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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 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*

1. 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 from the perspective of 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 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 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 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). 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 in 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 in the retail sector in Malaysia, whereas larger firms and big-box retailers, despite making up a minority in the retail sector in Malaysia in terms of segment size, have a significant and proportionately 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 focusing more on the importance and significance of technology adoption.

The gains through technology adoption are not limited to 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 a multitude of government services. Technology adoption also helps SMEs in terms of innovation through greater access to assets that deal in innovation, as well as improving firm performance by giving SMEs the opportunity to generate and analyse data to improve business as well as operational efficiency (Nair et al., 2019; Taiminen & Karjaluoto, 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 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 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 played a pivotal role for local SMEs in Malaysia. According to a recent study by Jayaram (2019), technology adoption has helped reduce the transactional costs 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 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 through the adoption of Industry 4.0 technologies. Another such policy of the government is the Malaysia Digital Economy Blueprint of the Economic Planning Unit of the PMO.

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, theories that explain technology adoption, and the formulation of a conceptual framework, with grounding in the research hypotheses.

2. 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 are as follows: “the choice to acquire and use an innovation” (Hall and 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 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 Tables 3.1 and 3.2, for this conceptual paper and keeping in mind the research context, technology adoption is defined as: "the act of implementing any relevant technology by 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, to make the organization more effective and efficient (Carr, 1999), to gain a competitive edge and meet business objectives (Zamani, 2022)."

2.1. 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 the system itself, while others attempt to take a more holistic approach by including 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.

Table 3.3
Summary of Theories explaining Technology Adoption

THEORY	EXPLANATION
Diffusion of Innovation (Rogers, 1962)	The adoption of new ideas, innovations, and technologies occurs in multiple stages, including understanding, persuasion, decision making, implementation, and confirmation. The rate at which these stages are completed depends on the category to which one belongs: innovators, early adopters, early majority, late majority, and laggards, which can be represented by an 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 predisposition 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)	The TTF theory posits that the adoption of any technology depends on how relevant that technology is for the user to perform their tasks and whether technology adoption will have a positive impact on the individual's performance, 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 the adoption or usage of technology depends primarily on the user's intention to adopt it. This intention is also known as behavioural intention. Behavioural intention is dependent on the user's attitude and any social or subjective norms that the user may possess.
Theory of Planned Behaviour (TPB) (Ajzen, 1991)	The theory of planned behaviour is an extension of the TRA. It adds to the theory of TRA by utilising perceived behavioural control along with attitude and subjective norms as the three major elements that affect an individual's behaviour.
Decomposed Theory of Planned Behaviour (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 behavioural 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 adopt technology.
Technology Acceptance Model 2 (TAM 2) (Venkatesh and Davis, 1996)	Venkatesh and Davis found a direct relationship between both ease of use and behavioural intention, as well as usefulness and behavioural intention; 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.. al, 2003)	UTAUT is a theory that combines previous models by expanding behavioural intention or intention to use technology into four predictors: performance expectancy, effort expectancy, social influence, and facilitating conditions. In the UTAUT model, behavioural intention has a direct effect on user behaviour. The ease of use of technology and its usefulness are antecedents to behavioural intention through performance expectancy and effort expectancy.
Technology Organisation-Environment Framework	The TOE framework is an organisational-level technology adoption theoretical framework that explains technology with the help of three different elements.

(TOE) (Tornatzky and Fleischer, 1990)	adoption process for the firm. The three elements of the TOE framework are "technological," "organisational, " and "environmental" contexts.

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 and 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 of 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 relevance of the technology itself to the tasks that users need to perform. Therefore, TTF also falls within the system-specific paradigm. This process is depicted in Figure 3.1.

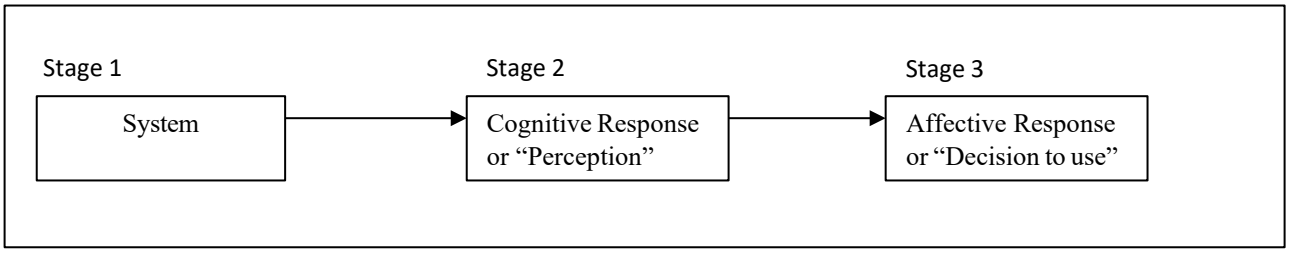


Figure 3.1 System Specific Approach of TAM

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

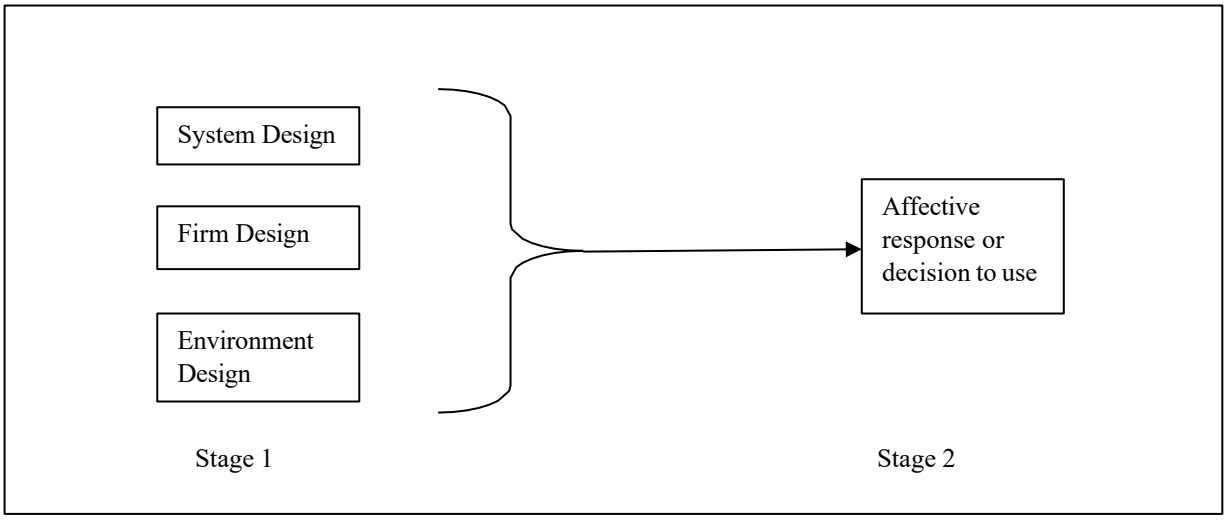
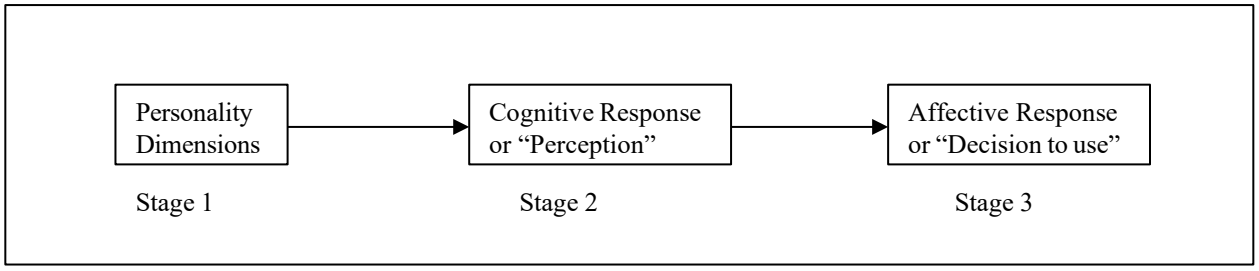


Table 3.3 also shows that diffusion of innovation, TRI, TRA, TPB, and DTPB follow the *latent personality dimension paradigm* because each of these theories focuses on the latent inherent behaviour or personality traits of the individual while studying technology adoption. In the case of diffusion of innovation theory, the stages of technology adoption or innovation adoption depend on the traits of individuals, which would classify them as 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 as TRA. It should also be noted that TAM is an extension of TRA; however, methodologically, it does not follow the same approach as TRA, 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



2.2. 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; Sciarelli 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 the personality traits of individuals, which have a subsequent effect on technology adoption, it fails to analyse the inherent attributes of technology and how they affect an individual's perception of technology. 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 the respective paradigms, and from the literature, it is clear that inter-paradigm integration of all three paradigms 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 literature gap in technology adoption by retail SMEs was identified, whereby although demographic variables, such as age, education, and gender, have been used previously to check their moderating effects on the constructs of technology adoption, behavioural moderators have yet to be used. 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 by SME retailers through different technology adoption theories. First, the technology acceptance model (TAM), which was first 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, which is a social-psychology model that explains the relationship between attitudes and behaviours with human actions. Although TAM is an extension of the TRA, it removes and replaces many of the 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 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 technology adoption theoretical framework (Gangwar et al., 2015) that explains the technology adoption process for firms using three different elements. The three elements for 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.

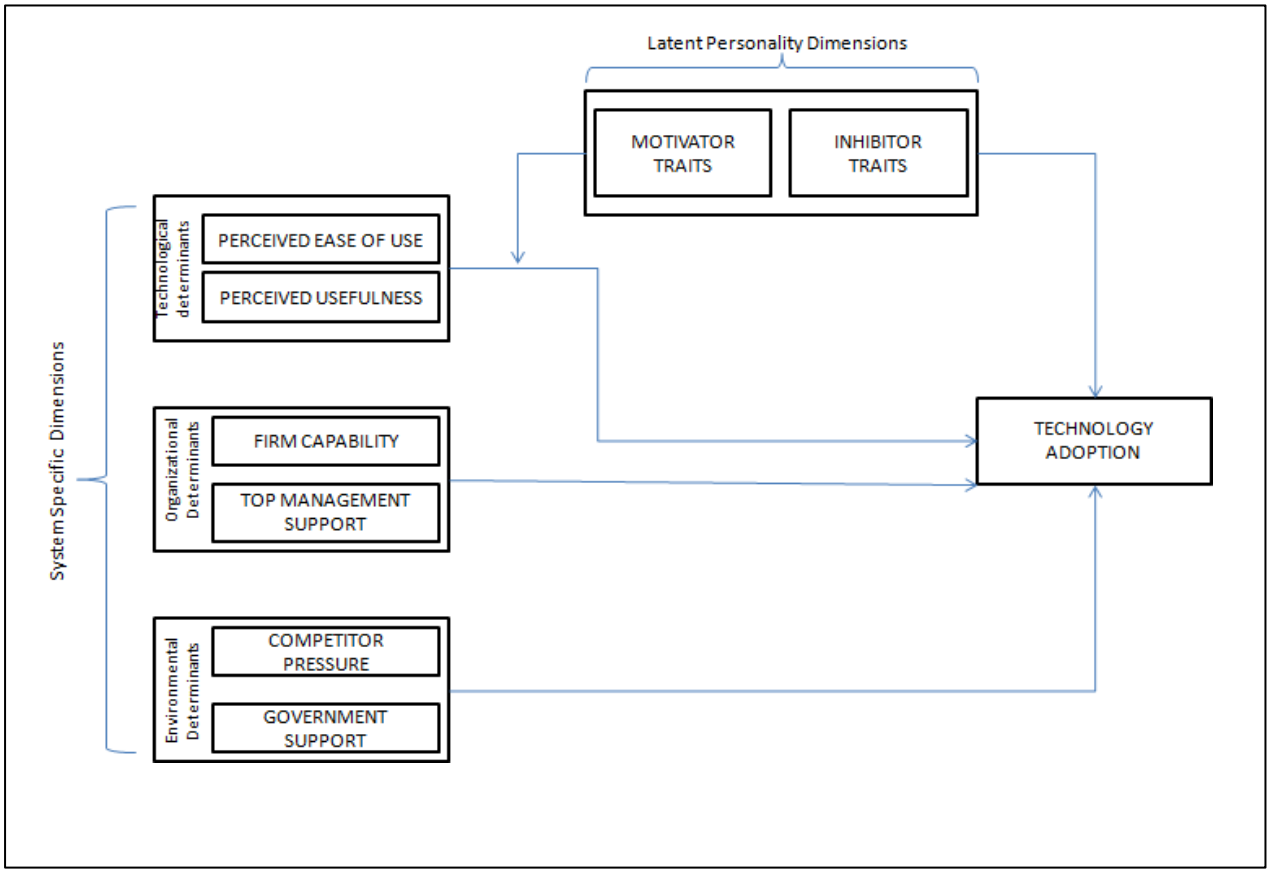


Figure 4.1: Conceptual Model

Table 4.1: Definition of the constructs of the proposed model

FACTOR/ CONSTRUCTION	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.	Davis (1989)
	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.	
Perceived Usefulness	1. The use of technology helps me accomplish tasks quickly.	Davis (1989)
	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.	
Firm Capability	1. Our organisation has sufficient turnover to adopt new technology.	Eze et al. (2018); Nair et al. (2019)
	2. Our organisation has sufficient human capital to adopt new technologies.	
	3. Our organisation has sufficient bottom-line resources to adopt new technologies.	
Top Management Support	1. I am willing to provide my expertise to my organisation for a new technology.	Eze et al. (2018); Nair et al. (2019)
	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.	
Competitor Pressure	1. Technology adoption has provided my competitors with a 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 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); Nair et al. (2019)
	2. Government financial incentives have helped me adopt new technologies.	
	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 & Khangamwa (2012)
	2. I am open to innovative methods for completing tasks.	

	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 these studies' results have concluded that technology adoption is positively impacted by the relevance of the technology to the user for performing their tasks, its usefulness, and its degree of 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; Sciarelli 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; 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 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 stepwise technology implementation (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 impacts the adoption of technology for 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 impacts the adoption of technology by SMEs and is one of the most relevant determinants of the *organisational* element of 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 size and capability of the firm and the resources that the firm can garner (Eze, Chinedu-eze, Bello, Ayeni, et al., 2019). A direct correlation has been found between the capability of a firm 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 that acts as a measure of the environmental context of the TOE framework when studying technology adoption. Normative pressure is generated through the wants and needs of trading partners and customers, and to match their needs, competitors adopt innovation, which in turn adds 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 are measures of the extent to which the government acts as a link between 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 that act as a measure for analysing 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) have a positive relationship with technology adoption in Malaysian retail SMEs.

H4.b: *Inhibitor traits* (InT) have a negative relationship with 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 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) 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 retailors.

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, organisational determinants, environmental determinants,* as well as *latent personality determinants*. Of the four factors, the *system-specific determinants* are technological determinants, organisational 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 has a negative relationship with the technology adoption of Malaysian SME retailers. 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.

REFERENCES

Abdul, S., Khan, R., & Umar, M. (2021). Tackling post-pandemic challenges with digital technologies: an empirical study. *Journal of Enterprise Information Management*, *20210218*. https://doi.org/10.1108/JEIM-01-2021-0040

Abdullahi, I. N., Husin, M. H., Baharudin, A. S., & Abdullah, N. A. (2022). Determinants of Facebook adoption and its impact on service-based small and medium enterprise performance in northwestern Nigeria. *Journal of Systems and Information Technology*, *24*(3), 246–267. https://doi.org/10.1108/JSIT-11-2020-0249

Adam, A., Hassan, R., & Abdullah, H. (2021). Maintaining The Survival of Malaysian SMEs During Covid-19 Outbreak: Challenges and Suggestions for Management. *ASEAN Entrepreneurship Journal* | *7*(1), 27–33. https://www.smeinfo.com.my

Agostini, L., & Nosella, A. (2020). The adoption of Industry 4.0 technologies in SMEs: results of an international study. *Management Decision*, *58*(4): 625–643. https://doi.org/10.1108/MD-09-2018-0973

Al-Okaily, M., Alqudah, H. M., Al-Qudah, A. A., & Alkhwaldi, A. F. (2022). Examining the critical factors of computer-assisted audit tools and techniques adoption in the post-COVID-19 period: internal auditors' perspective. *VINE Journal of Information and Knowledge Management Systems*. https://doi.org/10.1108/VJIKMS-12-2021-0311

Ali, O., Shrestha, A., Osmanaj, V., & Muhammed, S. (2021). Cloud computing technology adoption: an evaluation of key factors in local governments. *Information Technology and People*, *34*(2), 666–703. https://doi.org/10.1108/ITP-03-2019-0119

Alomari, K. M. (2022). Information Technology Practices in the Jordanian Retail Sector: Employee and Customer Perspective. *Innovative Marketing*, *18*(1), 38–48. https://doi.org/10.21511/im.18(1).2022.04

Alshamaila, Y., Papagiannidis, S., & Li, F. (2013). Cloud computing adoption by SMEs in the north east of England: A multi-perspective framework. *Journal of Enterprise Information Management*, *26*(3), 250–275. https://doi.org/10.1108/17410391311325225

Anand, A., Muskat, B., Creed, A., Zutshi, A., & Csepregi, A. (2020). Knowledge sharing, knowledge transfer and SMEs: evolution, antecedents, outcomes and directions. *Personnel Review*, *50*(9), 1873–1893. https://doi.org/10.1108/PR-05-2020-0372

Arendt, L. (2008). Barriers to ICT adoption in SMEs: How to bridge the digital divide? *Journal of Systems and Information Technology*, *10*(2), 93–108. https://doi.org/10.1108/13287260810897738

Asiaei, A., Zairah, N., & Rahim, A. (2019). *A multifaceted framework for the adoption of cloud computing in Malaysian SMEs*. https://doi.org/10.1108/JSTPM-05-2018-0053

Awa, H. O., Ojiabo, O. U., & Orokor, L. E. (2017). Integrated technology-organisation-environment (T-O-E) taxonomies for technology adoption. *Journal of Enterprise Information Management*, *30*(6), 893–921. https://doi.org/10.1108/JEIM-03-2016-0079

Ayinla, K. O. (2017). *Bridging the digital divide in BIM technology adoption*. *2*. https://doi.org/10.1108/ECAM-05- 2017-0091

Bai, H., He, W., Shi, J., McColl, J., & Moore, C. (2021). Parenting advantages of emerging market multinationals (EMNCs) in luxury fashion retailing. *International Journal of Retail and Distribution Management*. https://doi.org/10.1108/IJRDM-07-2020-0261

Battisti, S., & Brem, A. (2021). Digital entrepreneurs in technology-based spinoffs: an analysis of hybrid value creation in retail public–private partnerships to tackle showrooming. *Journal of Business and Industrial Marketing*, *36*(10), 1780–1792. https://doi.org/10.1108/JBIM-01-2020-0051

Behera, R. K., Bala, P. K., Tata, S. V., & Rana, N. P. (2021). Retail atmospherics effect on store performance and personalised shopper behaviour: a cognitive computing approach. *International Journal of Emerging Markets*. https://doi.org/10.1108/IJOEM-03-2021-0433

Beynon, M. J., Munday, M., & Roche, N. (2021). ICT resources and use: examining differences in pathways to improved small firm performance. *International Journal of Entrepreneurial Behaviour and Research*, *27*(7), 1798–1818. https://doi.org/10.1108/IJEBR-12-2020-0847

Bhatti, H. Y., Bint E. Riaz, M., Nauman, S., & Ashfaq, M. (2022). Browsing or buying: A serial mediation analysis of consumers' online purchase intentions in times of the COVID-19 pandemic. *Frontiers in Psychology*, *13*, 1008983. https://doi.org/10.3389/fpsyg.2022.1008983

Blaise, P., Issock, I., & Mpinganjira, M. (2021). Investigating the relevance of the traditional marketing mix across di ff erent stages of change: empirical evidence from household recycling. *Journal of Social Marketing*, *11*(4), 489–506. https://doi.org/10.1108/JSOCM-11-2020-0221

Bruno-Valdivia, G., Montoya-Del Solar, G., & Quiroz-Flores, J. C. (2022). RFID in the Retail sector: A Bibliographic review of the literature. *Proceedings of the LACCEI International Multi-Conference for Engineering, Education and Technology*, *2022-July*, 1–7. https://doi.org/10.18687/LACCEI2022.1.1.158

Cai, J., Li, Z., Dou, Y., & Li, T. (2022). *Understanding the adoption of high off-site construction level technologies in construction based on the TAM and TTF*. *72071027*. https://doi.org/10.1108/ECAM-05-2022-0439

Cai, Y., Qi, W., & Yi, F. (2022). *Mobile Internet adoption and technology adoption extensity: evidence from litchi growers in southern China*. *14*(1), 106–121. https://doi.org/10.1108/CAER-11-2020-0260

Chakraborty, D., Dash, G., Kiefer, K., & Bhatnagar, S. B. (2021). *Stop hailing, start apping: adoption of app-cab services in an emerging economy*. *May*. https://doi.org/10.1108/FS-09-2020-0088

Chatterjee, S., Chaudhuri, R., & Vrontis, D. (2022). AI and digitalisation in relationship management: Impact of adopting an AI-embedded CRM system. *Journal of Business Research*, *150*, 437–450. https://doi.org/10.1016/j.jbusres.2022.06.033

Chatterjee, S., Chaudhuri, R., Vrontis, D., & Basile, G. (2021). Digital transformation and entrepreneurship process in SMEs of India: a moderating role of adoption of AI-CRM capability and strategic planning. *Journal of Strategy and Management*. https://doi.org/10.1108/JSMA-02-2021-0049

Claro, D., Vieira, V. A., Agnihotri, R., & Serer, R. (2021). When value- and experience-related trade promotions influence retailers' sales: the moderating role of retail format strategy and channel structure. *European Journal of Marketing*, *55*(12), 3099–3128. https://doi.org/10.1108/EJM-10-2020-0762

Cordery, C. J., Fowler, C. J., & Mustafa, K. (2011). A solution looking for a problem: factors associated with the non-adoption of XBRL. *Pacific Accounting Review*, *23*(1), 69–88. https://doi.org/10.1108/01140581111130634

de Oliveira Santini, F., Ladeira, W. J., Pinto, D. C., Herter, M. M., Mattila, A. S., & Perin, M. G. (2021). Retail crowding: meta-analysis of contextual and cultural moderators. *Marketing Intelligence and Planning*. https://doi.org/10.1108/MIP-03-2021-0076

Depaoli, P., Za, S., & Scornavacca, E. (2020). A model for digital development of SMEs: an interaction-based approach. *Journal of Small Business and Enterprise Development*, *27*(7), 1049–1068. https://doi.org/10.1108/JSBED-06-2020-0219

Donmez-Turan, A. (2020). Does the unified theory of acceptance and use of technology (UTAUT) reduce the resistance and anxiety of individuals towards a new system? *Kybernetes*, *49*(5), 1381–1405. https://doi.org/10.1108/K-08-2018-0450

Duan, X., Deng, H., & Corbitt, B. (2012). Evaluating the critical determinants for adopting e-market in Australian small-and-medium sized enterprises. *Management Research Review*, *35*(3–4), 289–308. https://doi.org/10.1108/01409171211210172

Dutta, G., Kumar, R., Sindhwani, R., & Singh, R. K. (2020). Digital transformation priorities of India's discrete manufacturing SMEs – a conceptual study in perspective of Industry 4.0. *Competitiveness Review*, *30*(3), 289–314. https://doi.org/10.1108/CR-03-2019-0031

Eze, S. C., Chinedu-Eze, V. C., & Bello, A. O. (2019). Determinants of the dynamic process of emerging ICT adoption in SMEs – actor network theory perspective. *Journal of Science and Technology Policy Management*, *10*(1), 2–34. https://doi.org/10.1108/JSTPM-02-2018-0019

Eze, S. C., Chinedu-Eze, V. C., & Bello, A. O. (2021). Some antecedent factors that shape SMEs' adoption of social media marketing applications: a hybrid approach. *Journal of Science and Technology Policy Management*, *12*(1), 41–61. https://doi.org/10.1108/JSTPM-06-2019-0063

Eze, S. C., Chinedu-eze, V. C., Bello, A. O., Ayeni, A., & Peter, F. (2019). *Determinants of perceived information need for emerging ICT adoption: A study of UK small service businesses*. *32*(2), 158–183. https://doi.org/10.1108/BL-01-2019- 0059

Eze, S. C., Chinedu-eze, V. C., Bello, A. O., Inegbedion, H., & Nwanji, T. (2019). *Mobile marketing technology adoption in service SMEs: a multi-perspective framework*. *10*(3), 569–596. https://doi.org/10.1108/JSTPM-11-2018-0105

Eze, S. C., Olatunji, S., Chinedu-Eze, V. C., & Bello, A. O. (2018). Key success factors influencing SME managers'

information behaviour on emerging ICT (EICT) adoption decision-making in UK SMEs. *Bottom Line*, *31*(3–4), 250–

275. https://doi.org/10.1108/BL-02-2018-0008

Fearne, A., Borzino, N., De La Iglesia, B., Moffatt, P., & Robbins, M. (2022). Using supermarket loyalty card data to measure the differential impact of the UK soft drink sugar tax on buyer behaviour. *Journal of Agricultural Economics*, *73*(2), 321–337. https://doi.org/10.1111/1477-9552.12462

Fei, L., Bu, M., Gao, W., & Xiang, L. (2010). An empirical study on the positioning point of successful retail enterprises in China. *Nankai Business Review International*, *1*(2), 152–165. https://doi.org/10.1108/20408741011052564

Gangwar, H., Date, H., & Ramaswamy, R. (2015). Understanding determinants of cloud computing adoption using an integrated TAM-TOE model. *Journal of Enterprise Information Management*, *28*(1), 107–130. https://doi.org/10.1108/JEIM-08-2013-0065

Gangwar, H., Date, H., & Raoot, A. D. (2014). Review on IT adoption: Insights from recent technologies. *Journal of Enterprise Information Management*, *27*(4), 488–502. https://doi.org/10.1108/JEIM-08-2012-0047

Gavino, M. C., Williams, D. E., Jacobson, D., & Smith, I. (2019). Latino entrepreneurs and social media adoption: personal and business social network platforms. *Management Research Review*, *42*(4), 469–494. https://doi.org/10.1108/MRR-02-2018-0095

Ghobakhloo, M., Iranmanesh, M., Vilkas, M., Grybauskas, A., & Amran, A. (2022a). Drivers and barriers of Industry 4.0 technology adoption among manufacturing SMEs: a systematic review and transformation roadmap. *Journal of Manufacturing Technology Management*, *33*(6), 1029–1058. https://doi.org/10.1108/JMTM-12-2021-0505

Ghobakhloo, M., Iranmanesh, M., Vilkas, M., Grybauskas, A., & Amran, A. (2022b). Drivers and barriers of Industry 4.0 technology adoption among manufacturing SMEs: a systematic review and transformation roadmap. *Journal of Manufacturing Technology Management*, *01*. https://doi.org/10.1108/JMTM-12-2021-0505

Giotopoulos, I., Kontolaimou, A., & Tsakanikas, A. (2022). Digital responses of SMEs to the COVID-19 crisis. *International Journal of Entrepreneurial Behaviour and Research*, *28*(7), 1751–1772. https://doi.org/10.1108/IJEBR-11-2021-0924

Giovannetti, M., Sharma, A., Cardinali, S., Cedrola, E., & Rangarajan, D. (2022). Understanding salespeople's resistance to, and acceptance and leadership of, customer-driven change. *Industrial Marketing Management*, *107*, 433–449. https://doi.org/10.1016/j.indmarman.2022.10.021

Gombachika, H. S. H., & Khangamwa, G. (2012). ICT readiness and acceptance among TEVT students in the University of Malawi. *Campus-Wide Information Systems*, *30*(1), 35–43. https://doi.org/10.1108/10650741311288805

Goyal, S., Hardgrave, B. C., Aloysius, J. A., & DeHoratius, N. (2016). The effectiveness of RFID in backroom and sales floor inventory management. *International Journal of Logistics Management*, *27*(3), 795–815. https://doi.org/10.1108/IJLM-03-2015-0051

Hall, B. H., & Khan, B. (2016). New Economy Handbook: Adoption of New Technology. *New Economy Handbook*, *24*(5), 381. file:///C:/Users/Zef/AppData/Local/Mendeley Ltd./Mendeley Desktop/Downloaded/Hall, Khan - 2002 - Adoption of new technology.pdf%0Ahttp://elsa.berkeley.edu/~bhhall/papers/HallKhan03 diffusion.pdf

Hasbolah, H. B., Sidek, S. B., Mohamed Khadri, N. A. B., Yusrinadini Zahirah, Y. Z. B., Abdullah, Z. Bin, & Abdullah, F. A. B. (2023). Exploring aggravating factors for digital wallet acceptance: An approach from online shoppers. *Lecture Notes in Networks and Systems*, *485*, 235–246. https://doi.org/10.1007/978-3-031-08093-7_16

Hendler, F., LaTour, K. A., & Cotte, J. (2022). Temporal Orientation and Customer Loyalty Programs. *Cornell Hospitality Quarterly*, *63*(4), 448–464. https://doi.org/10.1177/19389655211008413

Hu, M. K., & Kee, D. M. H. (2022). Fostering sustainability: reinventing SME strategy in the new normal. *Foresight*, *24*(3–4), 301–318. https://doi.org/10.1108/FS-03-2021-0080

Hutchinson, K., Donnell, L. V., Gilmore, A., & Reid, A. (2015). Loyalty card adoption in sme retailers: The impact upon marketing management. *European Journal of Marketing*, *49*(3–4), 467–490. https://doi.org/10.1108/EJM-06-2013-0321

Jain, N. K., Kaul, D., & Sanyal, P. (2021). What drives customers towards mobile shopping? An integrative technology continuance theory perspective. *Asia Pacific Journal of Marketing and Logistics*, *2014*. https://doi.org/10.1108/APJML-02-2021-0133

Jain, S., & Gandhi, A. V. (2021). Impact of artificial intelligence on impulse buying behaviour of Indian shoppers in fashion retail outlets. *International Journal of Innovation Science*, *13*(2), 193–204. https://doi.org/10.1108/IJIS-10-2020-0181

Jamshidi, D., & Kuanova, L. (2022). Investigating the customers' drivers of Islamic credit card loyalty and word of mouth. *Journal of Islamic Marketing*, *13*(4), 868–886. https://doi.org/10.1108/JIMA-09-2019-0182

Jayaram, A. (2017). Smart Retail 4 . 0 IoT Consumer Retailer Model for Retail Intelligence and Strategic Marketing of In-store Products Athul Jayaram Amity University Uttar Pradesh Keywords. *17th International Business Horizon-INBUSH ERA-2017*, *February*, o.S. https://www.researchgate.net/publication/314114955_Smart_Retail_40_IoT_Consumer_Retailer_Model_for_Retail_Intelligence_and_Strategic_Marketing_of_In-store_Products

Jocevski, M., Arvidsson, N., Miragliotta, G., Ghezzi, A., & Mangiaracina, R. (2019). Transitions towards omni-channel retailing strategies: a business model perspective. *International Journal of Retail and Distribution Management*, *47*(2), 78–93. https://doi.org/10.1108/IJRDM-08-2018-0176

Jung, J. H., Yoo, J., & Jung, Y. (2021). The synergistic effects of LMX and procedural justice climate on employee motivation and customer loyalty in a retail service context. *Journal of Service Theory and Practice*. https://doi.org/10.1108/JSTP-04-2021-0079

Kang, J., Diao, Z., & Zanini, M. T. (2021). Business-to-business marketing responses to the COVID-19 crisis: a business process perspective. *Marketing Intelligence and Planning*, *39*(3), 454–468. https://doi.org/10.1108/MIP-05-2020-0217

Kapuza, A., Kolygina, D., Khavenson, T., & Koroleva, D. (2022). A time to gather stones – barriers to using technologies before the COVID-19 school closures. *International Journal of Educational Management*, *36*(6), 923–936. https://doi.org/10.1108/IJEM-02-2022-0069

Kaushik, M. K., & Agrawal, D. (2021). Influence of technology readiness in adoption of e-learning. *International Journal of Educational Management*, *35*(2), 483–495. https://doi.org/10.1108/IJEM-04-2020-0216

Kazancoglu, I., & Aydin, H. (2018). An investigation of consumers' purchase intentions towards omni-channel shopping: A qualitative exploratory study. *International Journal of Retail and Distribution Management*, *46*(10), 959–976. https://doi.org/10.1108/IJRDM-04-2018-0074

Kim, C., & Hu, B. (2021). Role of brand equity and competitive strategies in the relation between horizontal alliances and their benefits. *Journal of Business and Industrial Marketing*, *February*. https://doi.org/10.1108/JBIM-02-2021-0115

Konecka, S., & Maryniak, A. (2020). RFID as An Element of Economy 4.0 Used to Create Sustainable Supply Chains. *Journal of Physics: Conference Series*, *1487*(1), 0–6. https://doi.org/10.1088/1742-6596/1487/1/012035

Krishna, M., & Arora, S. (2022). Nykaa: A Keen Contest in Beauty Products Retailing. *Asian Journal of Management*

Cases, 1–10. https://doi.org/10.1177/09728201221139948

Kumagai, K., & Nagasawa, S. (2021). Hedonic shopping experience, subjective well-being and brand luxury: a comparative discussion of physical stores and e-retailers. *Asia Pacific Journal of Marketing and Logistics*. https://doi.org/10.1108/APJML-04-2021-0256

Lai, P. (2017). The Literature Review of Technology Adoption Models and Theories for the Novelty Technology. *Journal of Information Systems and Technology Management*, *14*(1), 21–38. https://doi.org/10.4301/s1807-17752017000100002

Laurenza, E., Quintano, M., Schiavone, F., & Vrontis, D. (2018). The effect of digital technologies adoption in the healthcare industry: a case based analysis. *Business Process Management Journal*, *24*(5), 1124–1144. https://doi.org/10.1108/BPMJ-04-2017-0084

Lee, C. S. (2021). Contact tracing apps for self-quarantine in South Korea : rethinking datafication and dataveillance in the COVID-19 age. *Journal Online Inf Rev.*. https://doi.org/10.1108/OIR-08-2020-0377

Leung, X. Y. (2022). *Geocaching in Texas state parks: a technology readiness analysis*. 182–194. https://doi.org/10.1108/JHTT-09-2020-0240

Li, X., & Ai, X. (2021). A choice of selling format in the online marketplace with cross-sales supply chain: Platform selling or traditional reselling? *Electronic Commerce Research*, *21*(2), 393–422. https://doi.org/10.1007/s10660-019-09370-7

Lok, C. K. (2015). Adoption of Smart Card-Based E-Payment System for Retailing in Hong Kong Using an Extended Technology Acceptance Model. In *E-services Adoption: Processes by Firms in Developing Nations* (Vol. 23B, pp. 255–466). Emerald Group Publishing Limited. https://doi.org/10.1108/S1069-09642015000023B003

Mahadevan, K., & Joshi, S. (2021). Omnichannel retailing: a bibliometric and network visualisation analysis. *Benchmarking*. https://doi.org/10.1108/BIJ-12-2020-0622

Mahakittikun, T., Suntrayuth, S., & Bhatiasevi, V. (2021). The impact of technological-organizational-environmental (TOE) factors on firm performance: merchant's perspective of mobile payment from Thailand's retail and service firms. *Journal of Asia Business Studies*, *15*(2), 359–383. https://doi.org/10.1108/JABS-01-2020-0012

Malaquias, F. F. de O., & Malaquias, R. F. (2022). The Use of Digital Financial Services and Business Performance Satisfaction in the Context of Female Entrepreneurship. *Journal of Technology Management and Innovation*, *17*(3), 3–11.

Mao, L. L. (2021). Retail quality, market environment and business survival in the retail Apocalypse: an investigation of the sporting goods retail industry. *International Journal of Sports Marketing and Sponsorship*. https://doi.org/10.1108/IJSMS-06-2021-0115

Marcon, É., Soliman, M., Gerstlberger, W., & Frank, A. G. (2022). Sociotechnical factors and Industry 4.0: an integrative perspective for the adoption of smart manufacturing technologies. *Journal of Manufacturing Technology Management*, *33*(2), 259–286. https://doi.org/10.1108/JMTM-01-2021-0017

Maroufkhani, P., Iranmanesh, M., & Ghobakhloo, M. (2022). Determinants of big data analytics adoption in small and medium-sized enterprises (SMEs). *Industrial Management and Data Systems*. https://doi.org/10.1108/IMDS-11-2021-0695

Martins, A. (2022). Dynamic capabilities and SME performance in the COVID-19 era: the moderating effect of digitalisation. *Asia-Pacific Journal of Business Administration*. https://doi.org/10.1108/APJBA-08-2021-0370

McNamara, A. J., Shirowzhan, S., & M.E. Sepasgozar, S. (2022). Investigating the determents of intelligent construction contract adoption: a refinement of the technology readiness index to inform an integrated technology acceptance model. *Construction Innovation*. https://doi.org/10.1108/CI-10-2021-0191

Mishra, A., Maheswarappa, S. S., & Colby, C. L. (2018). Technology readiness of teenagers: a consumer socialisation perspective. *Journal of Services Marketing*, *32*(5), 592–604. https://doi.org/10.1108/JSM-07-2017-0262

Mitchell, A. (2021). Collaboration technology affordances from virtual collaboration in the time of COVID-19 and post-pandemic strategies. *Journal of Information Technology & People*. https://doi.org/10.1108/ITP-01-2021-0003

Mkansi, M. (2022). E-business adoption costs and strategies for retail micro businesses. In *Electronic Commerce Research* (Vol. 22, Issue 4). Springer US. https://doi.org/10.1007/s10660-020-09448-7

Molinillo, S., & Japutra, A. (2017). Organizational adoption of digital information and technology: a theoretical review. *Bottom Line*, *30*(1), 33–46. https://doi.org/10.1108/BL-01-2017-0002

Monoarfa, H., Juliana, J., Setiawan, R., & Abu Karim, R. (2021). The influences of Islamic retail mix approach on purchase decisions. *Journal of Islamic Marketing*, *2011*. https://doi.org/10.1108/JIMA-07-2020-0224

Morenza-Cinos, M., Casamayor-Pujol, V., & Pous, R. (2019). Stock visibility for retail using an RFID robot. *International Journal of Physical Distribution and Logistics Management*, *49*(10), 1020–1042. https://doi.org/10.1108/IJPDLM-03-2018-0151

Nair, J., Chellasamy, A., & Singh, B. N. B. (2019). Readiness factors for information technology adoption in SMEs: testing an exploratory model in an Indian context. *Journal of Asia Business Studies*, *13*(4), 694–718. https://doi.org/10.1108/JABS-09-2018-0254

Newby, M., Nguyen, T. H., & Waring, T. S. (2014). *Understanding customer relationship management technology adoption in small and medium-sized enterprises An empirical study in the USA*. *27*(5), 541–560. https://doi.org/10.1108/JEIM-11-2012-0078

Omotayo, F. O., & Adekunle, O. A. (2021). Adoption and use of electronic voting system as an option towards credible elections in Nigeria. *International Journal of Development Issues*, *20*(1), 38–61. https://doi.org/10.1108/IJDI-03-2020-0035

Ortt, J. R., & Schoormans, J. P. l. (2004). The pattern of development and diffusion of breakthrough communication technologies. *European Journal of Innovation Management*, *7*(4), 292–302. https://doi.org/10.1108/14601060410565047

Parra-Sánchez, D. T., Talero-Sarmiento, L. H., & Guerrero, C. D. (2021). Assessment of ICT policies for digital transformation in Colombia: technology readiness for IoT adoption in SMEs in the trading sector. *Digital Policy, Regulation and Governance*, *23*(4), 412–431. https://doi.org/10.1108/DPRG-09-2020-0120

Paydar, S., Endut, I. R., Yahya, S., & Rahman, S. H. A. (2014). Environmental Factors Influencing the Intention to Adopt RFID Technology in Retail Industry: An Empirical Study. *Asia-Pacific Journal of Management Research and Innovation*, *10*(1), 13–26. https://doi.org/10.1177/2319510X14529490

Perez-Vega, R., Hopkinson, P., Singhal, A., & Mariani, M. M. (2022). From CRM to social CRM: A bibliometric review and research agenda for consumer research. *Journal of Business Research*, *151*, 1–16. https://doi.org/10.1016/j.jbusres.2022.06.028

Rahadi, R. A., Nainggolan, Y. A., Afgani, K. F., Yusliza, M. Y., Faezah, J. N., Ramayah, T., Saputra, J., Muhammad, Z., Farooq, K., & Angelina, C. (2022). Towards a cashless society: Use of electronic payment devices among generation z. *International Journal of Data and Network Science*, *6*(1), 137–146. https://doi.org/10.5267/J.IJDNS.2021.9.014

Reyes-Mercado, P., Barajas-Portas, K., Kasuma, J., Almonacid-Duran, M., & Zamacona-Aboumrad, G. A. (2022). Adoption of digital learning environments during the COVID-19 pandemic: merging technology readiness index and UTAUT model. *Journal of International Education in Business*. https://doi.org/10.1108/JIEB-10-2021-0097

Rojas-Méndez, J. I., Parasuraman, A., & Papadopoulos, N. (2017). Demographics, attitudes, and technology readiness: A cross-cultural analysis and model validation. *Marketing Intelligence and Planning*, *35*(1), 18–39. https://doi.org/10.1108/MIP-08-2015-0163

Sakrabani, P., & Teoh, A. P. (2021). Retail 4.0 adoption and firm performance among Malaysian retailers: the role of enterprise risk management as moderator. *International Journal of Retail and Distribution Management*, *49*(3), 359–376. https://doi.org/10.1108/IJRDM-09-2020-0344

Salo, J., & Tan, T. M. (2021). Digitalisation of the buyer – seller relationship in the steel industry. *Journal of Business & Industrial Marketing*, *7*(October 2021), 1229–1245. https://doi.org/10.1108/JBIM-03-2020-0141

Sciarelli, M., Prisco, A., Gheith, M. H., & Muto, V. (2022). Factors affecting the adoption of blockchain technology in innovative Italian companies: an extended TAM approach. *Journal of Strategy and Management*, *15*(3), 495–507. https://doi.org/10.1108/JSMA-02-2021-0054

Sepasgozar, S. M. E., Ghobadi, M., Shirowzhan, S., Edwards, D. J., & Delzendeh, E. (2021). Metrics development and modelling the mixed reality and digital twin adoption in the context of Industry 4.0. *Engineering, Construction and Architectural Management*, *28*(5), 1355–1376. https://doi.org/10.1108/ECAM-10-2020-0880

Shetty, J. P., & Panda, R. (2022). Cloud adoption in Indian SMEs – an empirical analysis. *Benchmarking: An International Journal*. https://doi.org/10.1108/bij-08-2021-0468

Sillah, B. M. S. (2015). Human capital, Foreign direct investment stock, Trade and the technology diffusion in saudi arabia 1974-2011. *Journal of Economic Studies*, *42*(1), 101–116. https://doi.org/10.1108/JES-04-2013-0047

Stamenkov, G., & Zhaku-Hani, R. (2021). Perceived benefits and post-adoption usage of education management information system. *Library Hi Tech*. https://doi.org/10.1108/LHT-06-2021-0185

Stoyanov, D. (2020). Marketing of vending channels: a case of French university campuses. *International Journal of Retail and Distribution Management*, *49*(5), 577–594. https://doi.org/10.1108/IJRDM-06-2020-0228

Taiminen, H. M., & Karjaluoto, H. (2015). The usage of digital marketing channels in SMEs. *Journal of Small Business and Enterprise Development*, *22*(4), 633–651. https://doi.org/10.1108/JSBED-05-2013-0073

Talib, A. A., & Salman, A. D. (2022). Design and develop authentication in electronic payment systems based on IoT and biometric. *Telkomnika (Telecommunication Computing Electronics and Control)*, *20*(6), 1297–1306. https://doi.org/10.12928/TELKOMNIKA.v20i6.22157

Testa D. S., & Karpova, E. E. (2020). *Executive decision-making in fashion retail: a phenomenological exploration of resources and strategies fashion retail*. https://doi.org/10.1108/JFMM-08-2020-0169

Tripković, S., & Simić, D. (2023). *Using Ethereum Smart Contracts for Payment Transactions*. 30–42. https://doi.org/10.1007/978-3-031-18645-5_3

Venkatesh, Morris, Davis, & Davis. (2003). User Acceptance of Information Technology: Toward a Unified View. *MIS Quarterly*, *27*(3), 425. https://doi.org/10.2307/30036540

Wait, M. (2022). Grocery loyalty cards: Do they work? A customer-centred investigation. *Acta Commercii*, *22*(1), 1–9. https://doi.org/10.4102/ac.v22i1.1056

Wilkinson, M., Quraishi, M., Irfan, L., & Schneuwly Purdie, M. (2021). Building on the shoulders of Bhaskar and Matthews: a critical realist criminology. *Journal of Critical Realism*, 1–22. https://doi.org/10.1080/14767430.2021.1992736

Yadav, M. L. (2022). Query Execution Time Analysis Using Apache Spark Framework for Big Data: A CRM Approach. *Journal of Information and Knowledge Management*, *21*(4), 2023. https://doi.org/10.1142/S0219649222500502

Yawised, K., Apasrawirote, D., Chatrangsan, M., & Muneesawang, P. (2022). Turning digital technology to immersive marketing strategy: a strategic perspective on flexibility, agility and adaptability for businesses. *Journal of Entrepreneurship in Emerging Economies*, *ahead-of-p*(ahead-of-print). https://doi.org/10.1108/JEEE-06-2022-0169

Ye, Y., Lau, K. H., & Teo, L. K. Y. (2018). Drivers and barriers of omni-channel retailing in China: A case study of the fashion and apparel industry. *International Journal of Retail and Distribution Management*, *46*(7), 657–689. https://doi.org/10.1108/IJRDM-04-2017-0062

Zamani, S. Z. (2022). Small and Medium Enterprises (SMEs) facing an evolving technological era: a systematic literature review on the adoption of technologies in SMEs. *European Journal of Innovation Management*, *25*(6), 735–757. https://doi.org/10.1108/EJIM-07-2021-0360