

A Conceptual Framework for Studying Technology Adoption of Malaysian SME Retailers

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ABSTRACT

This paper is fundamentally a conceptual paper that proposes a framework for researchers to study technology adoption by small and medium-sized enterprise (SMER) retailers in Malaysia by combining the dimensions of the system-specific approach and latent personality dimensions. This paper focuses on existing theoretical frameworks and paradigms in the study of technology adoption by SMERs. However, it also draws on a database of reviews of past studies conducted in the field of technology adoption and identifies two fundamental paradigms: the system-specific approach and the latent personality dimensions' approach. The paper also draws upon the empirical findings of these studies to determine and define the elements of the proposed conceptual framework. The available empirical data from the conclusions of existing research studies are, therefore, bound by the limits of these two paradigms. This paper proposes a conceptual framework and language that scholars can utilise to take a more holistic approach, which bridges the gap between the two existing paradigms. The study has a theoretical contribution as it aims to propose a new model for the technology adoption of SMERs by incorporating the system-specific and latent personality behaviour paradigms. The second theoretical contribution of this framework is that it can test the moderating effect of latent personality dimensions. Furthermore, the paper is in alignment with the Government of Malaysia's National 4IR Policy. This paper modifies three existing theoretical frameworks- TAM, TOE, and TRI, thereby proposing a new conceptual model for technology adoption of SMERs.

Keywords: *Technology Adoption, SME, Retail, TAM, TOE*

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1.0 INTRODUCTION

Retailing has been defined in the literature as a set of activities involved in selling products and services to the final consumer, not for resale but for consumption (Behera et al., 2021; Claro et al., 2021; de Oliveira Santini et al., 2021). In other words, retail can be understood as the process of selling individual units or small lots of products and services to a large number of consumers by a business set up for that specific purpose (Behera et al., 2021; Claro et al., 2021; de Oliveira Santini et al., 2021).

1.1. Overview of the Malaysian Retail Industry

The Malaysian retail industry is highly significant to the national economy. It contributes to approximately 37% of the country's gross domestic product (GDP) (Department of Statistics Malaysia, 2021). In addition, the Malaysian retail industry provides jobs for approximately 2 million people, that is, 13% of Malaysia's working population, and generated revenue amounting to RM 1,321.7 billion (USD 313.07 billion) in the financial year 2020–2021 (DOSM, 2021). These figures underscore the importance of this industry to the country. The largest contributor to Malaysia's retail industry is the F&B sector, which accounts for 35% of the industry. Next is the Garments and Footwear sector, which contributes almost 25% to the retail industry, while the Personal and Household Care sector, with a 15% contribution, is the third-largest sector in the retail industry.

1.2. Landscape of Malaysian Small and Medium Retail Enterprises

The Malaysian retail sector is highly fragmented, with a large number of small-to medium-sized retail firms compared to larger firms (Department of Statistics Malaysia, 2021). Despite the higher number of SMEs (75%) in Malaysia's retail sector, their contribution to the retail sector's GDP is 53% (Department of Statistics Malaysia, 2021). Although larger firms, including multinational enterprises, big-box retailers such as hypermarkets/supermarkets, and chain retailers, make up only 25% of the retail sector in Malaysia, their contribution to the national economy, in terms of retail sector GDP, is 46% (Department of Statistics Malaysia, 2021). These numbers reveal that SME retailers are underperforming in Malaysia's retail sector, whereas larger firms and big-box retailers, despite constituting a minority in terms of segment size, make a disproportionately higher contribution.

1.3. Significance of Technology Adoption

In the global retail landscape, technology adoption has played a significant role in the transformation of traditional retail into highly efficient and cost-effective retail 4.0, with the adoption of digital tools such as cloud computing, big data analysis, social media marketing, inventory optimisation tools, stock-tracking tools, easy payments, shrinkage control tools, RFID tagging, customisation of products, omni-channel retailing, and the use of artificial intelligence and virtual reality for virtual trials (Cai et al., 2022; de Oliveira Santini et al., 2021; Goyal et al., 2016; Hutchinson et al., 2015; Stoyanov, 2020). The adoption of these tools by retail firms has given them a competitive advantage and helped them meet business objectives efficiently by delivering value to all stages of the supply chain from production to retail, and hence, ultimately adding value to the bottom line (Bai et al., 2021; Behera et al., 2021; Claro et al., 2021; de Oliveira Santini et al., 2021; Fei et al., 2010; Ghobakhloo et al., 2022a; Jung et al., 2021; Kim & Hu, 2021; Kumagai & Nagasawa, 2021; Mahadevan & Joshi, 2021; Monoarfa et al., 2021; Testa & Karpova, 2020; Wilkinson et al., 2021).

A recent study by Monetate and WBR Research (2018) concluded that personalisation strategies, retail solutions, inventory control, easy payments, experiential marketing, and omnichannel retail have enabled firms to realise higher revenues at a comparatively lower cost, with a return that is almost six times that of

the investment (Blaise et al., 2021; Kang et al., 2021; Stoyanov, 2020). This, in turn, means that retail players are placing greater emphasis on technology adoption.

The gains through technology adoption are not limited to larger firms. Past studies have concluded that technology adoption also helps SMEs gain better access to resources, including financial resources (e.g., peer-to-peer interest-free lending), human resources (e.g., recruitment portals and training channels), and a multitude of government services. Technology adoption also supports innovation among SMEs through greater access to innovation-related assets, as well as improves firm performance by enabling SMEs to generate and analyse data to enhance business and operational efficiency (Nair et al., 2019; Taiminen & Karjaluo, 2015).

In Malaysia, technology adoption is slowly gaining traction in the retail industry, with the first movers being large and mid-sized retail firms. Security systems help provide a safe shopping experience and control shrinkage. Such technological advancements are only beginning to emerge for Malaysian retailers, and the industry has acknowledged the need for them (Jayaram, 2017; Kazancoglu & Aydin, 2018; Paydar et al., 2014). There are other retail technological solutions which are being adopted by large and mid-size retailers in Malaysia like AEON Big, Jaya Grocers, 7/11, Parksons and Tesco, some of which range from POS applications, RFID inventory racks, stock tracking tools, and other ERP packages and solutions like Retail Pro, Retek, JDA, SAP IS Retail, which help in facilitating back-end as well as front end operations (Jocovski et al., 2019; Sakrabani & Teoh, 2021; Ye et al., 2018).

Similarly, technology adoption has played a pivotal role for local SMEs in Malaysia. According to a recent study by Jayaram (2019), technology adoption has helped reduce SMEs' transactional costs by almost 30%. Technology adoption has opened up new avenues for Malaysian SMEs, giving them access to broader markets, both locally and internationally. In terms of access to resources, technology adoption has also exposed SMEs to a variety of resources, which, without digitisation, would go unutilised or misutilised (Alshamaila et al., 2013; Beynon et al., 2021; Chatterjee et al., 2021; Depaoli et al., 2020; Dutta et al., 2020; Ghobakhloo et al., 2022b; Nair et al., 2019; Shetty & Panda, 2022). Data-driven business analysis has helped SMEs reduce costs and improve efficiency. The importance of technology adoption has also been realised by the Government of Malaysia. To boost the digitisation of the economy, including the SME sector, the government has revamped its digital policies through initiatives such as the National 4IR policy, which aims to catapult Malaysia into a high-income nation by adopting Industry 4.0 technologies. Another such government policy is the Malaysia Digital Economy Blueprint by the Economic Planning Unit of the PMO.

2.0 RESEARCH METHODOLOGY

The primary research objectives of this study were to conduct a literature review to determine:

- i. How has technology adoption been defined in the retail context in the literature?
- ii. What theories have been used in the literature to examine technology adoption?
- iii. Identification of gaps in the literature as the first step towards the development of a conceptual framework for technology adoption by Malaysian SME retailers

The remainder of this paper elucidates the available literature on technology adoption, the theories that explain it, and the formulation of a conceptual framework, all grounded in the research hypotheses.

3.0 LITERATURE REVIEW

Carr (1999) defined technology adoption as the “stage of selecting a technology for use by an individual or an organisation.” Other definitions of technology adoption in the literature include: “the choice to acquire and use an innovation” (Hall & Khan, 2016). “The stage at which a technology is mentally accepted by an individual or an organization after which the individual or the organisation decides to utilise and implement a technology” (Laurenza et al., 2018). “The extent to which a given technology becomes accepted and incorporated into approved social practices” (Ayinla, 2017). (2022). “Adoption of relevant innovations to make the organisation more effective and efficient, to gain a competitive edge and meet business objectives” (2022).

Previous studies on technology adoption have shown that the adoption of a novel innovation or idea is not immediate for all users and organisations. A seminal study on the same topic was conducted by Everett Rogers in his book titled “Diffusion of Innovations,” which was first published in 1962, with the latest revised edition published in 2003. Rogers explained that the spread of a new idea, innovation, or technology occurs in a “life cycle” or “technology adoption life cycle.” Innovators are among the earliest adopters, while the “late majority” and “laggards” are among the last adopters. In the domain of retail technology adoption, SME retailers often fall into the late majority or laggard stages (Agostini & Nosella, 2020; Arendt, 2008; Eze et al., 2019; Parra-Sánchez et al., 2021).

In light of this discussion of technology adoption, researchers and academics have offered different definitions for this term. A summary of some of the definitions of technology adoption is presented in Table 3.1.

Table 3.1 Definitions of Technology Adoption

Definition	Author(S)
“The stage of selecting a technology for use by an individual or an organisation”	(Carr, 1999)
“The choice to acquire and use an innovation”	(Hall & Khan, 2016)
“The stage at which a technology is mentally accepted by an individual or an organization after which the individual or the organisation decides to utilise and implement a technology”	(Laurenza et al., 2018)
“The extent by which a given technology becomes accepted and incorporated into approved social practices”	(Ayinla, 2017)
“Adoption of relevant innovations to make the organisation more effective and efficient, with the purpose of gaining a competitive edge and meeting business objectives”	(Zamani, 2022)

The existing definitions, as listed in Table 3.1, show that academics have focused on the conscious choice of individuals and organisations to adopt new technology (Agostini & Nosella, 2020; Hall & Khan, 2016), which occurs at a particular stage of decision-making (Dutta et al., 2020; Laurenza et al., 2018). Some academics have also argued that technology adoption is not simply the usage of a particular technology but also the mental acceptance of individuals and organisations, implying behavioural and personality dimensions in addition to a technology-specific approach (Ayinla, 2017; Laurenza et al., 2018).

In addition, technology adoption must always translate into tangible gains, either making organisations

more efficient in cutting costs or more effective in meeting business objectives (Zamani, 2022). Table 3.1 discusses the adoption of technology by an organisation and the benefits it brings to the organisation. However, in the context of retail, technology adoption also requires a discussion on the type of technology that is most effective for retail organisations. In the literature on technology adoption in the context of SME retailers, there are two schools of thought. The first school of thought has specifically defined technology and studied the adoption of that particular technology as its research construct. The second school of thought has not specifically defined technology but has kept the research construct general, that is, technology adoption itself. The reason behind this is to keep it broad to let the SME owners and Top Management has the freedom to decide the technology that is most relevant to them. Table 3.2 lists and summarises both schools and their chosen research construct.

Table 3.2 Two schools of thought for technology adoption for SME retailers

Technology	Representative Studies
RFID	Alomari (2022); Bruno-Valdivia et al. (2022); Konecka and Maryniak (2020); Morenza-Cinos et al. (2019)
E-Business/E-Commerce	Battisti and Brem (2021); Bhatti et al. (2022); Krishna and Arora (2022); Li and Ai (2021); Mkansi (2022)
Customer Relationship Management (CRM)	Chatterjee et al. (2022); Giovannetti et al. (2022); Hendler et al. (2022); Perez-Vega et al. (2022); Yadav (2022)
Electronic Payment (E-Payment)	Hasbolah et al. (2023); Malaquias and Malaquias (2022); Rahadi et al. (2022); Talib and Salman (2022); Tripković and Simić (2023)
Loyalty Card Systems	Abdul et al. (2021); Fearne et al. (2022); Jamshidi and Kuanova (2022); Lee (2021); Mitchell (2021); Ortt and Schoormans (2004); Wait (2022)
Inventory Management Systems	Alshamaila et al. (2013); Cordery et al. (2011); Jain and Gandhi (2021); Jayaram (2017); Mao (2021); Sillah (2015)

Second School of Thought: Technology Adoption as an Organizational Capability

Research Construct	Representative Studies
Technology Adoption	Abdul et al. (2021); Anand et al. (2020); Giotopoulos et al. (2022); Hu and Kee (2022); Marcon et al. (2022); Martins (2022); Mitchell (2021); Ortt and Schoormans (2004); Salo and Tan (2021); Yawised et al. (2022)

1.4. Literature Review: Theories Explaining Technology Adoption

In the literature on technology adoption, several theories have been proposed to explain a firm's acceptance and adoption of new technologies and innovations. Some of these theories focus on the intricacies or complexity of the technology or system itself, while others take a more holistic approach by incorporating external factors. Others focus on cognitive and behavioural aspects because their approach is more psychoanalytic. Table 3.3 lists some of the most commonly used theories to explain technology adoption and their explanations.

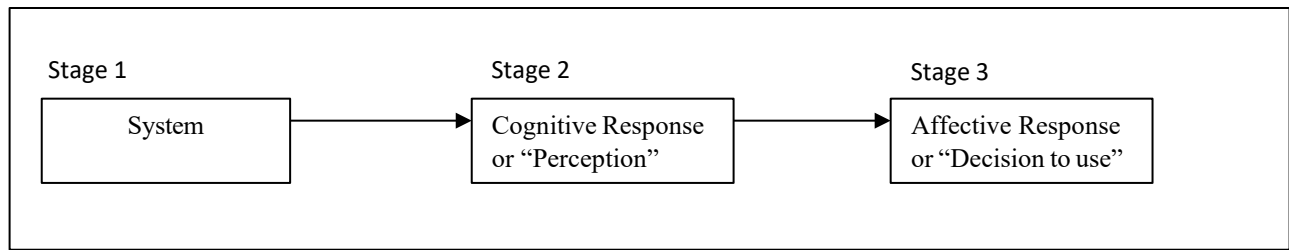
Context	Description	Examples of Factors
Technological Context	Refers to the internal and external technologies available to the firm that influence the adoption of innovation. These include the perceived characteristics of the technology such as relative advantage, compatibility, complexity, security, and technological readiness.	Relative advantage, compatibility, complexity, technological readiness, IT infrastructure
Organizational Context	Refers to the characteristics and resources of the organization that affect innovation adoption, including firm size, managerial support, organizational culture, financial resources, and employee competence.	Top management support, organizational readiness, firm size, financial resources, employee expertise
Environmental Context	Refers to the external environment in which the organization operates, including industry characteristics, competition, government regulations, customer pressure, and support from technology vendors.	Competitive pressure, government support, regulatory environment, trading partner pressure, vendor support

Table 3.3 shows that two major research paradigms have emerged to explain technology adoption and acceptance. Porter and Donthu (2006) have labelled these two paradigms as *the system-specific paradigm* and *the latent personality dimension paradigm*, respectively. In the system-specific paradigm, technology adoption is studied from the perspective of the system or technology. In contrast, in the latent personality dimension paradigm, technology adoption is studied from the perspective of an individual's latent behaviour or personality traits (Porter & Donthu, 2006).

As shown in Table 3.3, theories such as TAM, TAM 2, and TTF fall under the "system-specific paradigm". This is because all three theories focus on the attributes of the technology at hand and study technology adoption accordingly. In the case of TAM, two predictors—*perceived ease of use (PEU)* and *perceived usefulness (PU)*—determine adoption by analysing the degree to which a technology is useful and simple to use (Cai et al., 2022; Sciarelli et al., 2022). TAM 2 follows the same approach as TAM; however, it removes the "attitude to use" construct from the initial model and establishes a direct relationship between the attributes of technology—PEU and PU—and technology adoption (Gangwar et al., 2015). TTF also studies the technology adoption process by focusing on the technology's relevance to the tasks users need to perform. Therefore, TTF also falls within the system-specific paradigm. This process is depicted in Figure 3.1.

Figure 3.1

System-Specific Approach of TAM



TOE and UTAUT attempt to take a more holistic approach by incorporating external factors, such as *the environment* and *organization* in TOE, and *social influence* and *facilitating conditions* in UTAUT. Between TOE and UTAUT, TOE is more holistic because it considers the organisational element, which UTAUT does not (Gangwar et al., 2015; Mahakittikun et al., 2021). However, for both UTAUT and TOE, system design or technological attributes play a central role, and despite their holistic approach, both are considered extensions of a system-specific paradigm. Porter and Donthu (2006) call this an *extended systems approach (ESA)* to the system-specific paradigm, which is not a new paradigm in itself but rather the same paradigm as the system-specific paradigm, because technological attributes are the key dimensions for both TOE and UTAUT. This process is illustrated in Figure 3.2 below.

Figure 3.2
Extended Systems Specific Approach of TOE

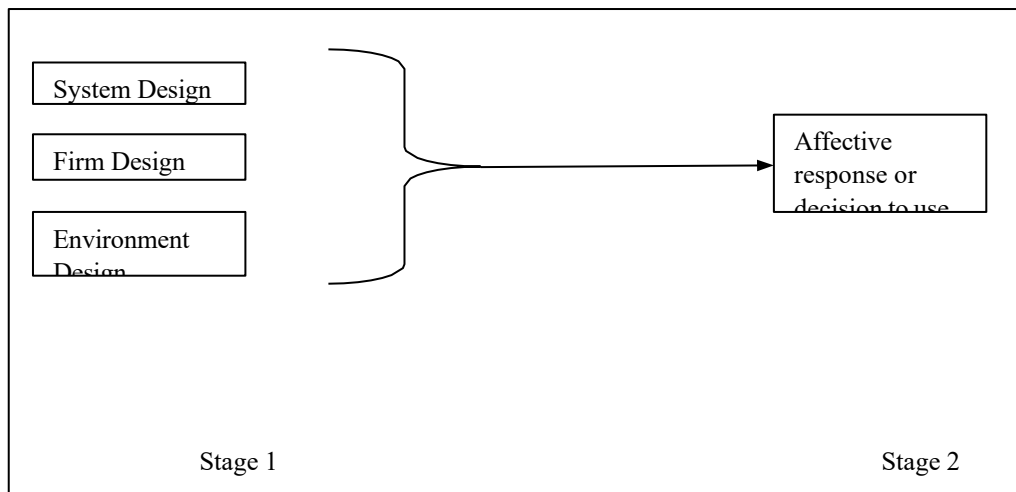
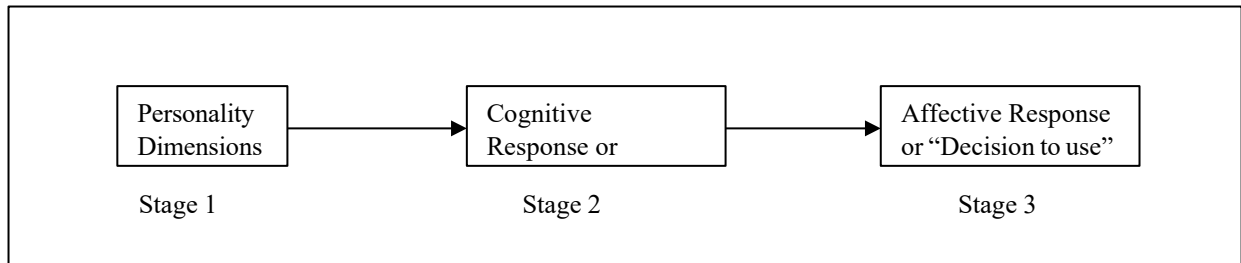


Table 3.3 also shows that diffusion of innovation, TRI, TRA, TPB, and DTPB follow the *latent personality dimension paradigm*, as each of these theories focuses on the latent, inherent behaviour or personality traits of the individual when studying technology adoption. In the case of diffusion of innovation theory, the stages of technology adoption depend on individuals' traits, which classify them as innovators, early adopters, early majority, late majority, or laggards (Omotayo & Adekunle, 2021). By contrast, TRI analyzes the personality traits that either motivate or inhibit users from adopting technology (Reyes-Mercado et al., 2022). TRA uses the latent personality behavioural trait of "attitude of the user" to analyse technology adoption. In addition, both TPB and DTPB are extensions of TRA and therefore follow the same approach. It should also be noted that TAM is an extension of TRA; however, methodologically, it does not follow the same approach, as it replaces the "attitude of the user" construct with PEU and PU. Therefore, TAM falls under the system-specific paradigm methodologically. Figure 3.3 depicts the three-stage *latent personality dimension approach*.

Figure 3.3

Latent Personality Dimension Approach of TRI



1.1. Gap in The Literature

Previous studies have concentrated on the technology adoption process via either a system-specific approach or a latent personality dimension approach. Studies that have taken a more holistic approach have adopted the extended systems approach of the system-specific paradigm. However, inter-paradigm linkages are seldom found in the literature. Technology adoption motivation (TAM) is one of the most frequently used theories in the literature when studying

technology adoption from a system-specific approach (Cai et al., 2022; Gangwar et al., 2014, 2015; Gavino et al., 2019; Lai, 2017; Sciarrelli et al., 2022; Sepasgozar et al., 2021). However, the system-specific approach fails to incorporate the personality dimensions of decision-makers and managers, who comprise the top management and decide the fate of technology adoption within their organisation.

The TRI index is one of the most frequently used theories in the literature to analyse technology adoption from the perspective of the latent personality dimensions of individuals and managers (Donmez-Turan, 2020; Gombachika & Khangamwa, 2012; Kapuza et al., 2022; Kaushik & Agrawal, 2021; McNamara et al., 2022; Mishra et al., 2018; Rojas-Méndez et al., 2017). Although this paradigm focuses on individuals' personality traits, which subsequently affect technology adoption, it fails to analyse the inherent attributes of technology and how they shape an individual's perception of it. The TOE framework adds to the system-specific paradigm by providing two additional research contexts, "organisation" and "environment"; however, it overlooks analysing technology adoption by incorporating the latent personality dimension factor from the second paradigm (Alshamaila et al., 2013, 2013; Duan et al., 2012; Maroufkhani et al., 2022; Nair et al., 2019; Stamenkov & Zhaku-Hani, 2021).

Lin et al. (2005) attempted to integrate the system-specific and personality dimension paradigms through their technology readiness and acceptance model (TRAM). TRAM represents the latest contribution to merging the general personality dimensions of technology readiness with the system-specific dimensions of TAM. Thus, it explains how personality dimensions can influence people's interactions with, experience, and use of new technology. However, the TRAM model does not incorporate external factors such as organisational design and the environment. Later studies on technology adoption developed models and frameworks within their respective paradigms, and the literature makes it clear that inter-paradigm integration across all three is lacking.

Accordingly, this study addresses this gap in the literature by integrating the two paradigms: the system-specific paradigm, which focuses on the attributes of a technology on an individual's perception of a technology, and the extended systems approach, which studies the ecosystem of the technology within and outside the organisation; and the latent personality dimension paradigm, which focuses on an individual's personality and its influence on the potential acceptance of technology, into one integrated framework to study technology adoption by SME retailers.

Another gap in the literature on technology adoption by retail SMEs was identified: although demographic variables, such as age, education, and gender, have been used previously to examine their moderating effects on technology adoption constructs, behavioural moderators have yet to be examined. Therefore, this study aims to fill this gap by using the two behavioural variables of TRI, namely, motivator traits and inhibitor traits, as moderators.

4.0 DEVELOPMENT OF CONCEPTUAL MODEL

The following factors have been shown to influence technology adoption among SME retailers across various technology adoption theories. First, the technology acceptance model (TAM), proposed by Davis and Bagozzi in 1989, has since become one of the most popular frameworks for explaining an individual's acceptance and use of technology. TAM is an extension of *the theory of reasoned action* (TRA), proposed by Fishbein and Ajzen in 1967, a social psychology model that explains the relationship between attitudes and behaviours and human actions. Although TAM is an extension of the TRA, it replaces many of the TRA's attitude determinants with two technology acceptance measures: "ease of use" and "usefulness" (Lai, 2017; Venkatesh et al., 2003). Therefore, TAM follows a system-specific approach in which it focuses on the aspects of technology, its ease of use, and its usefulness to determine the "intention to use" or adopt technology (Venkatesh et al., 2003). The factors proposed by TAM to measure technology adoption are perceived ease of use (PEU) and perceived usefulness (PU).

Second, *the technology-organisation-environment (TOE) framework*, also known as the TOE framework, is an organisational-level theoretical framework for technology adoption (Gangwar et al., 2015) that explains the technology adoption process for firms through three elements. The three elements of the TOE framework are the "technological" context, the "organisational" context, and the "environmental" context (Al-Okaily et al., 2022; Gangwar et al., 2015; Mahakittikun et al., 2021). Some of the factors identified through this model are top management support, firm

capability, competitor pressure, and government support. The technological context provided by the TOE framework overlaps with that of TAM; for this paper, TAM is used as the technological context.

Third, the TRI model focuses more on the cognitive disposition of an individual toward technology adoption, that is, their innate beliefs and predisposition to technology, which are, in turn, affected by positive or negative personality traits regarding technology adoption (McNamara et al., 2022; Mishra et al., 2018; Rojas-Méndez et al., 2017). Therefore, TRI follows a "latent personality dimension approach" to study technology adoption, in contrast to TAM, which follows a system-specific approach, or TOE, which follows an extended systems approach (McNamara et al., 2022). TRI postulates that there are two major personality traits in an individual that can either foster or hinder technology adoption (McNamara et al., 2022; Mishra et al., 2018; Rojas-Méndez et al., 2017). The personality traits that foster technology adoption are called *motivator traits*, and those that hinder technology adoption are called *inhibitor traits*. As seen in the previous section, a systematic literature review was conducted to synthesise, analyse, and compare available studies to generate the following model (Figure 4.1). Table 4.1 presents the sources from which the constructs of this model were adapted, whereas Table 4.2 presents the items (scales) for each factor.

Figure 4.1: Conceptual Model

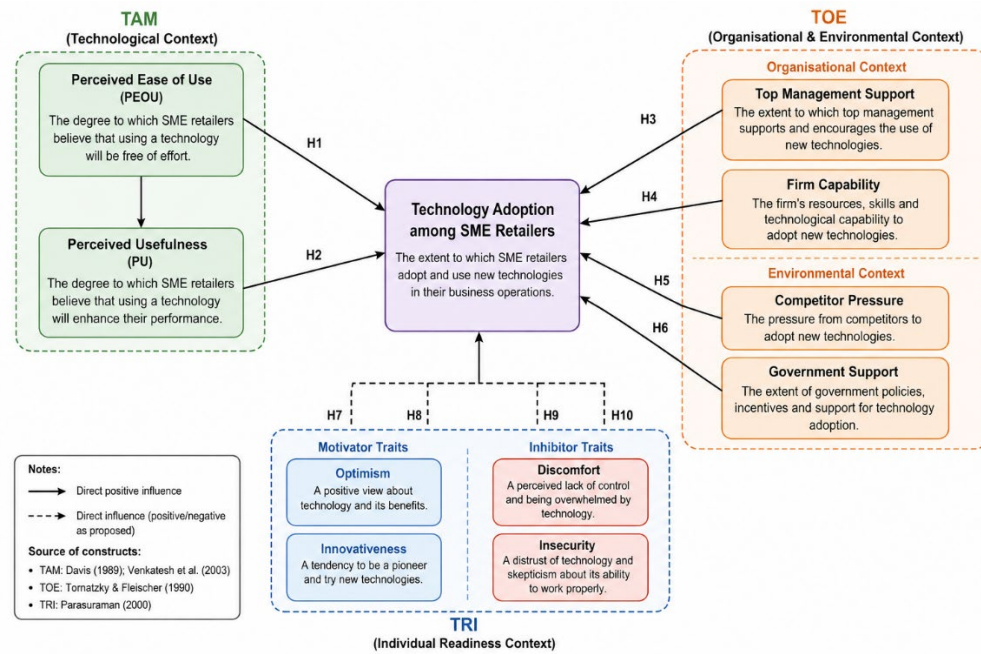


Figure 4.1. Proposed Research Model for Technology Adoption among SME Retailers

Table 4.1: Definition of the constructs of the proposed model

Factor/Construct	Definition	Source
Perceived Ease of Use	This dimension captures the extent to which SME retailers perceive technology as easy to use, free of effort, and simple to apply, thereby instilling confidence in their ability to master it.	Davis (1989)
Perceived Usefulness	This refers to an SME retailer's perception of the extent to which technology can improve their tasks or roles in terms of efficiency and efficacy.	Davis (1989)
Firm Capability	It is defined as the financial capacity of an SME retailer, considering its turnover, bottom line and profit, number of human capital employed, and assets and liabilities, which directly impact the SME retailer's technology adoption decision.	Eze et al. (2018); Nair et al. (2019)
Top Management Support	This refers to the help provided by SME retail outlet owners or decision-makers in the form of direction, expertise, and resource allocation, thereby instilling confidence in employees to make the organisation conducive for technology adoption.	Eze et al. (2018); Nair et al. (2019)
Competitor Pressure	The normative pressure experienced by SME retailers is due to the evolution in competing retailers' business processes through technology adoption, making the competition more productive and cost-efficient, and raising the quality of products and services.	Eze et al. (2018); Nair et al. (2019)

Government Support	The help SME retailers receive from the government in the form of incentives, scheme benefits, and training workshops for technology adoption is derived from the overall vision of the government of a country to uplift small-scale businesses through technology adoption.	Eze et al. (2018); Nair et al. (2019)
Motivator Traits	A set of positive traits that increase an SME retailer's confidence and optimism toward new technology by building trust, thereby motivating them to adopt new technology.	Gombachika & Khangamwa (2012)
Inhibitor Traits	A set of negative traits, which increases a SME retailer's scepticism and decreases their confidence towards a new technology, by increasing mistrust of the new technology, thereby inhibiting them from adopting a new technology	Gombachika & Khangamwa (2012)

Table 4.2: Measurement items of the constructs of the proposed model

FACTOR/ CONSTRUCT	MEASUREMENT ITEMS	SOURCE
Perceived Ease of Use	1. Learning the operation of a technology is easy for me. 2. I find it easy to apply technology to accomplish my tasks. 3. My interactions with technology are clear and understandable. 4. I find the use of technology to be simple and less complicated. 5. I can easily become skilled in new technologies.	Davis (1989)
Perceived Usefulness	1. The use of technology helps me accomplish tasks quickly. 2. Technology improves job performance. 3. Using technology helps improve productivity. 4. The use of technology enhances my effectiveness. 5. The use of technology helps me perform my job easily and efficiently.	Davis (1989)
Firm Capability	1. Our organisation has sufficient turnover to adopt new technology. 2. Our organisation has sufficient human capital to adopt new technologies. 3. Our organisation has sufficient bottom-line resources to adopt new technologies.	Eze et al. (2018); Nair et al. (2019)
Top Management Support	1. I am willing to provide my expertise to my organisation for a new technology. 2. I am willing to allocate resources to new technologies. 3. I am willing to build confidence in my employees regarding new technology. 4. I have a clear vision for my organisation regarding technology adoption.	Eze et al. (2018); Nair et al. (2019)

Competitor Pressure	1.	Technology adoption has provided my competitors with a business edge.	Eze et al. (2018);
	2.	There is an increase in productivity of my competitor due to technology adoption	Nair et al. (2019)
	3.	Technology adoption has made my competitors more cost-effective.	
	4.	Technology adoption has made competitors more efficient.	
Government Support	1.	Benefits from my government have helped me adopt new technology.	Eze et al. (2018);
	2.	Government financial incentives have helped me adopt new technologies.	Nair et al. (2019)
	3.	The benefits provided by the government have helped me adopt new technologies.	
Motivator Traits	1.	I am generally optimistic about the success of this technology.	Gombachika &
	2.	I am open to innovative methods for completing tasks.	Khangamwa (2012)

	3. I am generally positive about the functioning of technology.	
	4. I am confident in using any technology.	
	5. I like to learn about the technology that I use.	
Inhibitor Traits	1. I generally don't feel comfortable using a technology	Gombachika & Khangamwa (2012)
	2. I am generally insecure about using technology.	
	3. I am generally negative about technology.	
	4. I am hesitant about using technology.	
	5. I feel like I lack control over technology in general.	

Hypotheses Development

Past studies on technology adoption (Abdullahi et al., 2022; Alshamaila et al., 2013; Awa et al., 2017; Eze, Chinedu-Eze, Bello, Inegbedion, et al., 2019; Eze, Chinedu-Eze, et al., 2019; Lai, 2017; Molinillo & Japutra, 2017; Shetty & Panda, 2022) have shown the importance of the design of the system or technology itself in SMEs' technology adoption decisions. This is because the results of these studies indicate that technology adoption is positively affected by the technology's relevance to users' tasks, its usefulness, and its complexity. The PEU plays a significant role in analysing the system-specific paradigm and positively impacts technology adoption. This is because it plays a significant role in demonstrating the "ease of use" of a given technology (Gangwar et al., 2014, 2015; N. K. Jain et al., 2021; Lok, 2015; Sciarrelli et al., 2022), which, in turn, means that the PEU is significant in determining how conveniently end-users can gain proficiency in technology (Gangwar et al., 2014, 2015; Gavino et al., 2019; N. K. Jain et al., 2021; Lai, 2017; Lok, 2015; Sepasgozar et al., 2021). Similar to the PEU, a review of the literature also reveals a positive relationship between PU and technology adoption. PU plays a significant role in demonstrating the "usefulness" of a given technology (Gangwar et al., 2014, 2015; N. K. Jain et al., 2021; Lok, 2015; Sciarrelli et al., 2022), which, in turn, means that PU is significant in determining to what extent end users find the technology useful for the task at hand (Gangwar et al., 2014, 2015; Gavino et al., 2019; N. K. Jain et al., 2021; Lai, 2017; Lok, 2015; Sepasgozar et al., 2021).

In light of this discussion, the following hypotheses are proposed:

H1.a: *Perceived ease of use* (PEU) positively relates to technology adoption in Malaysian retail SMEs.

H1.b: *Perceived Usefulness* (PU) positively correlates with technology adoption among Malaysian retail SMEs.

Top management support is a critical variable in studying the technology adoption process for a firm, as it is a significant factor in overcoming barriers and boosting an organisation's technological capacity to efficiently utilise new technological services or products (Al-Okaily et al., 2022; Alshamaila et al., 2013, 2013; Duan et al., 2012; Mahakittikun et al., 2021). Top management also provides a vision and sets targets for the stepwise implementation of technology (Asiaei et al., 2019; Eze et al., 2021; Gangwar et al., 2015; Maroufkhani et al., 2022; Nair et al., 2019). This suggests that top management support positively influences technology adoption among SMEs and is one of the most relevant determinants of the *organisational* element of the TOE framework (Al-Okaily et al., 2022; Alshamaila et al., 2013; Duan et al., 2012; Nair et al., 2019). In light of this discussion, Hypothesis **2a** is proposed as follows:

H2.a: *Top management support* is positively related to technology adoption in Malaysian retail SMEs.

Firm capability positively influences SMEs' technology adoption and is one of the most relevant determinants of the *organisational* element in the TOE framework. Technology adoption increases more than proportionately with an increase in firm capability because such projects typically involve high fixed costs (Alshamaila et al., 2013, 2013; Duan et

al., 2012; Maroufkhani et al., 2022; Stamenkov & Zhaku-Hani, 2021). Firm capability also significantly influences the choice of ITES technology and management accounting practices (Ali et al., 2021; Asiaei et al., 2019; Eze et al., 2018, 2021). This is because the top management of a firm is bound by the firm's size and capabilities, as well as the resources it can garner (Eze, Chinedu-eze, Bello, Ayeni, et al., 2019). A direct correlation has been found between a firm's capability and its propensity to adopt technology (Ali et al., 2021; Gangwar et al., 2015; Mahakittikun et al., 2021). Thus, we propose the following hypothesis:

H2.b: *Firm capability* positively correlates with technology adoption among Malaysian retail SMEs.

Other studies suggest that competitor pressure is one of the most relevant constructs, serving as a measure of the environmental context in the TOE framework when studying technology adoption. Normative pressure is generated by the wants and needs of trading partners and customers, and, to meet these needs, competitors adopt innovations, which in turn add to the existing normative pressure (Alshamaila et al., 2013; Gangwar et al., 2014). Therefore, in this study, to measure external environmental dimensions, Hypothesis **H3.a** is formulated as follows:

H3.a: *Competitor pressure* positively correlates with technology adoption in Malaysian retail SMEs.

Government support takes various forms, all of which reflect the extent to which the government acts as a link among different players in the industry for knowledge and information sharing (Alshamaila et al., 2013; Maroufkhani et al., 2022). This is translated at the grassroots level of small-scale industries via pragmatic national and regional schemes (Gangwar et al., 2014) and even financial incentives (Stamenkov & Zhaku-Hani, 2021). And therefore, for this study, to measure the external environmental dimensions, the following hypothesis has also been formulated:

H3.b: *Government support* is positively related to technology adoption among Malaysian retail SMEs.

One of the most relevant constructs used to measure the effect of latent personality dimensions on technology adoption is *motivator traits (MoT)*, as provided by the TRI framework. The significance of MoT as a determinant of technology adoption can be judged by the fact that many authors have argued that not only does MoT have a positive effect on an individual's confidence and optimism towards a new technology (Gombachika & c; McNamara et al., 2022; Mishra et al., 2018; Rahadi et al., 2022) but it also builds trust among users towards the adoption of technology (Adam et al., 2021; Kapuza et al., 2022; McNamara et al., 2022; Tripković & Simić, 2023); therefore, it has a positive effect on the adoption of technology (Gombachika & Khangamwa, 2012; Kaushik & Agrawal, 2021; Leung, 2022; Mishra et al., 2018; Testa & Karpova, 2020). In contrast, *InT* has a positive relationship with an individual's discomfort and insecurity towards a new technology (Adam et al., 2021; Kapuza et al., 2022; McNamara et al., 2022; Tripković & Simić, 2023) because it builds mistrust and scepticism towards the adoption of technology (Gombachika & Khangamwa, 2012; Kaushik & Agrawal, 2021; Leung, 2022; Mishra et al., 2018; Testa & Karpova, 2020); the cumulative effect of which is that it hinders technology adoption. In light of this discussion, the following subordinate hypotheses are posited:

H4.a: *Motivator traits (MoT)* are positively related to technology adoption in Malaysian retail SMEs.

H4.b: *Inhibitor traits (InT)* are negatively related to technology adoption among Malaysian retail SMEs.

Previous studies on technology adoption by SME retailers in Malaysia have used demographic variables, such as age and gender, as moderators (Chakraborty et al., 2021; Eze et al., 2021; Newby et al., 2014; Zamani, 2022). There is a gap in the literature on SME retailers in Malaysia regarding the positive moderating role of MoT on the determinants of technology adoption, namely PEU and PU, as well as the negative impact of InT. In light of this discussion, the following subordinate hypotheses are formulated:

H5.a: *Motivator traits (MoT)* moderate the relationship between *perceived ease of use (PEU)* and technology adoption among Malaysian SME retailers.

H5.b: *Motivator traits (MoT)* moderate the relationship between *perceived usefulness (PU)* and technology adoption among Malaysian SME retailers.

H5.c: *Inhibitor traits* (InT) moderate the relationship between *perceived ease of use* (PEU) and technology adoption among Malaysian SME retailers.

H5.d: *Inhibitor traits* (InT) moderate the relationship between *perceived usefulness* (PU) and technology adoption among Malaysian SME retailers.

4.0 CONCLUSION

Based on the research hypotheses framed, this research paper proposes a conceptual framework, which is shown in Figure

4.1. The conceptual framework proposes that technology adoption for SME retailers in Malaysia is dependent on four main factors. The four factors of technology adoption are technological, organisational, environmental *and latent personality determinants*. Of the four factors, the *system-specific determinants* are technological, organisational and environmental determinants, which are measured by the independent variables Perceived Ease of Use (PEU), Perceived Usefulness (PU), Firm Capability, Top Management Support, Competitor Pressure and Government Support. The *latent personality determinants* are determined by motivator traits (MoT) and inhibitor traits (InT). The framework also proposes that PEU, PU, top management support, firm capability, competitor pressure, government support, and MoT have a positive relationship with the technology adoption of Malaysian SME retailers, whereas InT has a negative relationship with such adoption. In addition, the framework posits that the system-specific determinants of PEU and PU and their relationship with technology adoption are also moderated by MoT and InT.

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