was tested through the SPSS software to determine the relationship between

independent and dependent variables. Based on Table 2, the result shows the relationship between the variables of this study. It indicates the perceived characteristics of relative and compatibility have a positive relationship with technology adoption. At the same time, the other characteristics of complexity, trialability, and observability have a strong relationship with technology adoption. The result also shows the relationship between technology adoption and SMEs' performance is positive and moderate. Overall, all relations between the variables are significant, with the p-value, which indicates 0.000.

Table 2. Pearson Correlation

		PE	TA
SMEs Performance (PE)	Pearson Correlation	1	468**
	Sig (2-tailed)		000
	N	153	153
Technology Adoption (TA)	Pearson Correlation	468**	1
	Sig (2-tailed)	000	
	N	153	153
Relative Advantage (RA)	Pearson Correlation	375**	633**
	Sig (2-tailed)	000	000
	N	153	153
Compatibility (CO)	Pearson Correlation	375**	633**
	Sig (2-tailed)	000	000
	N	153	153
Complexity (CX)	Pearson Correlation	354**	701**
	Sig (2-tailed)	000	000
	N	153	153
Trialability (TR)	Pearson Correlation	415**	763**
	Sig (2-tailed)	000	000
	N	153	153
Observability(OS)	Pearson Correlation	415**	763**
	Sig (2-tailed)	000	000
	N	153	153

**Correlation is significant at the 0.01 level (2-tailed)

Table 3 shows the coefficients result on the variables that affect technology adoption. The coefficients analysis indicates the effect of the five variables on technology adoption. Based on the beta value (B), the relative advantage is a positive effect but with a lower level and a significant value in the range of 0.000-0.005. Secondly, the beta value for complexity indicates it affects technology adoption but low, and the significant value is not in the range. Besides that, compatibility and trialability negatively affect and are also not significant. To conclude, the relationship of compatibility, complexity, and trialability on technology adoption is inverse which is not a fruitful predictor for this study. However, the last variable is observability, which positively affects technology adoption with a B value of 0.578, and a significant value is 0.000, which is in the range of 0.000 – 0.05. Overall, observability is the most effective and strongest factor that highly affects technology adoption among the five variables.

Table 3. Coefficients Results

Model		**Unstandardized Coefficients**		Sig
		B	**Std. Error**	
1	(Constant)	.964	.240	000
	RELATIVE2	.224	.076	.004
	COMPATIBILITY	-.238	.113	.037
	COMPLEXITY	.297	.114	.010
	TRIALABILITY	-.079	.087	.368
	OBSERVE	.578	.133	.000
	a. Dependent Variable: TECH			

Table 4 shows the linear relationship between the independent and dependent variables. For this study. the correlation (R) value is 0.791 while for the regression model the R Square value is 0.626. Overall, this result shows the model strength of this study is 62.6%.

Table 4. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.791a	0.626	0.614	0.39361

a.   Predictor: (Constant),   OBSERVE,RELATIVE2, TRIALABILITY, COMPATIBILITY, COMPLEXITY

Table 5 shows the hypothesis summary of this study. Hence, the hypothesis that were created through the discussion of past studies.

Table 5. Hypothesis Summary

No	Hypothesis	Accepted / Rejected
1	There is a significant relationship between relative advantage and technology adoption among SMEs in Malaysia.	Accepted
2	There is a significant relationship between compatibility and technology adoption among SMEs in Malaysia	Rejected
3	There is a significant relationship between complexity and technology adoption among SMEs in Malaysia.	Rejected
4	There is a significant relationship between trialability and technology adoption among SMEs in Malaysia.	Rejected
5	There is a significant relationship between observability and technology adoption among SMEs in Malaysia.	Accepted
6	There is a significant relationship between technology adoption and SME performance in Malaysia.	Accepted

Conclusion and Recommendations

Principally correlation analysis was utilized for this study to reveal the presence of perceived characteristics towards technology adoption among SMEs. Based on Table 2, Pearson correlation analysis, all the five perceived characteristics significantly affect technology adoption. There is a significant positive relationship between technology adoption and SME performance. Relative advantage, compatibility, complexity, trialability, and observability significantly impact technology adoption, and the results are consistent with (Low et al., 2011; Gutierrez et al., 2015; Roach, 2009; Cheng, 2018; Hameed & Arachchilage, 2017; Poorangi et al., 2013; Alshamaila et al.,2012; Hsbollah & Idris, 2009; Ahmad, 2015; Lee et al., 2003). The five characteristics are involved in user's decision-making on technology adoption. On the other hand, the finding has shown technology adoption affects SMEs' performance. As the prior study states, technology adoption involves leading and motivating SMEs on competitive advantage and positively influences organization performance (Potiwanna & Avakiat, 2017; Nikloski, 2014). Although the correlation analysis showed all the hypotheses are acceptable, only three hypotheses are acceptable for this study based on the coefficient analysis, which are H1, H5, and H6. However, the other three variables, compatibility, complexity, and trialability, have no significant relationship with technology adoption, and these three hypotheses were rejected. However, the finding is consistent with a previous study (Stieninger et al., 2017; Naicker & Merwe, 2017; Alam et al., 2007). For the overall result, relative advantage and observability is the predictor able characteristic for this study.

The main purpose of this study is to examine the impact of five characteristics on technology adoption among manufacturing SMEs in Malaysia. Based on the multiple regression analysis, the results showed that relative advantage and observability are the most affected factors on the decision of adoption. However, the analysis showed that observability is the most effective and predictable characteristic in

technology adoption, while relative advantage influences technology adoption at a lower level. Moreover, observability is more on how well the output of an application of technology is obvious to a user. Also, it is a platform for the user to understand the advantages. A firm or an organization can observe the effectiveness of technology by obtaining testimonials from stakeholders and suppliers. Other than that is an investment. An experiment cannot be observed without any input. Thus, a firm first needs to understand the capability of an employee on technology usage. Beyond that, a firm needs to invest in the application of technology and observe the improvement by comparing before and after. Generally, investment in technology is always the advantage of any organization.

Limitations and Suggestions for Future Study

There are a few limitations faced during this research. The lead time for the study was seven months to complete the whole research. Furthermore, in Chapter Two, some of the findings from past studies by other authors could not be included due to the limitation of word count. Therefore, in the future, this should be conducted for a longer period to investigate more deeply. Additionally, the scope of the study can be specific to cloud computing, internet-based, E-commerce, etc. On the other hand, future studies can also be conducted to explore the benefit, barriers, and challenges in technology adoption.

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