

Review of Technology Adoption Studies in Small and Medium Enterprises (SMEs): A Proposed Theoretical Framework for Malaysian SMEs in the Rural Context

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Abstract

Purpose: This paper proposes a theoretical framework for Malaysian SMEs in the rural context. It includes the potentially relevant factors from multiple perspectives that may affect SMEs to adopt technologies.

Design/methodology/approach: This paper utilizes the narrative literature review method to identify and synthesize the significant factors. This method covered 79 past technology studies in the Malaysian SME field.

Findings: The reviewed 79 past studies highlighted multiple perspectives, such as individual, technological, organizational, and environmental, that would be affected Malaysian SMEs to adopt the technology. The 12 significant factors also were identified: performance expectancy, effort expectancy, social influence, compatibility, complexity, perceived risk, top management support, organizational readiness, firm size, government support, competitive pressure, and customer pressure. The unified theory of acceptance and use of technology (UTAUT) and the technology-organization-environment (TOE) framework underpinned the fundamental of the proposed theoretical framework for Malaysian SMEs in the rural context. UTAUT presents the idea of individual perspective, and the TOE framework displays the perspective as it names.

Research limitations/implications: The findings of this paper may only provide an applicable guideline from a theoretical perspective. Future studies suggest using a mixed-method approach to validate the proposed framework.

Practical implications: The findings of this paper provide a literal idea suggesting that the government or the Ministry of Rural Development should consider appropriate guidelines from individual, technological, organizational, and environmental aspects to encourage SMEs operating in rural areas to adopt technologies.

Originality/value: This paper addresses the gap by proposing the theoretical framework for Malaysian SMEs in a rural context on technology adoption.

Keywords: SMEs, Technology Adoption, Rural

Introduction

Technology adoption has been studied widely in the context of Small and Medium Enterprises (SMEs) as it drives them for several reasons. First, in this era of the industrial revolution, integrating multiple technologies has become a significant component of business operations (Abu, Jabar, & Yunus, 2015), such as information and communication technology (ICT), big data, cloud computing, internet of things (IoT), social media, e-commerce, social commerce, e-payment, web technology, and other related applications. These technological applications are said to benefit businesses in a variety of ways. It includes higher efficiency and productivity (Ming, On, Rayner, Guan, & Patricia, 2020), more excellent internal and external communication (Bakar, Talukder, Quazi, & Khan, 2020), increased competitiveness (Bakar, Talukder, Quazi, & Khan, 2020), broader information exchange (Abed, 2020), market accessibility (Selase., et al., 2019), and other related benefits. In this respect, embracing technology applications enable SMEs to sustain and survive in the competitive market (Shahrudin, Rahman, Aziz, & Kassim, 2018; Ghobakhloo & Ng, 2019).

Second, SMEs in Malaysia recognize as the backbone of the economic contributor to the economic development and growth of the country through the creation of employment opportunities, exports, and national gross domestic product (GDP) contributions (Wong, Topimin, & Pinjaman, 2021). According to SME Corp. Malaysia (2022), SMEs categorize into five major sectors, such as service, manufacturing, agriculture, construction, and mining and quarrying, and overall SMEs contributed a total of RM512.8 billion to the national GDP in 2020 while exporting around RM117.8 billion and creating employment opportunities for 7.25 million workers.

But, when Covid-19 spread into Malaysia, SMEs greatly suffered from its effects (Cheong, 2022). Compared to the contribution of SMEs in 2019, SMEs declined a 7.35%, 33.18%, and 0.68% for national GDP, exports, and employment opportunities (SME Corp. Malaysia, 2022). In addressing and improving the declining contribution issue that SMEs face in this new business environment caused by the Covid-19 pandemic, the application of technology adoption considers the solution for them (Sombultawee, 2020). In this sense, it is crucial to enhance SMEs' flexibility in adopting technology applications, whereby improves their business performance. With that, anticipating the technology adoption by SMEs is significant.

However, the issue of the low rate of technology adoption by SMEs remains the investigated concern point in the past decade of existing studies (e.g. Shahrudin, Rahman, Aziz, & Kassim, 2018; Senarathna, Wilkin, Yeoh, & Salzman, 2018; Rastogi, Verma, & Sushil, 2018). Yet, there is a scarcity of study contexts in rural areas for SMEs to adopt technological applications, including a research framework of technology adoption that focuses on SMEs in the rural context (e.g. Rozmi, Nohuddin, Hadi, Bakar, & Nordin, 2020; Koe & Sakir, 2020, Khyer, Talukder, Bao, & Hossain, 2020). The possible reason may be that most researchers prioritize the technology adoption concerns among SMEs in developed areas (e.g. Basit, Tiong, & Hassan, 2020; Sin & Sin, 2020; Zaidi & Belal, 2019). In this respect, the technology adoption phenomenon remains unclear. It might limit the understanding of the technology adoption issue for Malaysian SMEs operating in rural areas, particularly in this new normal of the business environment.

Therefore, this paper proposes a theoretical framework for Malaysian SMEs in the rural context by explicitly addressing the following research question:

- What factors from multiple perspectives may affect SMEs in rural contexts to adopt technologies?

This paper is structured as follows. The following section explains the methodology. Section 3 deals with the findings of this paper, including the overview of technology adoption in SMEs, factors affecting SMEs on technology adoption, and the development of the theoretical framework of technology adoption for SMEs. Section 4 proposes a theoretical framework of technology adoption for SMEs in rural contexts. Section 5 concludes the findings and recommends a direction for future empirical research.

Method

This paper utilized a narrative literature review method to review the existing technology adoption studies in the SME field. The reason for choosing this method can divide into four aspects. First, this method was regarded as a comprehensive synthesis of existing works to frequently discuss theory and context to provoke thought and controversy (Meglio & Risberg, 2011). Second, it helps the researcher with a thorough overview and up-to-date information on a topic-related study field (Dixon-Woods, Agarwal, Jones, Young, & Sutton, 2005). Third, it enables the researcher to comprehensively map large, complex research areas involving multiple issues for reinterpretation and interconnection (Dixon-Woods, Agarwal, Jones, Young, & Sutton, 2005).

Finally, this method was also regarded as a valuable theory-building technique (Baumeister & Leary, 1997). It then enables researchers to summarize the limitations of previous work to create or propose new areas of research and outline future research paths (Hodgkinson & Ford, 2014; Rousseau, Manning, & Denyer, 2008). In this respect, this paper expected the proposed theoretical framework (i.e., the purpose of this paper) could be in-depth to cover the limitation found in the existing studies of technology adoption in SMEs and creates new research areas in future empirical study.

This paper followed the five-step procedure of narrative literature review proposed by Greenhalgh et al. (2005) and Hopkinson & Blois (2014): search, mapping, appraisal, synthesis, and recommendation derivation, and the application of the procedures of the method in this paper as illustrated at Figure 1. In the first Step: Search, the researcher used relevant keywords in a combined manner between "Technology Adoption," "SMEs," and "Rural SMEs" through the database from Science Direct, Google Scholar, and Research Gate to search the relevant articles. With the search process, the researcher prioritized the relevant articles published in English in the indexed journals but was not limited to other articles published in unranked sources.

In the meantime, the researcher discarded any article that did not investigate technological application adoption in SMEs during the mapping process in Step 2. In this phase, the researcher accepted articles that examined different applications of technology adoption in SMEs using empirical research, theoretical, conceptual, and methodological. As a result of the mapping, 79 articles were identified as relevant and can proceed to the next phase (i.e., Step 3: Appraisal).

In the appraisal phase, the researcher evaluated the 79 accepted articles to meet the review questions or research questions of this paper: what factors from multiple perspectives may affect SMEs in rural contexts to adopt technologies? During the reviewing process, the researcher also categorized and grouped the most debatable findings among these 79 articles while paying attention to these inconsistent results in preparation for Step 4: Synthesis. After completing the evaluation process, the researcher gave a coherent or synthesized overview of the significant aspects and relationships among these reviewed 79 articles. This action was mainly taken part or presented in terms of the writing process.

Finally, in the last Step: Recommendation Derivation, the researcher would first propose a theoretical framework from the reflection and multidisciplinary discussion in Step 4:

Synthesis, whereby reach the purpose of the paper. After that, the researcher would, therefore, outline the recommendations for future empirical research to improve the findings of this paper.

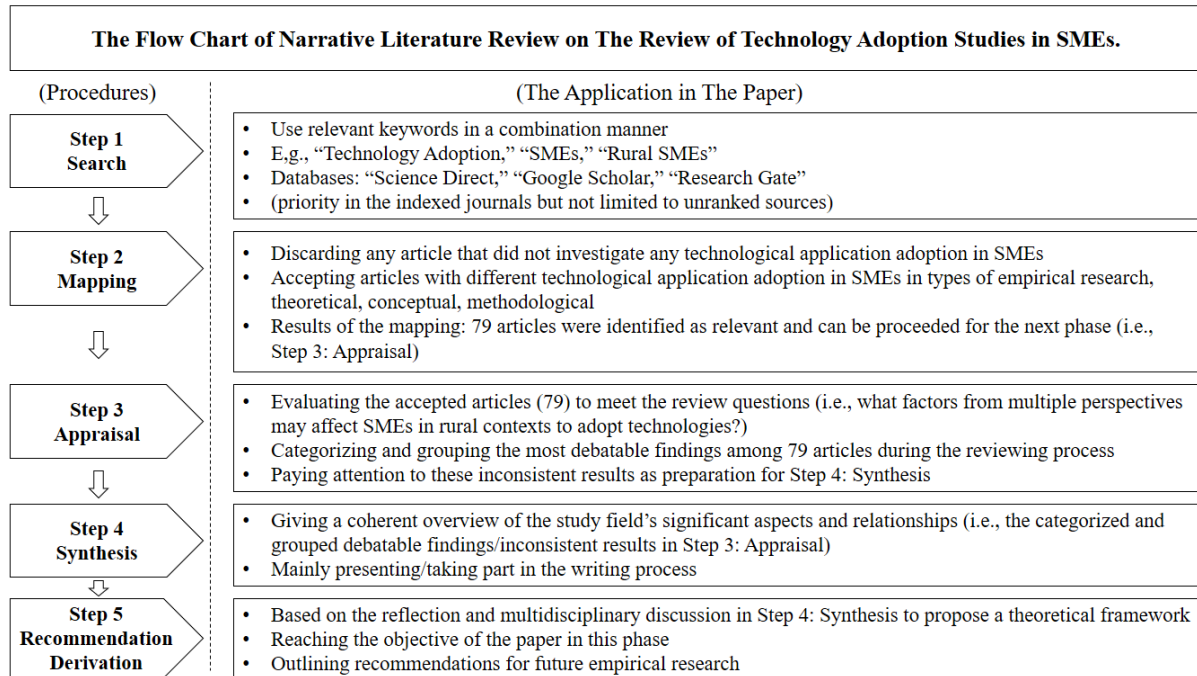


Figure 1: The Flow Chart of Narrative Literature Review on The Review of Technology Adoption Studies in SMEs.

Findings

An Overview of Technology Adoption in SMEs

Technology adoption can define the recognition of a need, decision, attempt to implement, and full implementation of innovation as a solution (Gallivan, 2001). In other words, it refers to the choice of technology for use by a firm or the decision to adopt and use an innovation (Dincbas, Ergeneli, & Yigitbasioglu, 2021). In the existing studies, a low rate of technology adoption in Malaysian SMEs remains the primary focus that attends the interest of extensive research in investigating the reason behind it (e.g., Rozmi, Nohuddin, Hadi, Bakar, & Nordin, 2020; Shahzad, Chin, Altaf, & Anwar, 2020; Yan, Falahat, & Sia, 2021; Zainuddin et al., 2020).

The previous and recent research, however, are not able to reach a consensus regarding the adoption of multiple technological applications for Malaysian SMEs (e.g., Abu, Jabar, & Yunus, 2015; Adamkolo, Hassan, & Yusuf, 2016; Lim, Suhaimi, & Low, 2017; Omar, Dimiyati, Ahmad, & Khairuddin, 2018; Rozmi, Bakar, Hadi, & Nordin, 2019; Sin & Sin, 2020; Yan, Falahat, & Sia, 2021). Studies on technology adoption in Malaysian SMEs tend to focus on only one application, such as e-commerce, ICT, cloud computing, social media, and technology. As shown in Table 1, these are the most investigated applications for SMEs in Malaysia. But, in the changing norms of the business environment, the decision to adopt multiple technologies might become essential for SMEs (Amankwah-Amoah, Khan, & Knight, 2021; Guo et al., 2020). In this sense, investigating a single technological application in a future study may neglect the other significant applications that could improve the contribution of SMEs to the country.

Table 1: The Summary of Reviewed Literature on the Technology Adoption Studies in Small and Medium Enterprises (SMEs).

Criteria	Type of Technological Applications Focus																										Total			
	Social Commerce	Technology	E-Commerce	Augmented Reality	ICT	Digitalization	E-Marketing	Cloud Computing/Service	Sustainable Technology	Social Media	Big Data	Internet Technology	Clean Technology	Mobile Marketing	Supply Chain Technology	E-Accounting	Digital Technology	Web Marketing	Intelligent Conversational Agent	Internet of Things	Mobile Money/Payment Service	Alternative Fuel Vehicle	Digital Payment System	Cryptocurrency Payment	Digital Inclusion	E-Business		Mobile Commerce	Web Technology	Smart Farm
Underpinned Theory Focus/ Total Reviewed:	3	4	17	1	9	4	1	7	3	4	1	1	1	1	2	1	2	1	1	3	2	1	1	1	1	2	2	1	1	79
1. Intention to Adopt	3	-	1	1	3	-	-	-	-	-	1	1	-	-	-	-	1	1	1	1	1	-	-	1	-	-	-	-	-	15
2. Actual Use	-	4	16	-	6	3	1	7	3	4	-	-	1	1	2	1	2	-	-	2	1	1	1	-	1	2	2	1	1	63
3. Extent of Adoption	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
SMEs Sector Focus (Malaysian Context):	2	2	12	1	7	1	-	2	1	2	-	-	-	-	1	1	2	-	-	1	-	-	-	-	1	-	-	1	-	37
1. General	2	-	7	-	6	-	-	-	1	2	-	-	-	-	-	-	1	-	-	1	-	-	-	-	1	-	-	-	-	21
2. Service	-	1	2	1	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	7
3. Manufacturing	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	4
4. Agriculture	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
5. Service & Manufacturing	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
6. Service, Manufacturing & Agriculture	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
7. All sectors	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Area/Location Focus/ Total Reviewed:	2	2	12	1	7	1	-	2	1	2	-	-	-	-	1	1	2	-	-	1	-	-	-	-	1	-	-	1	-	37
Malaysian Context																														
1. Developed	1	2	12	1	5	1	-	2	1	2	-	-	-	-	1	1	2	-	-	1	-	-	-	-	1	-	-	1	-	34
2. Rural	1	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
Perspective of the Selected Factors Concerned/ Total Reviewed:	3	4	17	1	9	4	1	7	3	4	1	1	1	1	2	1	2	1	1	3	2	1	1	1	1	2	2	1	1	79
1. Individual	X	X	X	X	X			X	X	X	X	X		X	X				X	X	X	X	X	X	X					
2. Technology	X	X	X		X	X	X	X	X	X			X	X	X	X	X	X			X	X	X	X		X	X	X	X	
3. Organization	X	X	X		X	X	X	X	X	X			X	X	X	X	X	X						X		X		X	X	
4. Environment	X		X		X	X	X	X		X			X	X	X	X	X	X							X		X	X	X	

As publicly known, Malaysian SMEs categorize into five major sectors. As the statistics in the introduction above show, SME sectors contribute significantly to employment creation, exports, and national GDP in Malaysia. Most existing studies of this in Malaysian contexts focus only on one specific or general SME sector. The previous scholars were less concerned with investigating the other five SME sectors understudy, as illustrated in Table 1. Thus, it possibly reduces the generality and understanding of technology adoption in these five major SME sectors. The reason is that each of them might have slightly different concerns about adopting technological applications based on the scale and resources of firms (Ahmad, Bakar, Faziharudean, & Zaki, 2015; Senarathna, Wilkin, Yeoh, & Salzman, 2018).

However, within the Malaysian context, SMEs located in developed areas remain the main investigated focus areas instead of rural SMEs, as shown in Table 1. The adoption of technology by SMEs operating in rural and developed areas may be a concern. The reason is that those SMEs established in different locations may offer distinct insight into technology adoption due to differences in practice, culture, regulation, or other factors (Lim, Lim, & Trakulmaykee, 2018).

As such, the phenomenon of technology adoption remains unclear for Malaysian SMEs operating in rural areas. In this area, a scarcity context exists, and further investigation is needed. In this regard, this paper employs the narrative literature review method to identify the potentially relevant factors that may affect SMEs in rural contexts adopting the technology. It also proposes a theoretical framework for SMEs operating in rural areas on technology adoption into their operations.

Factors Affecting Technology Adoption in SMEs

The review of 79 articles on technology adoption in Malaysian SMEs revealed various factors affecting SMEs. The possible reason might be the differences in several aspects, such as underpinning theory focus, SMEs sector focus, area or location focus, the perspective of the selected factors concerned, and type of technological application focus, as highlighted in Table 1. Among these reviewed findings, a total of 12 factors select as potential factors that may affect SMEs who operate in rural areas to adopt technological applications: performance expectancy, effort expectancy, social influence, compatibility, complexity, perceived risk, top management support, organizational readiness, firm size, government support, competitive pressure, and customer pressure.

1. Performance Expectancy

Performance expectancy (PE) is the construct that explains the degree to which an individual believes that using the system will help the user attain gains in performance (Venkatesh et al., 2003). PE has been used extensively in technology adoption studies in SMEs. It provides a similar concept to other constructs: perceived usefulness, perceived benefit, and relative benefit (e.g. Faisal & Idris, 2019; Rastogi, Vernma, & Sushi, 2018). It then believed that utilizing a particular technology would offer wellness benefits to improve performance (e.g. Sombultawee, 2020; Mohammed, Niesten, & Gagliardi, 2020). Thus, extensive studies frequently refer to its concepts related to ICT (e.g. Ibrahim, 2018), e-commerce (e.g. Shahzad, Chin, Altaf, & Anwar, 2020), internet technology (e.g. Dasgupta & Gupta, 2019), or any other technological application.

After reviewing existing studies, PE found inconclusive results. SMEs claim that they intend to adopt technological applications. They are aware that adopted applications provide various benefits to their business. For example, opportunities for increasing business generation (e.g. Khyer, Talukder, Bao, & Hossain, 2020) and improving business efficiency and productivity (e.g. Ghobakhloo & Ng, 2019; Dincbas, Ergeneli, & Yigitbasioglu, 2021). Easing the internal

communication process (e.g. Adamkolo, Hassan, & Yusuf, 2016), accessing market information and knowledge (e.g. Selase et al., 2019). Reduction in operational costs (e.g. Shaharuddin, Rahman, Aziz, & Kassim, 2018) and other benefits.

Some SMEs, however, do not intend to adopt it until they see tangible benefits. A lower understanding of technological applications leads them to underestimate the effectiveness of technologies (Yoon, Lim, & Park, 2020). They are also less prioritized for their benefits or do not find it necessary to use the latest technologies (e.g. Rozmi, Bakar, Hadi, & Nordin, 2019). The reason is that they have used them more effectively since they were young (e.g. Basit, Tiong, & Hassan, 2020; Ming, On, Rayner, Guan, & Patricia, 2020). As for these previous findings, it is essential to understand why SMEs in rural contexts believe technological applications will improve their businesses.

2. Effort Expectancy

Effort expectancy (EE) explains the degree of ease associated with using the system (Venkatesh et al., 2003). EE has been studied extensively in technology adoption studies in SMEs and investigated in different technological applications, such as ICT (e.g. Rozmi, Nohuddin, Hadi, Bakar, & Nordin, 2020), e-commerce (e.g. Sombultawee, 2020), big data (e.g. Cabrera-Sánchez & Villarejo-Ramos, 2020), and other applications. The reason is that this construct captures how easy the technology is to implement (Cabrera-Sánchez & Villarejo-Ramos, 2020; Sombultawee, 2020). It also provides a similar concept to perceived ease of use which believes the technology can implement effortlessly or free of effort in terms of physical or mental (Johnson, Kiser, Washington, & Torres, 2018; Jaafreh, 2018; Selase et al., 2019; Basit, Tiong, & Hassan, 2020; Nuryyev et al., 2020).

As a result of reviewing existing studies, the EE found no conclusive results. SMEs agree that easy-to-use technological applications increase their intention to adopt (e.g. Rozmi, Bakar, Hadi, & Nordin, 2019). The reason is that they feel more confident about convenient accessing applications (e.g. Rozmi, Nordin, & Bakar, 2018). On the other hand, if they perceive the experience of utilizing it to be simple, easy to use, and engaging to use, this would also encourage them to intend to implement it (Shahzad, Chin, Altaf, & Anwar, 2020). However, other studies found two different concerns about the ease of use in SMEs. Some SMEs consist a negative perception of adopting technological applications (e.g. Rozmi, Nohuddin, Hadi, Bakar, & Nordin, 2020). The reason came across as a lack of knowledge and required time to explore novel things (e.g. Mohammed, Niesten, & Gagliardi, 2020). Others might be less concerned about the ease of use of technology. It shows they started to be aware of other aspects, such as social and management, regarding adopting technological applications (Basit, Tiong, & Hassan, 2020). In this respect, understanding the degree of the beliefs of SMEs in rural contexts about the ease of use of technological applications is crucial, and further investigation is needed.

3. Social Influence

Social influence (SI) explains the degree to individual perceives that significant others believe the user should use the new system (Venkatesh et al., 2003). SI has been studied extensively in the technology adoption studies of SMEs. This construct refers to the changes in the behavior of an individual in terms of thoughts, feelings, attitudes, or behaviors toward new technologies due to the beliefs, recommendations, suggestions, and expectations of significant others (e.g. Khyer, Talukder, Bao, & Hossain, 2020; Nuryyev et al., 2020). Additionally, it provides a similar concept to subjective norms regarding the relevance of values from significant others when using new technologies (e.g. Basit, Tiong, & Hassan, 2020; Rastogi, Verma, & Sushil, 2018).

Despite reviewing existing studies, SI remained unsure. SMEs claim that they were encouraged by numerous significant others, such as peers, investors, competitors, customers, suppliers, industry practitioners, and other entrepreneurs (e.g. Basit, Tiong, & Hassan, 2020, Rozmi, Bakar, Hadi, & Nordin, 2019). They positively acknowledge that technological applications are appropriate tools for their business (e.g. Lim, Suhaimi, & Low, 2016). On the other hand, a negative term like slow learner would reduce their interest in adopting it since they might spend more time on it (e.g. Shaharuddin, Rahman, Aziz, & Kassim, 2018).

However, some of them neglected the influence of their significant others. Their priorities are on the benefits of technologies rather than their use (e.g. Khyer, Talukder, Bao, & Hossain, 2020). Some may be early adopters (e.g. Shahzad, Chin, Altaf, & Anwar, 2020). Further research should focus on whether rural SMEs perceive significant others to require them to adopt the technology.

4. Compatibility

Compatibility explains the degree to which an innovation perceive as consistent with the values, experiences, and needs of potential adopters (e.g. Selase et al., 2019; Yoon, Lim, & Park, 2020). This construct has been studied widely in the technology adoption studies in SMEs. It can relate to how the technological applications fit with the existing infrastructure in the firm (e.g. Amron, Ibrahim, Bakar, & Chuprat, 2019). It also measures the available technologies and processes of the firm without an issue when using technologies (e.g. Dincbas, Ergeneli, & Yigitbasioglu, 2021).

The reviewed existing studies on compatibility indicated it is a solid positive factor for SMEs in technology adoption. SMEs agree that the adopted technological applications align with their current business condition, such as values, culture, beliefs, or business needs (e.g. Amron, Ibrahim, Bakar, & Chuprat, 2019). The most important aspect is matching their existing infrastructure, equipment, and previous technologies (e.g. Zainuddin et al., 2018). On another side, they do avoid the failure fitness of their existing business infrastructure (e.g. Ahmad, Bakar, Faziharudean, & Zaki, 2015). If not, they would face many difficulties in adopting the new technologies (e.g. Selase et al., 2019).

However, some studies discover that compatibility is not a significant issue for SMEs to adopt new technologies. Some SMEs claim that they excuse any problem if new applications are not fit their existing infrastructure (e.g. AlBar & Hoque, 2017). The reason is that they adopted it numerously. Some of them are primarily dependent on the policy of government-sanctioned technology adoption (e.g. Alrousan & Madadha, 2020). With the previous findings above, this construct requires further investigation for SMEs who operate in rural areas to perceive whether the new technological applications fit their values, experiences, and existing infrastructure.

5. Complexity

Complexity explains the degree to which an innovation is perceived as relatively difficult to understand and use (e.g. Yoon, Lim, & Park, 2020; Alrousan & Madadha, 2020). This construct has been studied widely in the technology adoption studies in SMEs. It measured their understanding of the new technological applications (e.g. Amron, Ibrahim, Bakar, & Chuprat, 2019). It is in terms of complicated either learning processes, handling, knowledge sharing, or others (e.g. Faisal & Idris, 2019; Zainuddin et al., 2018).

From the reviewed existing studies, the complexity remaining found an inconclusive result. SMEs claim that they always need to deal with the complexity of technologies. The reason is that certain technologies may sometimes need upgrades (e.g. Dincbas Ergeneli & Yigitbasioglu, 2021). It then causes them complicated to understand and learn the complexity

of the upgraded or current operating processes (e.g. Masood & Sonntag, 2020; Shaharuddin, Rahman, Aziz, & Kassim, 2018).

However, some studies discover different perspectives of SMEs not perceiving complexity issues when adopting new technologies. Some SMEs express that they are ready to learn new applications (Rozmi, Nordin, & Bakar, 2018). But, some argue that they do not see any difficulty or complexity in technologies. The reason lies that they heavily rely on technology adoption practices introduced by the government or lack familiarity with technological applications (AlBar & Hoque, 2017; Ahmad, Bakar, & Ahmad, 2018). In this respect, it is crucial to understand does SMEs in rural contexts perceive difficulty using the technological applications.

6. Perceived Risk

Perceived risk (PR) explains the degree to which individuals believe adopting technology will have uncertainty and adverse effects on their businesses (e.g. Shahzad, Chin, Altaf, & Anwar, 2020; Mohammed, Niesten, & Gagliardi, 2020). PR is one of the constructs studied widely in technology studies in SMEs. It could capture the fear and negative perception of the user in new technological applications (e.g. Abed, 2020; Giampietri & Trestini, 2020). The negative things include security, privacy, and other related risk issues (e.g. Khyer, Talukder, Bao, & Hossain, 2020). These negatives then increase the level of resistance to adoption in the firm (e.g. Lim, Lim, & Trakulmaykee, 2018).

From the reviewed existing studies, PR remaining found an inconclusive result. SMEs agree with various hazard risks they are worried about (e.g. John, Gwahula, & Msemwa, 2018). It contains theft, fraud, cyber-attack, exposure of data, alteration of data, loss of password, information hacking, misallocation of funds, and transaction delay (e.g. Rozmi, Nordin, & Bakar, 2018). But, security and privacy risks remain concerns for SMEs when adopting new technologies (e.g. Shahruddin, Rahman, Aziz, & Kassim, 2018). It lies about their lack of trust, discomfort, and insufficiency of protection of the legal system and law (e.g. Khyer, Talukder, Bao, & Hossain, 2020). With that, they primarily prefer traditional techniques like cash transactions in their day-to-day operations rather than innovations (e.g. Najib & Fahma, 2020).

However, certain SMEs point out that the above risks might not delay them from adopting technological applications. The reason is that they have been educated at a higher level and did adopt it since its establishment (e.g. Giampietri & Trestini, 2020; Shahzad, Chin, Altaf, & Anwar, 2020). Besides that, some still believe it is secure for them to adopt, particularly at the fundamental level, such as email and websites (e.g. Lim, Lim, & Trakulmaykee, 2018; Lim, Suhaimi, & Low, 2016). These inconsistent findings of this construct suggest an effort to investigate any negative terms of adopting new technologies by SMEs who operate in rural areas.

7. Top Management Support

Top management support (TMS) explains the level of support received from the higher management to adopt innovative technology for business use (Abed, 2020). TMS is one of the constructs studied widely in the technology adoption studies in SMEs. This construct represents the person who is the first to understand the potential advantage and problems of new technologies (e.g. Ahmad, Bakar, & Ahmad, 2018). It then makes the decision either give support in terms of resources and involvement to adopt or reject (e.g. Ming, On, Rayner, Guan, & Patricia, 2020; Zaidi & Belal, 2019).

From the reviewed existing studies, TMS remains considered the most significant factor for SMEs in technology adoption. SMEs claim that they are the ones who primarily take the role

of the decision-maker to hold the authority in allocating all financial resources (e.g. AlBar & Hoque, 2017). It then facilitates and increases awareness of their internal stakeholders, such as employees, in the participation to succeed in any technology adoption (e.g. Alrousan & Madadha, 2020; Khyer, Talukder, Bao, & Hossain, 2020). It also encourages them to use it for business purposes, including tactical, marketing tools, and other related activities (e.g. Qalati, Li, & Vela, 2020; Ahmad, Bakar, & Ahmad, 2018).

However, some only would allocate the required resources for the technology adoption if they recognize the potential advantage (e.g. Ming, On, Rayner, Guan, & Patricia, 2020). The resources include financial, human resources, and the changes in the firm infrastructure (e.g. Sugandini, Effendi, & Istanto, 2020). But, this construct is still unclear for SMEs in rural contexts, particularly on how the level of support received from their higher management to adopt new technological applications. Thus, a need to investigate it further.

8. Organizational Readiness

Organizational readiness (OR) explains the availability of the resources in the firm for adoption (Lim, Suhaimi, & Low, 2016; Lim, Lim, Trakulmaykee, 2018). OR is one of the constructs investigated widely in the technology adoption studies in SMEs. It reflects the level to which current resources of the firm, such as financial resources, technological infrastructure, skill, and knowledge of technology (e.g. Alam, Susmit, Lin, Masukujjaman, & Ho, 2021). It then can be ready for adopting the technologies (e.g. Ming, On, Rayner, Guan, & Patricia, 2020; Shahzad, Hassan, Abdullah, Hussain, & Fareed, 2020). OR notes to provide a similar concept to facilitating conditions (e.g. Cabrera-Sánchez & Villarejo-Ramos, 2020). It measures the availability of existing resources to support the new technological application adoption (e.g. Khyer, Talukder, Bao, & Hossain, 2020; Sombultawee, 2020).

The reviewed existing studies highlighted OR be a significant factor for SMEs in technology adoption. Most SMEs agree that sufficient existing resources would motivate and accelerate them to adopt the new technology applications (e.g. Dincbas, Ergeneli, & Yigitbasioglu, 2021). The mentioned resources above include technological infrastructure, technical human resources, financial, technical support, and other related resources (e.g. Khyer, Talukder, Bao, & Hossain, 2020; Ming, On, Rayner, Guan, & Patricia, 2020).

But, the main issue is that they remain to face a scarcity of resources (e.g. Lim, Lim, & Trakulmaykee, 2018), as explained above. It is thus sensitive to resource allocation in adopting technology (e.g. Sombultawee, 2020). Sometimes that necessitates spending more of their already scarce resources. It might further delay their adoption (e.g. Rozmi, Nordin, & Bakar, 2018). On another side, some SMEs asserted they might not experience the scarcity of technical human resources like technological expertise. They had received substantial training and development courses since they were young (e.g. Koe & Sakir, 2020). Based on the reviewed findings above, it is crucial to confirm the availability of resources by SMEs in rural contexts making decisions to adopt the new technologies.

9. Firm Size

Firm size (FS) is a construct that has received less attention in studies of technology adoption in SMEs. The previous research prioritizes other important variables or sometimes treats FS as the control variable (e.g. Senarathna, Wilkin, Yeoh, & Salzman, 2018). But, FS is significant for SMEs. It would present the flexibility of the enterprises in adjusting the necessary actions to adopt technological applications. It also shows how quickly their larger counterparts are (Jere & Ngidi, 2020). But, the main issue is that they may be less competitive than them due to the scarcity of resources (Sani et al., 2020).

In the Malaysian context, FS explains the sales turnover and employees for micro, small, and medium-sized enterprises (SME Corp. Malaysia, 2022). From the reviewed existing studies, FS played a crucial factor that affected the new technologies by SMEs. SMEs agree that they have different availability of resources based on the size of their enterprises. They further claim that compared to micro-sized enterprises, small- and medium-sized enterprises have more excellent resources to adopt technological applications (e.g. Senarathna, Wilkin, Yeoh, & Salzman, 2018).

Interestingly, small-sized enterprises have limited resources. But, compared to their larger counterpart, they are still recognized as more flexible and reactive toward technological applications (Giampietri & Trestini, 2020). The reason is that SMEs believe adopting technologies in their business operation would reduce the gap between them and larger-sized firms in market share (Alrousan & Madadha, 2020). Based on the above-reviewed findings of FS suggests a need to identify the impact of sized enterprises of SMEs in rural contexts in adopting the new technologies.

10. Government Support

Government support (GS) explains the support from the government to assist technology adoption (e.g. Alrousan & Madadha, 2020, Mohammed, Niesten, & Gagliardi, 2020). GS is one of the constructs that received substantial study in the technology adoption of SMEs. It presents the effort provided by the government to promote the firm adopting new technology to grow and sustain itself in the competitive market (e.g. Alam, Susmit, Lin, Masukujjaman, & Ho, 2021; Jere & Ngidi, 2020).

From the reviewed existing studies, GS is the most controversial and debatable factor for technology adoption in SMEs. SMEs have welcomed government initiatives or assistance (e.g. Nuryyev et al., 2020 ; Shaharuddin, Rahman, Aziz, & Kassim, 2018). They also agreed that the government did provide sufficient support in response to their weakness of present resources like finances and knowledge. The given program from the government is information, infrastructure (e.g. Shaharuddin, Rahman, Aziz, & Kassim, 2018), training (e.g. Nuryyev et al., 2020), and technical workshops. Cyber laws, financial sources (e.g. Lim, Suhaimi & Low, 2016), agencies (e.g. Ahmad, Bakar, Faziharudean, & Zaki, 2015), and other related supports also undercount that.

However, other studies discover different perspectives of SMEs on government support. Some SMEs remain to argue that the provided support by the government did not meet their specific needs or desired services (e.g. Ming, On, Rayner, Guan, & Patricia, 2020). In this concern, insufficient support remains encountered by SMEs. The reason is that they complain about inadequate legal protection of online transactions, unclear business laws, and a lack of facilitators of technology adoption (e.g. Alia, Miao, & Tran, 2018). On another side, they perceive any support introduced by the government as requiring payment for it and not beneficial for their business (e.g. Rozmi, Nohuddin, Hadi, Bakar, & Nordin, 2020). With these arguable findings of government support, it is crucial to identify the impact of the provided support by the government on SMEs in rural contexts in adopting the new technologies.

11. Competitive Pressure

Competitive pressure (ComP) explains a firm adopting new technologies when they discover the existence of pressure from rivals or competitors employing the same technology within the industry (e.g. Alam, Susmit, Lin, Masukujjaman, 2021; Alrousan & Madadha, 2020). ComP is one of the constructs that has been studied extensively in the technology adoption studies of SMEs. It captures the extent of industrial rivalry and competitors exerting pressure

on the firm in technology (e.g. Ming, On, Rayner, Guan, & Patricia, 2020; Yoon, Lim, & Park, 2020).

From the reviewed existing studies, ComP remaining found an inconclusive result. SMEs strongly agree that the aggressive pressure from competitors has forced and driven them to adopt the technologies more extensively (e.g. Alrousan & Madadha, 2020). It not only helps them to gain competitive advantages, such as effective distribution channel and communication process but also place them in a better position in the market. It can be diversified and considered the potential to develop a niche market (e.g. Lim, Lim, & Trakulmaykee, 2018; Shahrudin, Rahman, Aziz, & Kassim, 2018). The central pressure is that they are afraid of lagging behind their competitors and facing aggressive competition in the future (e.g. Ahmad, Bakar, & Ahmad, 2018). But then they are unclear about the technological applications adopted (e.g. Rozmi, Nordin, & Bakar, 2018).

However, other studies discover a slightly different viewpoint of SMEs on the pressure from competitors. Some SMEs reflect that adopting new technologies is not an essential tool for them (e.g. Giampietri & Trestini, 2020). The reason lies that they typically focus on direct contact with their customers as the primary method (e.g. Yoon, Lim, & Park, 2020). Some argue that new technologies have become feasible and socially acceptable in nowadays market (e.g. Ghobakhloo & Ng, 2019). It, therefore, is their strategic necessity in the competitive market to achieve agility, increase market responsiveness and sustain competitiveness (e.g. Ghobakhloo & Ng, 2019). But, still, numerous SMEs remain just waiting to see how the trends of technology adoption in the market (e.g. Alia, Miao, & Tran, 2018). They believe it would not provide a competitive advantage for them in the market (e.g. Shahzad, Hassan, Abdullah, Hussain, & Fareed, 2020). These inconsistent findings suggest an effort to understand this construct. In detail on how SMEs operating in rural areas react to technology adoption, particularly discovering the existence of pressure from competitors using technologies.

12. Customer Pressure

Customer pressure (CusP) explains the pressure from customers to push the firm to adopt new technology to satisfy their needs and expectations (e.g. Abed, 2020; Shahzad, Hassan, Abdullah, Hussain, & Fareed, 2020). The CusP has been studied widely in the technology adoption studies in SMEs. It is a significant factor driving firms to adopt new technology (e.g. Alam, Susmit, Lin, Masukujjaman, & Ho, 2021). It also captures the expectations and diverse needs (e.g. Dincbas, Ergeneli, & Yigitbasioglu, 2021).

From the reviewed existing studies, CusP remaining found an inconclusive result. SMEs confirm that the pressure from their customers leads them to adopt new technological applications. It then meets their expectations (e.g. Ghobakhloo & Ngidi, 2019). But, some of them ignore the customer pressure. They are hard to balance the feedback from their customer pressure. The reason is that their customers sometimes complain that the new technologies are hard to use (e.g. Al-Gharaibah, 2020; Shahzad). On the other hand, customers satisfy if it is less complex and time to use (e.g. Hassan, Abdullah, Hussain, & Fareed, 2020). These inconsistent findings of customer pressure suggest a need to investigate the phenomenon of SMEs in rural contexts in technology adoption in this aspect.

The Development of the Theoretical Framework of Technology Adoption for SMEs

The review of 79 articles on technology adoption studies in Malaysian SMEs enables the researcher to identify the trend of theoretical underpinning in this respect. It then selects the theory to underpin the theoretical framework as fundamental. It also follows a brief explanation of the underpinned technology adoption models.

1. From Theory Underpinning to a Theoretical Framework

From the review of 79 articles, the existing studies showed considerable interest in integrating or incorporating the attributes from numerous technology adoption models in researching technology adoption in SMEs. For example, integrating theories between the Diffusion of Innovation (DOI), Resource-based View theory (RBV), Technology-Organization-Environment (TOE) Framework, Unified Theory of Acceptance and Use of Technology (UTAUT), Theory of Reasoned Action (TRA), Theory of Planned Behaviour (TPB), and Technology Acceptance Model (TAM). The reason for this regard is that previous scholars intend to relate the influential factors. It follows by providing a better understanding of how SMEs deal with technological adoption issues (Alroushan & Madadha, 2020; Basit, Tiong, & Hassan, 2020; Mohammed, Niesten, & Gagliardi, 2020; Sued, 2020; Yoon, Lim, & Park, 2020).

Specifically, the integration of theories not only helps to explore the different perspectives of technology adoption in SMEs. It also addresses the limitation of the model itself that focuses on a single aspect. For example, DOI shows the technological perspective. Individual behavioral perspectives underpinned by UTAUT, TRA, TPB, and TAM. In this respect, this paper integrates two theories of UTAUT and the Technology-Organization-Environment (TOE) framework into the fundamentals. Before proposing the theoretical framework of technology adoption for Malaysian SMEs in the rural context, a brief explanation of these models would discuss as follows.

2. Unified Theory of Acceptance and Use of Technology (UTAUT)

The UTAUT proposed by Venkatesh et al. in 2003 is to facilitate the user intention and subsequent behavior in the technology adoption and rejection across time. The UTAUT was established based on the constructs of eight established models. It includes the TRA, TBP, IDT, TAM, and other theories or models like the Motivational model, the combined TAM-TPB, the model of PC Utilization, and the Social Cognitive Theory (Venkatesh et al., 2003). UTAUT was also to solve some of the limitations in the TAM model. It refers to excluding crucial restrictions like necessary resources (e.g. time and money) that might affect or prohibit an individual from adopting an information system.

The UTAUT states that behavior or actual use of a system is affected by facilitating conditions (FC) and intention. Specifically, the intended behavior of using a system is also affected by three factors, including performance expectancy (PE), effort expectancy (EE), and social influence (SI). Venkatesh et al. (2003) tested this UTAUT model in numerous circumstances. The tested result explained 70% of the variance in intention to use (R²). It then indicated a significant improvement over prior models (Venkatesh et al., 2003).

3. Technology-Organization-Environment (TOE) Framework

Tornatzky and Fleisher developed the TOE framework in 1990 to evaluate a firm's process of adopting and implementing technological innovation in different dimensions: technology adoption, the likelihood of adoption, intention to adopt, and extent of adoption. TOE framework anticipated that technology adoption is affected by three perspectives. It refers to technological, organizational, and environmental. These three components also offer both limits and potential for technical innovation in this respect. As a result, these three factors recognized an impact on how a firm views the need for new technology, searches, and uses for it.

Discussion

A Proposed Theoretical Framework of Technology Adoption for Malaysian SMEs in the Rural Context

As a recapitulation, the scarcity of study contexts in rural areas for SMEs to adopt technological applications. It includes a research framework of technology adoption that focuses on SMEs in the rural context. It then drives the interest of this paper to propose the theoretical framework for this aspect. The selection of integration between the UTAUT and TOE framework make for several reasons. First, both theories are widely utilized and recognized in technology studies (e.g. Alraja, Hussein, & Ahmed, 2021; Cabrera-Sánchez & Villarejo-Ramos, 2020; Dinçbas, Ergeneli, & Yigitbasioglu, 2021). They are considered comprehensive theories in this regard (e.g. Low, Lata, & Jabbour, 2021; Ming, On, Rayner, Guan, & Patricia, 2020; Mohammed, Niesten, & Gagliardi, 2020). Second, multiple factors can construct from the two theories to reveal the reality of technology adoption in SMEs (Abu, Jabar, & Yunus, 2015). Third, integrating these two theories provides a flexible framework (e.g. Lim, Suhaimi, & Low, 2016). It then analyzes the relevant determinants of technology adoption from multiple perspectives (e.g. Lim, Suhaimi, & Low, 2017; Sin & Sin, 2020).

Aside from the reasons above, addressing the research gaps or future directions in technology adoption studies is the main interest in integrating UTAUT and TOE framework. The existing studies suggest combining the relevant constructs from theories under the four perspectives: individual, technological, organizational, and environmental (El-Haddadeh, 2020; Khyer, Talukder, Bao, & Hossain, 2020; Koe & Sakir, 2020; Othman & Shahzad, 2016). In this regard, this paper integrates these two theories to propose a more comprehensive theoretical framework. It incorporates a larger number of potentially significant constructs, as discussed in Section 4, that may affect Malaysian SMEs to adopt technology in the rural context.

Understanding and identifying the underpinned theory focus concept is crucial before proposing the theoretical framework. Among the review of 79 articles, several underpinned theory focus has been used in the previous research to measure the technology adoption. It is either intended to adopt, actual use, or extent of adoption, as highlighted in Table 1.

The intention to adopt can be known as the behavior intention (Venkatesh et al., 2003). It refers to a specified behavior performed by the strength of one intention (Jaafreh, 2018). Relating the context of technology adoption in SMEs refers to the intention of SMEs to adopt a particular technology application (Monhammed, Niesten & Gagliardi, 2020; Zaremohzzabieh et al., 2015). For example, if SMEs with high confidence in the new technology, they intend to adopt it (Sani et al., 2020). In the intention phase, if SMEs anticipate future trends that using a particular technological application could preserve competitive positions in the industry consequentially (Pappas, Caputo, Pellegrini, Marzi, & Michopoulou, 2021), their intention will lead to the actual adoption of an innovation (Lim, Suhaimi & Low, 2016). However, the concern is that only emphasizing the intention of SMEs as a single primary focus might limit the actual phenomenon of technology adoption. The reason is that their intention expects to affect the actual adoption of technology (Abu, Jabar, & Yunus, 2015).

In this respect, lots of previous research did consider the other measurement concept: actual use, to investigate the phenomenon of technology adoption in SMEs. This actual use can be known as user behavior (Venkatesh et al., 2003). It refers to the shift of using a particular technological application by a firm for its entrepreneurial development (Adamkolo, Hassan, & Yusuf, 2016). Generally, with this measurement concept, the technology adoption by SMEs can lead to two situations: adopt or not adopt (Amrona et al., 2019). With that, it expects that those SMEs who adopt technologies may enable them to deal with different business activities. It thus leads to better performance or vice versa (Salimon et al., 2018).

Aside from that, the extent of adoption is one of the other measurement concepts. But, it is just a few considered by previous research to understand the degree to of a firm uses the adopted technological applications (Tornatzky and Fleisher, 1990; Guo et al., 2020). Under this measurement concept, SMEs consider a low extent of adoption if they use technological applications less. In this sense, SMEs could seem to have a high digitalization level if they widely use their adopted technology applications in their business operation (Yan, Falahat & Sia, 2021).

In this regard, by applying all discussions above (i.e., the identified factors in Section 4, the reasons for the selection of these two theories, the found gaps, and underpinned theory focus concept), this paper started to propose the theoretical framework of technology adoption for Malaysian SMEs in the rural context. UTAUT presents the idea of individual perspectives. It refers to the enterprise's intention and subsequent behavior in adopting or rejecting the technology over time. The factors under this perspective include performance expectancy, effort expectancy, and social influence, which affect the intention to adopt.

In the meantime, the TOE framework displays the perspectives as its names. The selected factors affect the intention to adopt and actual use. The technological perspective refers to the characteristics of existing and new technologies relevant for an enterprise to adopt. It includes compatibility, complexity, and perceived risk. Organizational perspective refers to the structure related to the enterprise, such as top management support, organizational resources, and firm size. The environmental perspective focuses on the areas in which the enterprise conducts its business activities. It then prioritizes the external factors such as government support, competitive pressure, and customer pressure that affect the technology adoption by a firm.

This paper proposes the direct effect on the intention that would affect actual adoption. It also includes the concept of the extent of adoption to understand the digitalization level of SMEs in rural contexts in the studied particular context based on the actual adoption. Finally, based on the discussion, a visualization of the theoretical framework of technology adoption for Malaysian SMEs in the rural context is proposed, as illustrated in Figure 2.

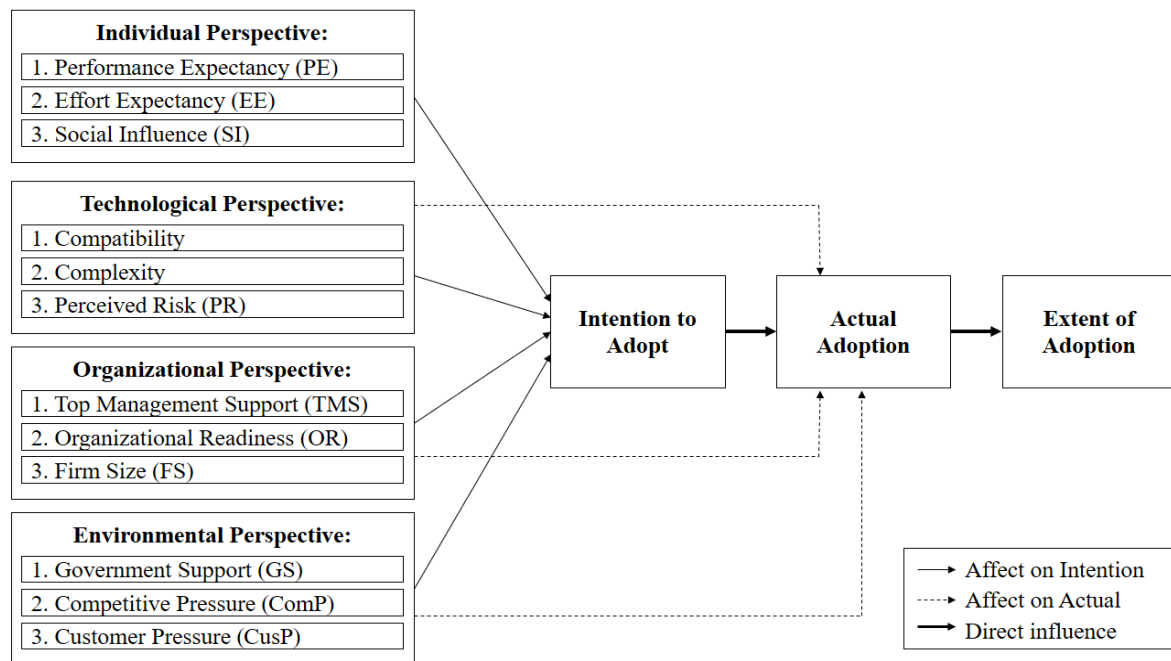


Figure 2: A Proposed Theoretical Framework of Technology Adoption for Malaysian SMEs in the Rural Context.

Source: Adapted by the author based on Venkatesh et al. (2003) & Tornatzky and Fleisher (1990).

Conclusion

In this new normal of the business environment, adopting technological applications might become essential for SMEs. But, a low rate of technology adoption issues remains encountered by SMEs. It drives the interest of the existing research in investigating the reasons behind it. Yet, the scarcity of studies of technology adoption of SMEs in the rural context. It also includes a research framework in this regard. In this aspect, the purpose of this paper is to propose a theoretical framework for Malaysian SMEs in the rural context. It also with the potentially relevant factors from multiple perspectives that may affect SMEs to adopt technologies. This paper utilizes the narrative literature review method to review 79 articles on SMEs' technology adoption studies. Twelve (12) factors are identified and discussed as the potential significant constructs that may affect SMEs who operate in rural areas in adopting technological applications. In the reviewing process, the existing technology adoption studies in SMEs also suggested combining the relevant constructs under multiple perspectives to investigate the technology adoption in SMEs. It includes individual, technological, organizational, and environmental perspectives. With that, this paper integrates UTAUT and TOE frameworks to propose the theoretical framework for the technology adoption of Malaysian SMEs in the rural context. UTAUT is selected to present the individual perspective, and the TOE framework displays its names.

In this regard, this paper addresses the gap by proposing a theoretical framework. It then identifies the relevant potential factors that may affect Malaysian SMEs in rural areas on technology adoption according to the related perspectives, as illustrated in Figure 2. As a result, technology adoption in SMEs that operate in rural areas argued to be affected by various factors from different perspectives (Dincbas, Ergenli, & Yigitbasioglu, 2021; Khyer, Talukder, Bao, & Hossain, 2020; Ming, On, Rayner, Guan, & Patricia, 2020; Jere & Ngidi, 2020; Qalati et al., 2020). Interestingly, this proposed framework could be the initial fundamental before the empirical study in the future. But, the findings of this paper may only provide an applicable guideline from a theoretical perspective. Future studies suggest using a mixed-method approach to validate the proposed framework. Despite that, the findings of this paper provide a literal idea offering that the government or the Ministry of Rural Development should consider appropriate guidelines from individual, technological, organizational, and environmental aspects to encourage SMEs operating in rural areas to adopt technologies.

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