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A CONCEPTUAL FRAMEWORK FOR STUDYING TECHNOLOGY ADOPTION OF MALAYSIAN SME RETAILERS

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ABSTRACT

This paper is fundamentally a conceptual paper, the purpose of which is to propose a framework for researchers to study technology adoption of small and medium enterprise retailers (SMERs) in Malaysia by combining the dimensions of system-specific approach and latent personality dimensions. which focuses on existing theoretical frameworks and paradigms in the study of technology adoption of SMERs. However, the paper also draws on the 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 the existing research studies, therefore, are bound by the limits of these two paradigms. This paper proposes a conceptual framework and a language which scholars can utilize 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 paradigm and the latent personality behavior paradigm. The second theoretical contribution of this framework is that it can test the moderating effect of latent personality dimensions. Furthermore, the paper is also 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.

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1.0 INTRODUCTION

Retailing has been defined in the literature as a set of activities that are involved in the selling of products and services to the final consumer, not for resale but rather, 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 large numbers 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 a highly significant industry from the national economic point of view. The Malaysian retail industry contributes to almost 37 percent of the country's Gross Domestic Product (GDP) (Department of Statistics Malaysia, 2021). In addition to this, the Malaysian Retail industry provided jobs for almost 2 million people, i.e. 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 underline the importance of this industry to the country. The biggest contributor to the retail industry in Malaysia is the F&B sector, which makes up 35% of the retail industry. Next is the Garments and Footwear sector, which contributes almost 25% to the retail industry, whereas the Personal and Household Care sector, with a 15% contribution, makes up the third largest sector for the retail industry.

1.2 Landscape Of Malaysian Small and Medium Retail Enterprises

The Malaysian retail sector is highly fragmented, with the presence of a high number of small to medium size retail firms vis-à-vis larger firms (Department of Statistics Malaysia, 2021). Despite the higher number of SMEs (75%) in the retail sector of Malaysia, their contribution to the national economy in terms of GDP for the retail sector is 53% (Department of Statistics Malaysia, 2021). And although larger firms including multi-national enterprises, big box retailers such as hypermarkets/supermarkets and chain retailers make up only 25% of the retail sector of Malaysia, their contribution to the national economy in terms of GDP for the retail sector is 46% (Department of Statistics Malaysia, 2021). These numbers reveal that SME retailers are underperforming for the retail sector in Malaysia, whereas, larger firms and big box retailers, despite making a minority for the retail sector in Malaysia in terms of segment size, their contribution is significant and proportionately higher.

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 like cloud computing, big data analysis, social media marketing, inventory optimization tools, stock tracking tools, easy-payments, shrinkage control tools, RFID-tagging, customization of products, Omni-channel retailing, use of artificial intelligence and virtual reality for virtual trial, amongst others (Y. 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 have given them competitive advantage and helps them meet business objectives in an efficient manner, by delivering value to all the 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 personalization strategies, retail solutions, inventory control, easy payments, experiential marketing and omni-channel retail have made firms realize higher revenues at a comparatively lower costs, with a return which is almost 6 times that of investment (Blaise et al., 2021; Kang et al., 2021; Stoyanov, 2020). This in turn means that the retail players are turning their attention more towards the importance and significance of technology adoption.

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The gain through technology adoption is limited to not just the larger firms. Past studies have conclusively concluded that technology adoption also helps SMEs in facilitating better access to resources, including financial resources, such as peer-to-peer interest free lending, human resources such as recruitment portals and training channels, and also a multitude of government services. Technology adoption also helps SMEs in terms of innovation through a much greater access to assets which deal in innovation, as well as in improving firm performance by giving SMEs the opportunity to generate data and analyze it to improve business as well operational efficiency (Nair et al., 2019; Taiminen & Karjaluo, 2015).

In the context of Malaysia, technology adoption is slowly making a breakthrough in the retail industry, with the first movers being large and mid-sized retail firms. Security systems help in providing a safe shopping experience and help in shrinkage control. Such technological advancements are only just starting to come up for Malaysian retailers and the need for the same has also been acknowledged by the industry (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 rackets, 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 (Jocevski et al., 2019; Sakrabani & Teoh, 2021; Ye et al., 2018).

Similarly, technology adoption has also played a pivotal role for local SMEs in Malaysia. According to a recent study by Jayaram (2019), Technology Adoption has helped reduce the transactional cost for SMEs by almost 30%. Technology Adoption has made available wider avenues for Malaysian SMEs meaning small businesses have a wider market, both locally and internationally. In terms of access to resources, technology adoption has also made SMEs exposed to a variety of resources, which without digitization, would go un-utilized or mis-utilized (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 cut down costs and be more efficient. The importance of technology adoption is also realized by the Government of Malaysia. And in order to boost digitization of the economy, including the SME sector, the government has revamped its digital policies through initiatives like National 4IR policy, which aims to catapult Malaysia into a high-income nation through the adoption of Industry 4.0 technologies. Another such policy of the government is Malaysia Digital Economy Blue Print of the Economic Planning Unit of PMO's office.

2.0 RESEARCH METHODOLOGY

The primary research methodology for this paper was to do literature review, in order to determine:

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

The rest of the paper is an elucidation of the available literature on technology adoption, theories which explain technology adoption and formulation of a conceptual framework, with its groundings in the research hypotheses.

3.0 LITERATURE REVIEW

Carr (1999) has defined technology adoption as the “stage of selecting a technology for use by an individual or an organization”. Other definitions of technology adoption in the literature are as follows: “The choice to acquire and use a new 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 organization decides to utilize and implement a technology” (Laurenza et al.,

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2018). “The extent by which a given technology becomes accepted and incorporated into approved social practices” (Ayinla, 2017). “Adoption of relevant innovations so as to make the organization more effective and efficient, with the purpose of gaining competitive edge and meeting business objectives” (Zamani, 2022).

Past studies on Technology Adoption show that adoption of a novel innovation/idea is not immediate across all the users and organizations. A seminal study regarding the same was carried by Everett Rogers in his book titled “Diffusion of Innovations”, which was first published in 1962, with the latest revised edition in 2003. Rogers, in this study, explains that the spread of a new idea or an innovation or a technology happens in a “life cycle” or “technology adoption life cycle”. The earliest to adopt are “innovators”, whereas the last to adopt are “late majority” and “laggards”. In the domain of retail technology adoption, SME retailers often fall in either late majority stage or laggard stage (Agostini & Nosella, 2020; Arendt, 2008; Eze, Chinedu-Eze, et al., 2019; Parra-Sánchez et al., 2021).

In the light of this discussion of technology adoption, different definitions have been given by researchers and academics to define this term. A summary of some of the definitions of technology adoption can be seen listed 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 organization”	(Carr, 1999)
“The choice to acquire and use a new 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 organization decides to utilize 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 so as to make the organization more effective and efficient, with the purpose of gaining 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 organizations to adopt new technology (Agostini & Nosella, 2020; Hall & Khan, 2016), which happens 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 just usage of a particular technology, but also the mental acceptance of individuals and organizations, implying behavioral and personality dimensions as well, apart from just a technology specific approach (Ayinla, 2017; Laurenza et al., 2018).

Also, technology adoption must always translate into tangible gains, with it either making organizations more efficient in cutting down costs or more effective in meeting business objectives (Zamani, 2022). Table 3.1 discusses the adoption of technology for an organization and the benefits it brings to the organization. However, in the context of retail, technology adoption also requires a discussion on the type of technology which is most effective for a retail organization. In the literature of technology adoption in the context of SME retailers, there are two schools of thought which exist. The first school of thought has defined technology specifically and has studied adoption of that particular technology as their research construct. The second school of thought has not defined technology specifically, rather has kept the research construct general i.e. Technology Adoption. The reason behind this is to keep it broad so as to let the SME owners and Top

Management have the freedom to decide for them the technology which is most relevant to them. The table 3.2 below lists and summarizes both the schools, with their chosen research constructs.

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

FIRST SCHOOL OF THOUGHT	
TECHNOLOGY	AUTHOR(S)
RFID	(Alomari, 2022; Bruno-Valdivia et al., 2022; Konecka & Maryniak, 2020; Morenza-Cinos et al., 2019)
E-Business/E-Commerce	(Battisti & Brem, 2021; Bhatti et al., 2022; Krishna & Arora, 2022; Li & Ai, 2021; Mkansi, 2022)
CRM	(Chatterjee et al., 2022; Giovannetti et al., 2022; Hendler et al., 2022; Perez-Vega et al., 2022; Yadav, 2022)
E-Payment	(Hasbolah et al., 2023; Malaquias & Malaquias, 2022; Rahadi et al., 2022; Talib & Salman, 2022; Tripković & Simić, 2023)
Loyalty Card	(Abdul et al., 2021; Fearne et al., 2022; Jamshidi & Kuanova, 2022; Lee, 2021; Mitchell, 2021; Ortt & Schoormans, 2004; Wait, 2022)
Inventory Management System	(Alshamaila et al., 2013; Cordery et al., 2011; S. Jain & Gandhi, 2021; Jayaram, 2017; Mao, 2021; Sillah, 2015)
SECOND SCHOOL OF THOUGHT	
RESEARCH CONSTRUCT	AUTHOR(S)
Technology Adoption	(Abdul et al., 2021; Anand et al., 2020; Giotopoulos et al., 2022; Hu & Kee, 2022; Marcon et al., 2022; Martins, 2022; Mitchell, 2021; Ortt & Schoormans, 2004; Salo & Tan, 2021; Yawised et al., 2022)

In light of this discussion, and as seen from Table 3.1 and Table 3.2, for the purpose of this conceptual paper, and keeping in mind the research context, technology adoption is defined as: “The act of implementation of any relevant technology by the SME retailers (Abdul et al., 2021; Anand et al., 2020; Giotopoulos et al., 2022; Hu & Kee, 2022; Marcon et al., 2022) at a stage at which it is mentally acceptable by users (Ayinla, 2017; Laurenza et al., 2018) in the organization, so as to make the organization more effective and efficient (Carr, 1999), with the aim to gain competitive edge and meet business objectives (Zamani, 2022)”.

3.1 Literature Review: Theories Explaining Technology Adoption

In the literature of technology adoption, a number of 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 the system itself, while others try to take a more holistic approach by including external factors as well. Yet others focus on the cognitive and behavioral aspects, hence their approach is more psycho-analysis. In Table 3.3, some of the most used theories to explain technology adoption have been listed with their explanation.

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Table 3.3: Summary of Theories explaining Technology Adoption

THEORY	EXPLANATION
Diffusion of Innovation (Rogers, 1962)	Adoption of new ideas/innovations/technology only happens in multiple stages which include understanding, persuasion, decision, implementation and confirmation. And the rate of completion of these stages depends on the category that one falls into: innovators, early adopters, early majority, late majority and laggards, which can be represented in the form of S-shaped adoption curve.
Technology Readiness Index (TRI) (Parasuraman, 2000)	TRI measures the attitudes and latent personality dimensions, by focusing more on the cognitive disposition of an individual towards technology adoption, which is his innate beliefs and pre-disposition to technology, which are, in turn, affected by the positive personality traits or the negative personality traits regarding technology adoption
Task Technology Fit (TTF) (Goodhue et. al, 1995)	TTF theory posits that adoption of any technology depends on the fact that how relevant that technology is for the user to perform his task and that there will be a positive impact on the individual's performance through technology adoption only if the tasks that the individual needs to perform are helped by that technology.
Theory of Reasonable Action (TRA) (Fishbein and Ajzen, 1975)	TRA posits that adoption of a technology or usage of technology depends primarily on the user's intention to adopt technology. This intention is also known as behavioral intention. Behavioral intention, in itself, is dependent on the attitude of the user and any social or subjective norms that the user may have.
Theory of Planned Behaviour (TPB) (Ajzen, 1991)	Theory of Planned behavior is an extension of TRA. It adds on to the theory of TRA by utilizing perceived behavioral control along with attitude and subjective norms, as the three major elements which affect the behavior of an individual.
Decomposed Theory of Planned Behavior (DTPB) (Taylor and Todd, 1995)	DTPB is an extension of TPB in that Taylor and Todd decomposed the "attitude" component of TPB into different attitudinal belief factors, while keeping the other two factors of perceived behavioral control as well as subjective norms intact.
Technology Acceptance Model (TAM) (Davis, 1986)	TAM is an extension of TRA, however TAM removes and replaces many of TRA's attitude determinants with the two technology acceptance measures of "ease of use" and "usefulness". Therefore, it focuses on the aspects of technology, its ease of use and its usefulness, to determine the "intention to use" or to adopt technology.
Technology Acceptance Model 2 (TAM 2) (Venkatesh and Davis, 1996)	Venkatesh and Davis found that there is a direct relationship between both ease of use and behavior intention as well as usefulness and behavior intention, and therefore they eliminated the attitude construct of the initial model in the revised model of TAM, also known as TAM 2.
Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et. al, 2003)	UTAUT is a theory which combines previous models by expanding behavioral intention or intention to use technology into four predictors: performance expectancy, effort expectancy, social influence and facilitating conditions. In the UTAUT model, the behavioral intention construct has a direct effect on the user behavior. Ease of use of technology and usefulness of technology are antecedents to behavioral intention through performance expectancy and effort expectancy.
Technology Organization-Environment Framework	The TOE framework is an organizational level technology adoption theoretical framework, which, with the help of three different elements, explains the technology

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(TOE) (Tornatzky and Fleischer, 1990) and adoption process for the firm. The three elements for the TOE framework are: the “technological” context, the “organizational” context and the “environmental” context.

Table 3.3 shows that there are two major research paradigms that have emerged to explain technology adoption and acceptance. Porter and Donthu (2006) have labeled these two paradigms as *System Specific Paradigm* and *Latent Personality Dimension Paradigm*. In the system specific paradigm, technology adoption is studied from the point of view of the system or the technology. Whereas, in the latent personality dimension paradigm, technology adoption is studied from the point of view of the latent behavior or the personality traits of the individual (Porter and Donthu, 2006).

From Table 3.3, we can see that under “system specific paradigm”, theories like TAM, TAM 2 and TTF fall. This is because all the 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 the adoption by analyzing the degree to which a technology is useful and is simple to use (J. Cai et al., 2022; Sciarelli et al., 2022). TAM 2 follows the same approach of TAM, however it removes the “attitude to use” construct of the initial model, and establishes a direct relationship between the attributes of technology- PEU and PU with that of technology adoption (Gangwar et al., 2015). TTF also studies the technology adoption process by focusing on the relevance of the technology itself to the tasks which the users need to perform. Therefore TTF also falls within the system specific paradigm. This process is depicted in Figure 3.1.

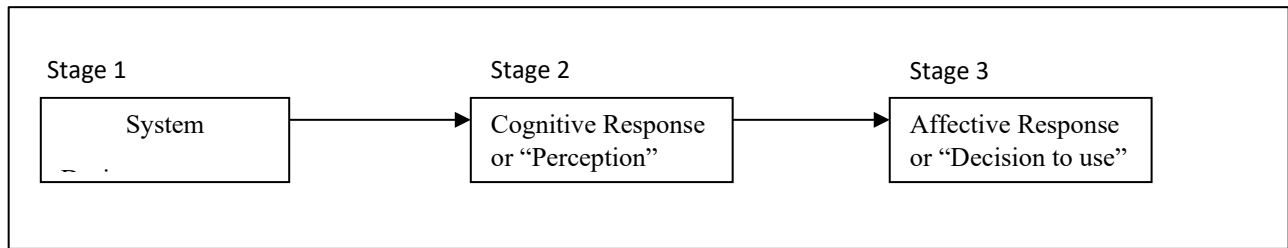


Figure 3.1 System Specific Approach of TAM

TOE and UTAUT try to take a more holistic approach by incorporating the external factors such as *environment* and *organization* in the case of TOE; and *social influence* and *facilitating conditions* in the case of UTAUT. Between TOE and UTAUT, TOE is more holistic because TOE also considers the organizational element which UTAUT does not (Gangwar et al., 2015; Mahakittikun et al., 2021). However, for both UTAUT and TOE, the system design or technological attributes play a central role, and despite their holistic approach, both of them are seen as an extension of system specific paradigm. Porter and Donthu (2006) call it an *extended systems approach (ESA)* to system specific paradigm, which is not a new paradigm in itself, but rather the same paradigm as the system specific paradigm as the technological attributes are the key dimension for both TOE as well as UTAUT. This process is depicted in figure 3.2.

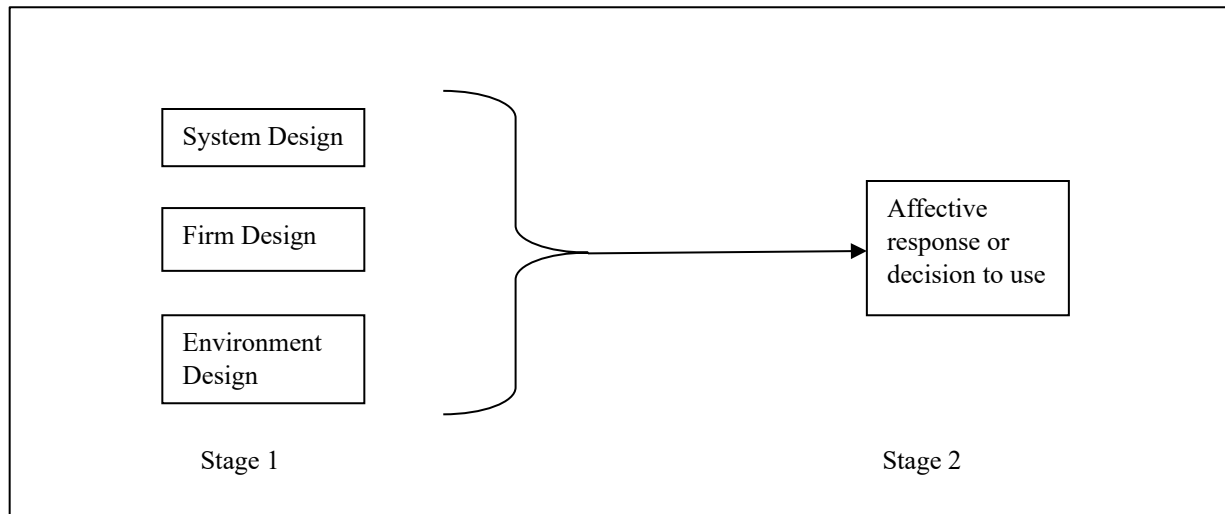


Figure 3.2 Extended Systems Specific Approach of TOE

Table 3.3 also shows that Diffusion of Innovation, TRI, TRA, TPB and DTPB follow the *latent personality dimension paradigm* because each of these theories focus on the latent inherent behavior or personality traits of the individual while studying technology adoption. In the case of Diffusion of Innovation theory, the stages of technology adoption or innovation adoption depend on the traits of individuals which would classify them as one of innovators or early adopters or early majority or late majority or laggard (Omotayo & Adekunle, 2021). On the other hand, TRI analyses the personality traits which either motivate the user or inhibit the user to adopt technology (Reyes-Mercado et al., 2022). Whereas, TRA uses the latent personality behavioral trait of “attitude of the user” to analyze technology adoption. In addition to this, both TPB and DTPB are an extension of TRA and therefore follow the same approach of TRA. It should also be noted that TAM is also an extension of TRA, however, methodologically it does not follow the same approach of TRA as it replaces the “attitude of the user” construct with PEU and PU, and therefore TAM falls under the system specific paradigm methodologically. Figure 3.3 depicts the three stage *latent personality dimension approach*

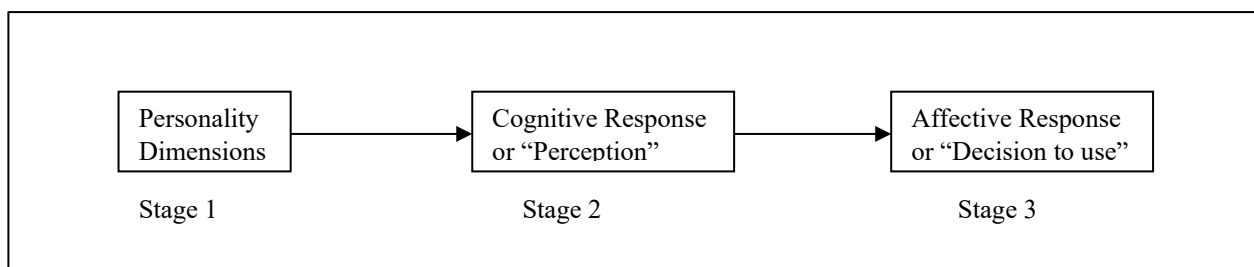


Figure 3.3 Latent Personality Dimension Approach of TRI

3.2 Gap in The Literature

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Past studies have concentrated on studying the technology adoption process via either system specific approach or via latent personality dimension approach. Studies which have taken a more holistic approach have taken the extended systems approach of system specific paradigm. However, inter-paradigm linkage is seldom found in the literature. TAM is one of the most frequently used theories in the literature when studying technology adoption from a system specific approach (J. Cai et al., 2022; Gangwar et al., 2014, 2015; Gavino et al., 2019; Lai, 2017; Sciarelli et al., 2022; Sepasgozar et al., 2021). However, the system specific approach fails to incorporate the personality dimensions of the decision makers and managers, who comprise the top management, and who decide the fate of technology adoption within their organization.

The TRI index is one of the most frequently used theory in the literature to analyze technology adoption from the paradigm of latent personality dimension 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 the personality traits of individuals, which have a subsequent effect on technology adoption, this paradigm fails to analyze the inherent technology's attributes and how they affect an individual's perception of a technology. The TOE framework adds on to the system specific paradigm by providing two additional research contexts of "organization" and "environment", however, it misses out on analyzing 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 paradigm and personality dimension paradigm through his TRAM model (Technology Readiness and Acceptance Model). TRAM represents the latest contribution to merge general personality dimensions of TRI with system specific dimensions of TAM. Thus, explaining how personality dimensions can influence the way people interact with, experience, and use new technology. However, the TRAM model does not incorporate the external factors of organizational design and the environmental setting. Later studies on technology adoption have developed models and frameworks within the respective paradigms, and from the literature, it is clear that inter-paradigm integration of all the three paradigms is lacking.

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

Another literature gap in technology adoption of retail SMEs was identified, whereby although demographical variables like age, education and gender have been used previously to check their moderating effect on the constructs of technology adoption, however behavioral moderators have yet not been used. Therefore this paper aims to fill this gap also by using the two behavioral variables of TRI, namely motivator traits and inhibitor traits as moderators.

4.0 DEVELOPMENT OF CONCEPTUAL MODEL

The following factors have been shown to have an influence on technology adoption of SME retailers through different technology adoption theories. First, The Technology Acceptance Model (TAM), a model first proposed by Fred Davis and Richard Bagozzi in 1989, has since then become one of the most popular framework to explain an individual's acceptance and usage of technology. TAM itself is an extension of *Theory of Reasoned Action* (TRA) proposed by Martin Fishbein and Icek Ajzen in 1967, which is a social-psychology model to explain the relationship between attitudes and behaviors with human actions. And although TAM is an extension of TRA, TAM removes and replaces many of TRA's attitude determinants with the two technology acceptance measures of "ease of use" and "usefulness" (Lai, 2017; Venkatesh et al., 2003). Therefore, TAM follows a system-specific approach, where-in, it focuses on the aspects of technology, its ease of use and its usefulness, to determine the "intention to use" or to 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).

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Second, *Technology-Organization-Environment Framework*, also known as the TOE framework, is an organizational level technology adoption theoretical framework (Gangwar et al., 2015), which, with the help of three different elements, explains the technology adoption process for the firm. The three elements for the TOE framework are: the “technological” context, the “organizational” 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 from the TOE framework have an overlap with TAM, and for the purpose of this paper, TAM is used as the technological context.

Third, the TRI model focuses more on the cognitive disposition of an individual towards technology adoption, which is his innate beliefs and pre-disposition to technology, which are, in turn, affected by the positive personality traits or the 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 which can either foster technology adoption or hinder technology adoption (McNamara et al., 2022; Mishra et al., 2018; Rojas-Méndez et al., 2017). The personality traits which foster technology adoption are called *Motivator Traits* and that which hinder technology adoption are called *Inhibitor Traits*. As seen in the previous section, a systematic literature review was carried out to synthesize, analyze and compare the available study to generate the following model (figure 4.1). Table 4.1 shows the sources from which the constructs of this model have been adapted, whereas table 4.2 mentions the items (scales) for each of the factor.

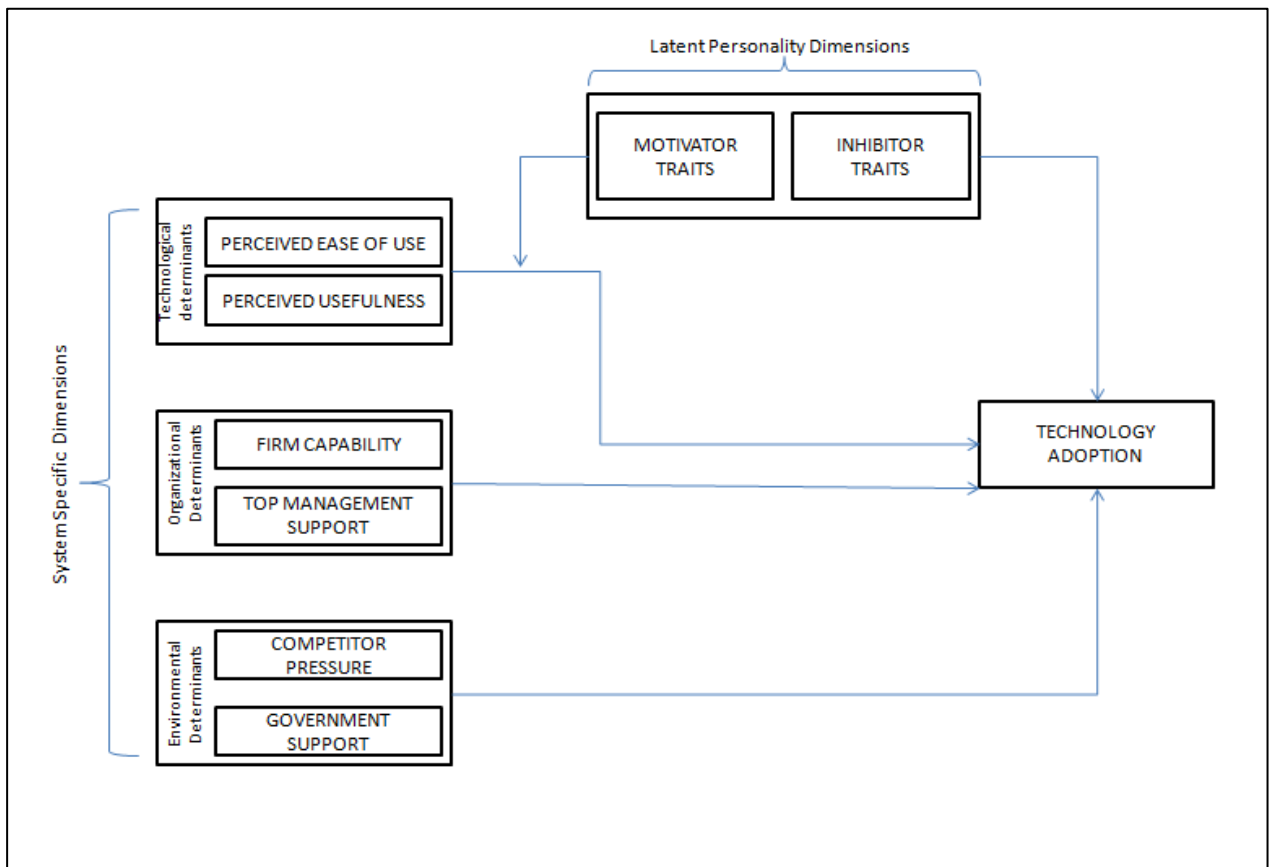


Figure 4.1: Conceptual Model

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Table 4.1: Definition of the constructs of the proposed model

FACTOR/ CONSTRUCT	DEFINITION	SOURCE
Perceived Ease of Use	It is a measure of the degree to which SME retailers feel a technology is easy to use , free of effort, simple in application, thereby giving them confidence in gaining proficiency of that technology.	Davis (1989)
Perceived Usefulness	It is a SME retailer’s perception of the extent of usefulness of a technology in improving their tasks or roles in terms of efficiency and effectiveness.	Davis (1989)
Firm Capability	It is defined as the financial capacity of a SME retailer, taking into account it’s turnover, it’s bottom line and profit, number of human capital employed and its assets and liabilities, which has a direct impact on the technology adoption decision of the SME retailer.	Eze et al. (2018); Nair et al. (2019)
Top Management Support	It is defined as the help provided by the owners or decision makers of SME retail outlets, in the form of direction, expertise and resource allocation, and thereby instilling confidence in the employees in order to make the organization conducive for technology adoption.	Eze et al. (2018); Nair et al. (2019)
Competitor Pressure	The normative pressure experienced by the SME retailers due to an evolution in competing retailers’ business processes through technology adoption, making the competition more productive and cost efficient and raising their quality of products and services.	Eze et al. (2018); Nair et al. (2019)
Government Support	The help which SME retailers receive from the government in the form of incentives, scheme benefits and training workshops for the purpose of technology adoption, which is derived from the overall vision that the government of a country to uplift small scale businesses via technology adoption.	Eze et al. (2018); Nair et al. (2019)
Motivator Traits	A set of positive traits, which increase a SME retailer’s confidence and optimism towards a 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 skepticism and decreases their confidence towards a new technology, by increasing mis-trust of the new technology, thereby inhibiting them from adopting a new technology	Gombachika & Khangamwa (2012)

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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.	Davis (1989)
	2. I find it easy to make a technology achieve my tasks.	
	3. My interaction with any technology is clear and understandable.	
	4. I find the use of technology to be simple and less complex.	
	5. I can easily become skillful in a new technology.	
Perceived Usefulness	1. Using technology helps me achieve my tasks quickly.	Davis (1989)
	2. Using technology helps me improve job performance.	
	3. Using technology helps me improve productivity.	
	4. Using technology helps me enhance effectiveness.	
	5. Using technology helps me perform my job easily.	
Firm Capability	1. My organization has enough Turn Over to adopt new technology.	Eze et al. (2018); Nair et al. (2019)
	2. My organization has enough human capital to adopt new technology.	
	3. My organization has sufficient bottom line to adopt new technology.	
Top Management Support	1. I am willing to provide expertise to my organization for a new technology.	Eze et al. (2018); Nair et al. (2019)
	2. I am willing to allocate resources for a new technology.	
	3. I am willing to build confidence in my employees for a new technology.	
	4. I have a clear vision for my organization regarding technology adoption.	
Competitor Pressure	1. Technology adoption has given my competitor business edge.	Eze et al. (2018); Nair et al. (2019)
	2. There is an increase in productivity of my competitor due to technology adoption	
	3. Technology adoption has made my competitor more cost effective.	
	4. Technology adoption has made my competitor more efficient.	
Government Support	1. Benefits from my government have helped me in adopting new technology.	Eze et al. (2018); Nair et al. (2019)
	2. Financial Incentives from my government have helped me in adopting new technology.	
	3. Scheme benefits from my government have helped me in adopting new technology.	
Motivator Traits	1. I am generally optimistic of the success of a technology.	Gombachika & Khangamwa (2012)
	2. I am open to innovative ways of completing a task.	

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	3. I am generally positive about the workings of a technology.	
	4. I am confident while 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 while using a technology.	
	3. I am generally negative about the workings of a technology.	
	4. I am hesitant while using any 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 on the technology adoption decision of SMEs. This is because, the results of these studies have concluded that technology adoption is positively impacted by the relevance of the technology at hand for the user to perform his or her task, its usefulness as well as its degree of complexity. PEU has a significant role in analyzing from the system specific paradigm and positively impact the adoption of technology. 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; Sciarelli et al., 2022), which, in turn, means that 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). Just like 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; Sciarelli 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 posited:

H1.a: *Perceived Ease of Use* (PEU) has a positive relationship with technology adoption of Malaysian retail SMEs.

H1.b: *Perceived Usefulness* (PU) has a positive relationship with technology adoption of 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 organization's technological capacity to efficiently utilize 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 step wise 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 has a positive impact on the adoption of technology for SMEs and is one of the most relevant determinants of the *Organizational* 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, the following hypothesis, **H2.a** is posited:

H2.a: *Top Management Support* has a positive relationship with technology adoption of Malaysian retail SMEs.

Firm capability has a positive impact on the adoption of technology for SMEs and is one of the most relevant determinants of the *Organizational* element of the TOE framework. Technology adoption increases more than proportionately with increase in firm capability because such projects typically involve large fixed costs (Alshamaila et al., 2013, 2013; Duan et

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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 of the fact that the top management of a firm is bound by the size and capability of the firm and the resources which the firm can garner (Eze, Chinedu-eze, Bello, Ayeni, et al., 2019). A direct co-relation has been found between the capability of the firm and its propensity to adopt technology (Ali et al., 2021; Gangwar et al., 2015; Mahakittikun et al., 2021). Thus, the following hypothesis is proposed:

H2.b: *Firm Capability* has a positive relationship with technology adoption of Malaysian retail SMEs.

Other studies suggest that one of the most relevant constructs which acts as a measure for the environmental context of the TOE framework while studying technology adoption is *Competitor Pressure*. There is a normative pressure generated through the wants and needs of trading partners and customers, and to match their needs, competitors adopt innovation, which in turn, acts as an addition to the existing normative pressure (Alshamaila et al., 2013; Gangwar et al., 2014). And therefore, for the purpose of this study, to measure the external environmental dimensions, the following hypothesis **H3.a** has been formulated:

H3.a: *Competitor Pressure* has a positive relationship with technology adoption of Malaysian retail SMEs.

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

H3.b: *Government Support* has a positive relationship with technology adoption of Malaysian retail SMEs.

One of the most relevant constructs which act as a measure for analyzing the effect of latent personality dimensions on technology adoption are *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 adoption of technology (Adam et al., 2021; Kapuza et al., 2022; McNamara et al., 2022; Tripković & Simić, 2023), and therefore has a positive effect on the adoption of technology (Gombachika & Khangamwa, 2012; Kaushik & Agrawal, 2021; Leung, 2022; Mishra et al., 2018; Testa & Karpova, 2020). On the other hand, 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 mis-trust and skepticism towards 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 has a negative effect on the adoption of technology. In light of this discussion, the following subordinate hypotheses are posited:

H4.a: *Motivator Traits (MoT)* has a positive relationship with technology adoption of Malaysian retail SMEs.

H4.b: *Inhibitor Traits (InT)* has a negative relationship with technology adoption of Malaysian retail SMEs.

Past studies on technology adoption for 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 of SME retailers in Malaysia when it comes to studying the positive directing role of MoT as moderators 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)* has a moderating effect on the relationship between *Perceived Ease of Use (PEU)* and Technology Adoption for Malaysian SME retailers.

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H5.b: *Motivator Traits* (MoT) has a moderating effect on the relationship between *Perceived Usefulness* (PU) and Technology Adoption for Malaysian SME retailers.

H5.c: *Inhibitor Traits* (InT) has a moderating effect on the relationship between *Perceived Ease of Use* (PEU) and Technology Adoption for Malaysian SME retailers.

H5.d: *Inhibitor Traits* (InT) has a moderating effect on the relationship between *Perceived Usefulness* (PU) and Technology Adoption for Malaysian SME retailers.

5.0 SUMMARY AND 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 the *technological determinants*; *organizational determinants*; *environmental determinants*; as well as *latent personality determinants*. Of the four factors, the *system specific determinants* are technological determinants, organizational determinants and environmental determinants which are measured by 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 have a negative relationship with the technology adoption of Malaysian SME retailers. In addition to this, the framework also posits that the system specific determinants of PEU and PU and their relationship with Technology adoption is also moderated by MoT and InT.

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