Usage guidelines

E-commerce adoption in Developing Countries SMEs: What Do the Prevailing Theoretical Models Offer Us?

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Abstract: This paper presents a critical analysis of prevailing innovation adoption theories and assess the extent of their appropriateness for explaining SMEs e-commerce adoption in developing countries. The theories examined are Technology Acceptance Model (TAM); Unified Theory of Acceptance and Use of Technology (UTAUT); Diffusion of Innovation Theory (DOI); Technology Organisation Environment (TOE); Theory of Planned Behavior (TPB); Resource Based Theory (RBT). Our analysis revealed that none of these theoretical models individually is sufficient to describe the contextual characteristics of SMEs in developing countries. Therefore, we suggested the integration of the Perceived E-readiness Model (PERM) by Molla and Licker (2005) and the Technology Organisation Environment Framework (TOE) by Tornatzky and Fleischer (1990) serves as a theoretical foundation for understanding e-commerce adoption of SMEs in developing country.

Keywords: e-Commerce, Small and Medium Enterprises, Developing Countries, Conceptual Model

1. INTRODUCTION

Small and medium enterprises (SMEs) are regarded as the engine of growth of the world economy because they contribute to more than eighty per cent of a nation's economic growth and account for more than ninety per cent of the entire businesses (Offstein and Childers, 2008). According to Jagoda (2010) SMEs play a significant role in creating employment opportunities in many countries across the globe.

E-commerce has become a medium by which organisations particularly SMEs may gain competitive advantage in the global environment. E-commerce platforms allow SMEs to overcome their limitations by affording them the opportunity to extend beyond their geographical reach and secure new market opportunities (Jagoda 2010). Despite the many benefits e-commerce offers, SMEs in developing countries are still far away from achieving e-commerce success (Rahayu and Day, 2016). Our examination of the literature shows that there are fewer research studies on e-commerce adoption in developing countries compared to their developed counterparts. In addition, those that exist have mostly used innovation adoption theories that were designed in developed countries context. As a result, our understanding of what drives a sustainable e-commerce adoption amongst SMEs in developing countries is still limited. In this paper, we contend that a contributing factor is the lack of theoretical framework that may explain the contextual characteristics that are particular to SMEs in a given part of the world. For instance there are some known important contextual characteristics that affect SMEs in developing countries such as poor infrastructure, lack of government policy and cultural issues that the prevailing models do not capture.

The aim of this research was to critically analyse prevailing innovation adoption theoretical models with the view of understanding the extent of their appropriateness for understanding SMEs e-commerce adoption in developing countries. Our survey of existing literature shows that there are certain models that dominate SMEs e-commerce adoption research. These models are Technology Acceptance Model (TAM); Unified Theory of Acceptance and Use of Technology (UTAUT); Diffusion of Innovation Theory (DOI); Technology Organisation Environment (TOE); Theory of Planned Behavior (TPB); Resource Based Theory (RBT).

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After our evaluation of the aforementioned theories, we resolved that the integration of frameworks is the way forward for understanding the contextual issues associated with e-commerce adoption in developing countries SMEs. Thus, we integrated one of the less commonly used theories the Perceived E-readiness Model (PERM) established by Molla and Licker (2005) and one of the dominant innovation theories the Technology Organisation Environment Framework (TOE) by Tornatzky and Fleischer (1990).

This paper is structured as follows: the next section critically evaluates the six dominant theoretical models listed earlier. Following that, an integration of the two theoretical frameworks (PERM and TOE) is discussed. The paper concludes with a summary and recommendation for future work.

2. EVALUATION OF PREVALILNG MODELS IN SME E-COMMERCE ADOPTION RESEARCH

This section critically evaluates the dominant models to understand their appropriateness in explaining e-commerce adoption in developing countries SMEs.

2.1 Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) has underpinned many studies related to Information systems (IS) adoption (Lee et al. 2003; Nyoro et al. 2015). TAM was established by Davis (1989) to describe user adoption of new technology innovation in organisations. Davis' TAM model posits that perceived usefulness (PU) and perceived ease of use (PEOU) are the two most important determinants of technology adoption. Perceived usefulness is defined in the model as the degree to which a person is certain that the continuous usage of a particular system will enhance his or her job performance. While perceived ease of use is the extent to which a person believes that using a particular system would be free of physical and mental effort (Turner et al. 2010).

A number of e-commerce researchers have used TAM as a model for understanding e-commerce adoption in organisations including SMEs. For example, TAM has been used as the model to assess the usefulness and ease of using e-commerce amongst SMEs in Malaysia, Singapore and Thailand manufacturing and service industries (Nezakati *et al*. 2012). TAM has also been used to investigate the effect of perceived system risk on the behavioural intention of tourism organizations in Algeria to use e- commerce (Belkhamza and Wafa, 2009). Both studies commended TAM to be a useful model to understand and explain a user's intention to use e-commerce.

Evidently, TAM is a key model that has been applied in many SME researches for explaining the use, behaviour and attitude to e-commerce adoption (McCloskey, 2004; Belkhamza & Wafa, 2009; Johar and Awalludin, 2011; Nezakati et al. 2012). However, despite the model's influential role in information systems research including e-commerce adoption, the model has several shortcomings. According to Nistor et al. (2014), TAM primarily focuses on perceived usefulness as the most acceptance indicator without considering the actual use of the technology. This is problematic because Nistor et al. (2012) suggest that there was non-significant relationship between a person's expressed intention and actual use behaviour. Therefore, it is equally important to study actual use of technology rather than just perceived use, which TAM currently offers. Parker & Castleman (2009) also observed that TAM is not suitable for understanding e-commerce adoption in SMEs on its own, as it does not take the contextual factors of SMEs into account. Thus, one might support Parker & Castleman (2009) assertion for the reason that SMEs in developing countries have other complex issues such as infrastructural and social issues rather than just their behavioural intentions.

2.2 Unified Theory of Acceptance and Use of Technology (UTAUT)

The UTAUT model is an extension of Technology Acceptance Model (TAM) introduced by Venkatesh et al. (2003) to bring together alternative view on users and innovation acceptance. The UTAUT model has four major constructs such as performance expectancy, effort expectancy, social influences and facilitating conditions. Performance expectancy according to the model is the degree to which an individual believes that the use of a system will translate into increases in work performance. Effort expectancy is the extent to which a system is perceived to be easy to use. Social influence refers to the extent to which individuals perceive that influential people believe they should use a new system. Facilitating conditions refers to the availability of infrastructure to support the use of a system. These four constructs are moderated by gender, age, experience and voluntariness of use. Venkatesh et al. (2003) argued that examining each of these constructs in the real world allows researchers and practitioners to assess a person's intention to use a specific system.

UTAUT has been applied or modified to understand e-commerce adoption in developing countries context. For instance, Ndayizigamiye (2012) used UTAUT to explore the determinant of e-commerce adoption in South Africa using a sample of 180 Small, Medium and Micro Enterprises (SMMEs).

The author's finding revealed that social influence, effort expectance and performance expectancy are determinant of e-commerce adoption within the selected SMMEs. Whereas, the facilitating conditions did not influence the decisions of e-commerce adoption.

UTAUT model has been commended by Waehama et al. (2014) for its ability to explain more than 70% of technology acceptance behaviour compared to other models that explain as little as 40% and its ability to determine the acceptance of impending new technology.

Even though the UTAUT model has been well received by many researchers (like its predecessor TAM), a number of shortcomings exist. Firstly, behavioural intention has a weak predictive and explanatory power to deal with uncertainties and unanticipated events between the times the intention is formed and when the behaviour is performed (Venkatesh et al. 2008). Another limitation is that behavioural intention is not a reflection of a person's internal belief and does not represent the external factors that may affect the performance of behaviour. As a result, the UTAUT model does not capture the various external and internal stimuli that alter intentions overtime (Venkatesh et al. 2008).

We observe that UTAUT is an extension of TAM and in many respects both models have common ideology revolving around behavioural intention when it comes to technology adoption, including e-commerce. Therefore, it not clear whether UTAUT on its own captures the contextual factors associated with SMEs in developing countries i.e. the complex relationship between owners of SME, families, customers and employees.

2.3 Diffusion of Innovation Theory (DOI)

The Diffusion of Innovation Theory was introduced by Rogers (1995) to explain the rate and stages of innovation adoption . According to DOI theory, diffusion is the way by which an innovation is communicated through certain channel overtime in a particular social system. Rogers' DOI theory suggests that an individual's decision about an innovation is not an immediate act but a process that occurs over time, consisting of a series of actions. These innovation processes are: knowledge, persuasion, decision, implementation and confirmation. According to Rogers (1995), Knowledge arises when an individual is exposed to an innovation and able to understand it. Persuasion happens when individuals form favourable or unfavourable attitudes towards an innovation. Decision is made when individuals engage in activities that lead to acceptance or rejection of an innovation. Implementation takes place when

individuals put innovation into use. The theory further posits that the rate of adoption is impacted by five attributes namely; relative advantage; complexity; compatibility; observability; and trialability. In the DOI model also categorises adopters into: innovators, early adopters, early majority, late majority and laggards. In the DOI framework, innovators are those who want to be the first to try an innovation. Early adopters represent opinion leaders. Early majority are people who rarely lead. Late are those who are sceptical about adopting innovation. Laggards are conservative people who are bounded by their traditions.

DOI theory is one of the most commonly cited diffusion theories in SME e-commerce adoption literature even though the model did not address e-commerce directly (Parker and Castleman, 2009). It has been applied in a number of SME adoption studies. For example, Poorangi et al (2013) used the theory to explore and explain the different dimensions of the adoption of e-commerce amongst SMEs in Malaysia. The authors found a majority of DOI adoption factors (relative advantage, compatibility, observability and trialability) were influential in e-commerce adoption. Furthermore, Poorangi et al. (2013) claimed that their findings were consistent with DOI postulation except for the fact that complexity does not significantly affect e-commerce adoption.

Even though Rogers' DOI theory has been commended for its explanatory power and applied in some SMEs e-commerce adoption studies such as (Al-Qirim, 2005; Moghavvemi et al. 2012) it has also been subjected to criticism.
The DOI theory has also been criticised for not been able to address the issues and dynamic social setting in SMEs (Parker & Castleman, 2009). Similarly, Lawrence (2010) observed that DOI is a variance model and cannot adequately explain the contextual issues that are associated with of ICT adoption in SMEs. Therefore, Rogers' DOI theory on its own may not be sufficient to explain all the contextual issues such as limited resources and customers readiness associated with SMEs e-commerce adoption in developing countries.

2.4 Technology Organisation Environment (TOE)

The Technology Organisation Environment (TOE) framework was developed by Tornatzky and Fleischer (1990) to explain the factors that affects a firm's decision to adopt innovation. The framework posits that technological innovation in organisations is influenced by three factors specifically: the technological, the organisational and the external environment. Organisational factors consists of

informal and formal methods, communication processes, and size of the organisation. The environmental factors comprises of characteristics such as government regulation market structure and technology infrastructure. Technological context encompasses availability and features of the technology (Lippert and Govindarajulu, 2006).

TOE has been used in studies related to e-commerce adoption in SMEs. For instance, Huy et al. (2012) drew upon the TOE framework to identify factors influencing e-commerce adoption in 926 Vietnamese SMEs. They found that lack of skilled personnel, scarcity of resources, communication barriers between SMEs and supporting groups, limited option for online payment and cultural barrier with online shopping were the main factors influencing e-commerce adoption in Vietnam. Huy et al. (2012) commended the TOE framework as serving as a foundation for understanding the internal and external factors that could influence e-commerce adoption for all types of SMEs in Vietnam.

One of the limitations of TOE in relation to SMEs in developing countries is that some of constructs in the adoption predictors are presumed to be more applicable to large organisations due to their affluence of resources. For this reason, TOE on its own is not sufficient in explaining the adoption of SMEs (Awa et al. 2012). Therefore, Awa et al. (2012) suggested that the integration of TOE and TAM would offer a richer theoretical lens for understanding the adoption of e-commerce by SMEs in developing countries. The same point was also echoed by Gangwar et al. (2014) after conducting a critical literature review on TOE and TAM. Despite their suggestions it is not clear that the integration of both theories would be appropriate since both theories largely ignore the contextual issues of SMEs in developing countries.

2.5 Theory of Planned Behaviour (TPB)

The Theory of Planned Behaviour (TPB) is an extension of the Theory of Reasoned Action (TRA) that was established by (Ajzen, 1991). The theory posits that there are three constructs that can be used to predict intention to use an innovation. These constructs are perceived behavioural control, subjective norms and attitude toward behaviour. The perceived behavioural control is described as the extent to which a person feels able to enact the behaviour. Subjective norms characterise a person own evaluation of social pressure to perform the target behaviour. While attitude in the theory refer to a person overall evaluation of the behaviour.

TPB has been applied or modified to understand e-commerce adoption in the context of developing countries. For example, Uzoka et al. (2007) used the theory to investigate the behavioural factor that influences e-commerce adoption using Botswana as a case study. The authors found perceived advantages, accessibility, management support, internet and complexity, to have a major influence on e-commerce adoption decision, while perceived disadvantages and other facilitating conditions do not affect e-commerce adoption decision. Uzoka et al. (2007) noted that their findings tend to agree with the TPB. However, attitude seems to weigh more than subjective norm and perceived behavioural control.

Table 1.Mapping of Models' characteristics

	TAM	UTAUT	DOI	TOE	TPB	RBT
Perceived usefulness	✓					
Perceived ease of use	✓	✓				
Perceived behavioural control					✓	
Subjective norms					✓	
Attitude toward behaviour					✓	
Performance Expectancy		✓				
Effort Expectancy		✓				
Social Influence		✓				
Facilitating Conditions		✓				
Technological resources				✓		✓
Size of organisation				✓		
Communication process				✓		
Slack				✓		
External technological infrastructure				✓		
Government regulation				✓		
Industry characteristics				✓		
Communication process				✓		
Financial resources						✓
Relative advantage			✓			
Compatibility			✓			
Trialability			✓			
Observability			✓			

According to Parker and Castleman (2009) the strength of TPB is that it measures and predicts actions in the immediate future. However, the theory has been criticised for its inability to capture the complex interrelationships between the SME owner, government, agencies, customer and other stakeholders (Ukoha, 2011). Parker and Castleman (2009) have also argued that TPB largely ignore the

contextual nature of SMEs. For that reason, Parker and Castleman (2009) suggested that researcher seeking to explore e-commerce adoption in SME will requires explanatory theory rather than individualist prediction that TPB currently offers.

We observed that, TPB only focuses on user behaviour and largely ignores other factors that shape SMEs e-commerce adoption such as resources, customer readiness and infrastructure. One might assume that TPB on its own cannot be used to understand e-commerce adoption in SMEs in developing countries.

2.6 Resource Based Theory (RBT)

The resource-based theory was introduced by Barney (1991) to explain how and why firms develop the capability to gain and sustain competitive advantage in its market and industry. RBT posits that in order for a firm to have a sustainable competitive advantage, the firm's resources must be valuable, inimitable, non-substitutable and non-transferable (Boateng, 2011; Kazlauskaitė et al. 2015). According to Ray & Ray (2006), these resources can be gained internally or firm can choose to exploit external resources.

In the e-commerce adoption literature, RBT has been used to understand how businesses create value from IT assets and organisation skills. For instance, Zhao et al. (2008) used RBT to investigate causal relationships among strategic initiative, information technology related resources and e-business implementation process in 56 Chinese enterprises. The authors found that information sharing capabilities are intermediate and a transferable force that helps in translating information technology related organisational resources into the collaborative process capabilities. Zhao et al. (2008) further claimed that their study findings laid credence to RBT postulation.

One important advantage of RBT is that it highlights the capabilities that any firm, as well as SMEs must possess in order to adopt e-commerce, which include tangible and intangible resources (Parker and Castleman, 2009). However, RBT's limitation is that it assumes resources are used to full capacity in all firms, which is frequently not the case for SMEs because they often lack resources, skills and flexibility (Rivard et al. 2006). Given the particular nature of SMEs in developing countries, one could assume that RBT on its own may not capture the interplay that happens within them.

3. NEED FOR INTEGRATION OF THEORETICAL FRAMEWORKS.

Our review of prior e-commerce adoption literature in both developed and developing countries is summarised in Table 1. It suggests that the prevalent theoretical models when used on their own do not provide a lens to explain the contextual issues of SMEs in developing countries. Moreover, it also appeared from the literature that there is no consensus which theory/model can sufficiently explain e-commerce in developing countries SMEs. Instead, the existing studies we looked at generally use only one or two of these models to formulate their research models.

More specifically, we found out from the literature that TAM, UTAUT and TPB are deterministic models since they focus only on users and neglects the various interplay of other factors that shape e-commerce adoption amongst SMEs in developing countries. Literature also revealed that DOI, and RBT largely ignore the contextual issues of SMEs in developing countries. In contrast, the literature suggests that TOE framework may serve as a starting point for understanding this because it takes into account the organisational, technological and environmental impediment (Ghobakhloo et al. 2011). Our analysis is supported by Sila and Dobni's (2012) assertion that a theoretical model for SMEs e-commerce adoption needs to take into account factors that affect the tendency to use and adopt e-commerce, which is embedded in the technology, organisation and environmental circumstance of a business.

However, one of the limitations of TOE highlighted by Awa et al. (2012) is that it does not provide a lens for inspecting the nature of relationships and the complex social contexts in which SME in developing countries make decisions. For this reason, one might suggest that an additional model could be combined with TOE to form a theoretical framework for this context. One such model is the Perceived E-readiness Model (PERM) developed by Molla and Licker (2005): although it is less commonly used. This model posits that a multi-perspective of assessment of managerial, internal organisational and external contextual issues can provide meaningful predictors for e-commerce adoption in developing nations. PERM assumes that the interaction of all the aforementioned perspectives create a more dynamic framework for understanding the unique environment of organisations in developing countries.

The PERM therefore could complement TOE by providing an explanation of the interplay and social structure in which SMEs in developing countries operates. Our examination of the literature shows that a few studies have applied or modified PERM for SME e-commerce adoption such as (Tan et al. 2007; Al-Hudhaif and Alkubeyyer 2011; Idris, 2015). In addition, the model is often cited in

research papers for theoretical purpose without actual application in studies.

identify various patterns of e-commerce adoption of SME in developing countries, leading to an understanding of why e-commerce adoption is
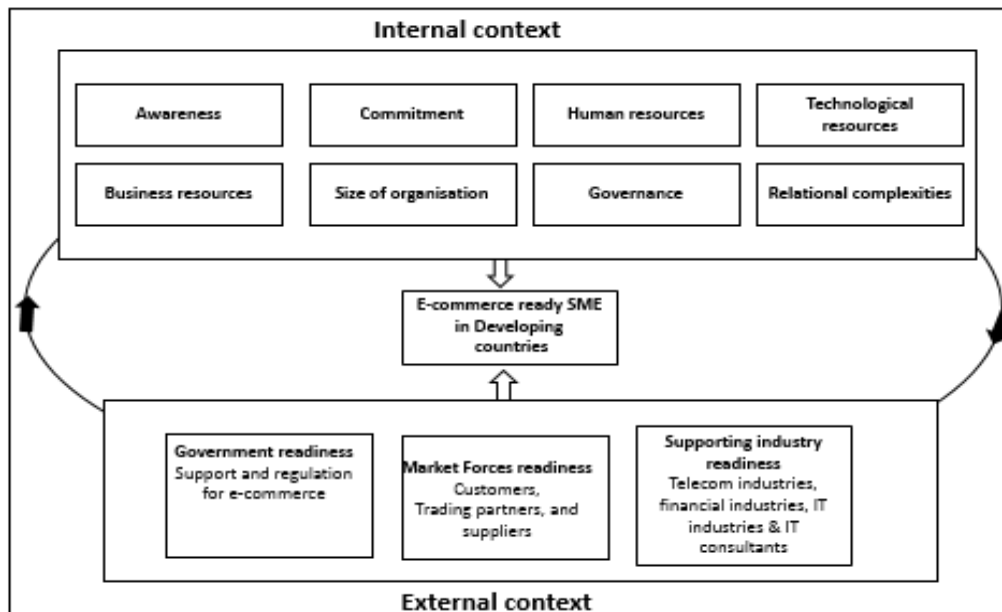

Figure 1: A Conceptual Model Modified from PERM (Molla and Licker, 2005), and TOE framework (Tornatzky and Fleischer 1990)

There appears to be a synergy between PERM and TOE, because both of them advocate the consideration of technology, organisation and environmental circumstances of an organisation as the major determining factors for e-commerce adoption. Unlike TOE, PERM does not consider each factor separately, but rather considers the interplay amongst various factors and captures changes that are relevant to organisations in developing countries. PERM therefore provides a useful lens to investigate SME adoption of e-commerce because it takes into account interaction and structural characteristics that affect e-commerce adoption in developing countries:

Firstly, PERM captures an organisation's perception, comprehension, potential benefits and risk of e-commerce, which are referred to in the model as innovation imperative attributes (Molla and Licker, 2005). Secondly, it encompasses the e-commerce knowledge and commitment of SMEs decision-making bodies, which is known as the managerial imperative attributes. Thirdly, it takes into account major organisational element, such as business infrastructure, business process and governance, which are known as the organisational imperative attributes (Molla and Licker, 2005). Fourthly, researchers applying PERM such as Tan et al. (2007) have used the model to distinguish between adopters and non-adopters of e-commerce in a developing country context. For this reason, one might suggest that PERM could help researchers to

successful in certain SMEs but not others.

Despite the usefulness of PERM for understanding e-commerce adoption in developing countries, its main limitations are that it excludes important industry descriptors, such as sector, and firm size Tan et al. (2007), whereas this aspect has been covered by TOE. Therefore integrating the theoretical models to understanding e-commerce adoption in developing countries SMEs allow TOE to act as the overarching model and PERM to be lens for contextualising the various interactions that take place inside and outside the SMEs. The rationale here is that understanding e-commerce adoption of developing countries SMEs requires models that are flexible enough to capture changes (Ghobakhloo et al. 2011: Huy et al. 2012). Our combined model shown in Figure 1, encompasses this.

4. CONCLUSION

This paper has evaluated the dominant theoretical models in developing countries SMEs e-commerce adoption studies and the extent of their relevance. We have been able to demonstrate from the literature that TAM, UTAUT and TPB are deterministic model because they focus only on users and neglects the various interplays of other factors that shape e-commerce adoption in developing countries SMEs. We have also shown that DOI, and RBT largely ignore the heterogeneous nature of SMEs in developing countries. We

conclude that these individual theories are not capable of explaining e-commerce adoption of developing countries SMEs. Consequently, we suggest that the integration of one of the less commonly used theory, PERM, and one of the dominant theories TOE may serve as a basis for explaining e-commerce adoption of SMEs in developing countries. The conceptual framework in Figure 1 can be used to drive empirical studies in developing countries SMEs to understand the underlying contextual issues affecting their e-commerce readiness. It is currently beyond the scope of this paper to do this but an analysis of the existing empirical evidence that supports the integrated framework is provided in (Idris et al. 2017).

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