

Study on Obstacles in Implementing ICT Tools for SMEs with Reference to Rural Sector

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Abstract: *This study investigated into three important barriers—environmental, organisational, and technological—that impact how developed ICT is adapted to or integrated. It also looked at how SMEs in less developed nations might explore the many ICT development stages by shifting from one to the next. Technology has evolved into a competitive tool in modern business practises, making ICT integration in SMEs crucial. Based on a survey of 322 SMEs in Nigeria, this report was verified using the SmartPLS3 programme. The quantitative analysis focused on the three hypothesised obstacles to gauge the extent to which internal and external factors may limit SMEs' ability to compete in terms of corporate growth and company expansion. Despite the literature's prior emphasis on the effects of ICT on the SMEs' growth and expansion, the analysis helped clarify some of the important obstacles faced by rural SMEs in an emerging country like Nigeria. The creation of a unique model to aid SMEs in understanding the importance of developed ICT and suggesting a strategy for SMEs to go through the stages of developed ICT is one of the study's significant contributions.*

Keywords: ICT; SMEs; less developed nations (LDNs); developing nations

I. INTRODUCTION

In the corporate world, technologies have significantly increased the competition for competitive advantages. Small and medium-sized businesses (SMEs) are not exempt from this dynamic, especially those operating in emerging nations that are vying for market share internationally. Small and medium-sized businesses (SMEs) have been claimed to have made a substantial contribution to the growth of emerging economies [1]. Previous research has concentrated on the variables (barriers) affecting ICT adoption success [2, 3] and their impact on SMEs' performance [4], demonstrating the significance of ICT not only for SMEs' organisational performance but also for their business expansion both inside and outside the local market [5]. Small businesses have been urged to include ICTs into their organisational structure by focusing on owner-manager characteristics [6,7], employee ICT knowledge and abilities [8,] and its advantages [9]. These studies have drawn criticism, nevertheless, because the majority of ICT models were created to address problems with effective ICT adoption among SMEs from the perspective of an advanced economy [10–12], which is different in the context of developing nations [13–14]. The obstacles preventing the proper integration of developed ICTs, particularly those operating in the rural context in less developed nations that have been long disregarded, must thus be identified. Such research can offer suggestions for lessening the effects of these difficulties [16].

Although many of these difficulties have been noted in the literature, the majority of these obstacles do not only affect SMEs in developing nations [17]. According to the study provided by [18,19], SMEs in less developed nations have greater obstacles that prohibit them from utilising modern ICTs to their full potential. For instance, the development of SMEs is influenced by the national economic strategy of each nation, which tries to find long-term solutions to problems with low GDP, low per capita income, unemployment, and income distribution [20]. International Monetary Fund (IMF) [21] claims that the majority of nations categorised as low-income economies frequently follow more stringent policies that are harmful to the expansion of SME. According to certain sources, the limited integration of developed ICTs among SMEs, and more notably in rural areas, is directly tied to these restrictive measures [22]. The degree of ICT integration among SMEs is typically influenced by the country's economic development, which affects SMEs more than large businesses [23, 24]. Weak government regulations often have an impact on the level of

developed ICT adoption, especially among SMEs, which helps them gain a significant competitive edge in the markets (both local and global markets). Where such policies are in place, they significantly contribute to the successful adoption of established ICTs by SMEs. Therefore, it is essential to recognise and acknowledge these obstacles in order to foster an environment that fosters SME growth [25].

However, the three main obstacles—namely, those connected to technology, organisations, and the environment—were found to have significant effects on SMEs as they decide whether to adopt cutting-edge technologies. The significance of these obstacles may be one of the reasons why Nigeria, the continent's powerhouse, had a low rating in the International Technology Union (ITU) study, which ranked it 143rd out of 167 nations in 2020 [29]. The level of established ICT integration among SMEs in less developed nations cannot be predicted using the constraining factors found in rich economies, according to Agwu's [30] argument. In the meantime, the government's key agenda item was to create a policy that would promote improved ICT integration among SMEs so that they could appropriately compete with their counterparts throughout the world [31,32].

This study uses the example of Nigeria to uncover the constraints preventing the successful integration of mature ICTs in SME business practises in developing nations. This study makes two contributions. It begins by addressing the gaps in the research. Although numerous studies have identified the barriers to ICT adoption, many of these studies have neglected to take into account how these barriers may affect the successful adoption of developed ICTs [33]. Second, the results of this study have policy repercussions for the effective adoption of sophisticated ICTs by SMEs in developing nations.

There are four main components to the essay. In the first, the literature on technology use in modern firms and SMEs is reviewed, and the theoretical model and research hypotheses are looked at. The frameworks for the methodology are described in the second part. The third portion summarises the survey's results, and the fourth section discusses them in relation to the literature. Finally, we reach findings that also emphasise the research's ramifications.

II. LITERATURE REVIEW

The Stage-of-Growth (SOG) framework by [35] and the Technology-Organisation-Environment (TOE) framework by [34] serve as the theoretical foundations for this investigation. Although numerous ICT models have been employed in the literature to explain the adoption of ICTs, they cannot be used to conduct the same inquiry in the contexts of the less developed nations because of some contextual difficulties. The rural areas of developed nations like the United Kingdom and the United States of America [14] cannot be compared to Nigeria's rural areas because there is a high concentration of people living there without access to basic services like roads, electricity, schools, and hospitals [17]. As a result, the two theories will first be thoroughly examined before being modified to fit the specific situations of this study.

To investigate the elements influencing the successful adoption of ICT and its diffusion in SMEs, [34] created the TOE framework. The technological contexts, organisational contexts, and environmental contexts are among the elements of the framework that can be utilised to explain the adoption of ICT in SMEs [36–38]. The literature pertinent to this study provided evidence that some adoption factors, such as those of the leader and the internal and external business features, influence how organisations use ICT [39,40]. The owner-manager of the SME's attitude towards change is among the traits of the leader, along with internal traits like organisational design and external traits like the openness of the system and the significance of ICT in general [41]. Similar to this, some academics have argued that the traits of the owner-manager can be seen as belonging to the internal characteristics of the firm. This is one of the main tenets of Rogers' DOI model, which also includes the traits of top management and the external characteristics [42,43]. The perceived usefulness and perceived ease of use, which are the two qualities of the TAM model, are identical to the two theories (the DOI model and the TOE framework).

The TOE framework has contributed to the literature, but it is not without criticism. The theory has come under fire for being overly static in nature because it only considers the variables (i.e., drivers and barriers) affecting the effective adoption of ICT. The complexity and dynamisms of the firm's ICT adoption process are not adequately explained by the theory, which is the second problem. When utilising the TOE framework to examine the adoption of ICT in SMEs, attention must be given because it differs significantly from other models that have been studied in the past due to its high number of variables, which makes it richer and more robust [44].

Model of Stages-of-Growth (SOG)

The stages-of-growth model was first put forth by [35], who suggested a four-stage model. Later on, [45,46] enlarged the model to a six-stage model. The model's foundation was the requirement to match the firm's management plan with the stage at which ICT adaption is currently being developed [47]. It is not necessary to complete each element embedded in each stage, according to Cieciora et al. [48], who also created a four-stage model. This statement gives the idea that it is feasible to pick a specific component of the produced ICT to work with and advance with. The authors of [49], who validated the stage-of-growth model submitted by the authors of [50] but did not specify the individual stages, supported these findings. Rustly et al. [51] suggested a five-stage model, asserting that each organisation would go through a different learning curve as it adapted to the recently established ICTs. Shee et al. [52] questioned this finding on the grounds that the model just categorises an organisation into one stage without describing how it might go from one stage to the next.

A model created by Kannabiran and Dharmalingham [9] explains in detail how businesses can develop their use of ICT while also demonstrating how adaptive organisations can go from an early stage to a more mature level. Olivera and Martins [53], who found the methodology to be a little overly complicated and consequently proposed a model that is more advantageous and focuses more on activities than outputs because they are less contextual, criticised this finding as well because activities offer the decision-makers some better indicators of what to do at each stage of developed ICT adaptation. Similar to how many authors have proposed various stages of ICT growth models based on these models for a variety of purposes, including: end-users of developed ICTs [54], information centres [55], technology-based new ventures [56], ICT planning [57], and ICT portfolio management [58], the empirical testing of the stages proposed in these models has, for the most part, been positive.

A number of new stages of growth models have been developed and introduced as a result of the development of advanced ICTs, such as e-businesses. In order to illustrate the activities involved in both the developed ICT processes and the traditional ICTs, Kannabiran and Dharmalingam [9] suggested a developed ICT model that incorporates the stage-of-growth model devised by the authors of [59]. The stages-of-growth concept assumes that levels will advance as an organisation gains ICT knowledge, experience, credentials, and skills. On the other hand, Duan [60] proposed a four-stage model of the development of B2B created ICTs like e-commerce, however the concept is now thought to be incorrect [61]. According to Davis [62], who also put forth a stage-of-growth model that was similar to that in [63], organisations are not required to complete each stage successfully because they can start at any stage and skip some of the stages if they choose. For example, an organisation that is becoming more familiar with recently developed technologies, like e-commerce, might start with a later maturity phase. Some scholars [64,65] also agreed that firms might pick and choose which developed ICT features to include into their organisational structure. On the other hand, according to Spalinger et al. [66], established ICT stages cannot be skipped because the knowledge gained from the prior stages is required for the subsequent step. When empirically analysed across several company profile examples, Teece et al. [67] discovered that just two growth kinds (i.e., the strategy and objectives, followed by the focus of the implementation) were consistent.

[68–70] used the stage-of-growth model to examine the development of ICTs in companies. For example, several academics, such as [57,61], emphasised that progression can be made even though not all elements are in the same phase and that stages can thus be bypassed. Chege and Wang [71] discovered that the intranet, which was initially developed in the early stages, evolved more quickly to become essential for day-to-day operations, and it was extended to integrate the external value chains. These findings had important parallels to [69]'s stage-of-growth model, which later became institutionalised in the organisations, and they also found that the intranet was extended to integrate the external value chains. Based on the findings of [51], Dahnil et al. [72] have created a data warehousing stage-of-growth model, highlighting the need of understanding the stages so that management is better able to plan and is better positioned to avoid any errors. In addition to [74], who created a six-stage (levels 0-5) Knowledge Management Capability Assessment (KMCA) model, [75] also developed five-level stage-of-growth models for E-Government and ICTs in healthcare and education. Kyakulumbye and Pather [73] created a four-stage knowledge management technology (KMT) model.

A five-stage model for information architectures in local governmental organisations was the topic of comparable work by [77] and Won and Park [76], who created a four-stage E-Government model. According to Shee et al. [78],

organisations occasionally concatenate stages, and as new technologies are developed or discontinuities take place, the number of stages may increase and a new stages-of-growth model may be needed. This viewpoint echoes that of the authors of [78], who disclosed that modifications to their stages-of-growth model were made in response to advancements in data warehousing technologies. For instance, Kumar [79] later expanded the E-Government stage-of-growth models into a seven-stage model and suggests the stage of acceptance once it is widely agreed that it is worthwhile to proceed. The model also implies that steps can be omitted. A stage-of-growth model was created by Singh et al. [80] to control the development of ICTs in healthcare. A five-stage model of growth for ICT service outsourcing in higher education was created by Nikou and Mezei [81]. It must be underlined that the [82] model was based on the [83] five-stage and [80] three-stage ICT outsourcing maturity models, but neither model was put to the test.

Reasons to Use the Stage-of-Growth (SOG) Model and the TOE Framework

These models have been used for a variety of purposes. First, while being aware of their shortcomings, the two models remain one of the most widely used frameworks and are still employed by IS researchers to describe developmental shifts in organisational experiences with ICT adoption [64]. For instance, Lorente-Martinez et al. [55] suggest an integrated approach for B2B e-commerce adoption in Australian firms that combines a TOE framework and a phased model. Because certain features of the model resonate with both practitioners and scholars, the model continues to be intuitively extremely appealing [72]. Additionally, the two models enable researchers to fully assess all contextual factors influencing small company organisations, as well as how they modify the idea of learning and understanding stages and satisfy the need for classification and order [67]. As a result, using a linear model to describe the adoption and use of ICTs may seem appealing. In order to map the development of E-business maturity, Kumar [79] argued that the models provide various testable constructs that enable researchers to have a clear understanding of how SMEs move from one stage to the next. This leads to the conclusion that the stages' concept is useful in a pragmatic sense because it appeals to managers [61]. Third, the models have shown to be a helpful tool for SME's that seek to categorise themselves for comparison with their major competitors engaged in E-commerce within their own industry or sector, hence highlighting gaps and resulting in strategic measures [72]. Another advantage is that they can offer a roadmap to help businesses decide whether it makes sense to go on to the next level [37]. The phases approach, for instance, can be used to describe past, present, and future engagement in ICT growth and development. The two models provide important direction for examining the existing degree of ICT adoption by outlining how to move forward and where a business can concentrate its objectives and resources [16]. Finally, unlike other models, the TOE framework and the SOG model allow corporate organisations to break down their ICT activities into smaller, more manageable chunks, thereby reducing the complexity of those initiatives.

Integrated Developed ICT Integration Obstacles

There are still certain obstacles preventing its successful implementation, notably in the contexts of the less developed nations, despite the advantages associated with the successful use of modern ICTs in boosting the organisational performance of the SMEs as proven in the literature [24]. Qureshi and York [32] claimed that small enterprises can benefit from developed ICT integration. However, there were a variety of concerns surrounding it, and they were extensively covered in the literature that was relevant to this study. For example, Wixom and Todd [83] highlighted that while most large firms that have been able to adopt and deploy developed ICTs into their organisational framework are thereby reaping all of its benefits, SMEs, particularly in emerging countries, are yet to take the advantages developed ICTs have to offer due to some barriers affecting its successful adoption. Few research have been done in the context of less developed nations, despite the fact that there have been many studies in the literature that look into the factors affecting the effective adoption of modern ICTs among SMEs in developed countries. In order to aid in the comprehensive understanding of these barriers and the relationship between them, there have also been extensive scholarly discussions on the various categories of barriers (i.e., the technologically related barriers, the organizationally related barriers, and the environmental related barriers).

2.4.1. technological obstacles

The successful implementation of sophisticated ICTs by SMEs may be hampered by technologically related obstacles. Although numerous impediments have been identified and explored in the literature with regard to developed countries,

they may be considerably different with regard to developing countries [53]. The expense of implementation [19], the security and quality of the Internet as offered by ISPs [56], the lack of sufficient hardware and software applications [47], and website-related issues like privacy and security are a few of the technological impediments that have been noted.

The most important technological hurdle preventing the integration of established ICT has been characterised in the literature, among other barriers, as security concerns. For instance, Reggi and Gil-Garcia [36] asserted that the biggest obstacle preventing SMEs from adopting sophisticated ICTs is security concerns. According to Alliance [23], the primary reasons why most company concerns have failed to adopt and use the recently developed technology are security and privacy concerns. This could result in the loss of personal information and financial resources due to fraud [51]. The use of advanced ICTs, such as e-commerce, has been hampered by various security challenges, including hacking, fraud, and virus attacks, as shown in the study presented by [21]. The high implementation costs and security concerns were found to be the two main factors in the study [16] done on the factors influencing the adoption of ICTs among SMEs in New Zealand.

Due to privacy and security concerns, many customers are hesitant to share their personal information online, including names, addresses, and even their status [7], which is currently impeding the successful integration of developed ICTs among SMEs, particularly in the context of developing countries. Igwe and others, [15]

asserts that the main obstacles to the adoption and usage of mature ICTs in less developed nations are security concerns, as both businesses and customers feel they are not safeguarded from fraudsters. Although new innovations, such the usage of smart cards, tend to lessen the crime-related problems preventing the efficient adoption of established ICT, Spalinger et al. [66] made it abundantly evident that both businesses and consumers still struggle to adopt and use it.

One technological impediment mentioned in the literature is the high cost of implementation. However, some studies trying to analyse the effective implementation of developed ICTs, particularly among small business firms, claim that the high cost of implementation also includes the cost of hardware and software applications as well as the cost of setting up the internet facilities and maintenance [54]. The high cost of Internet services offered by Internet service providers (ISPs) is one of the barriers preventing SMEs from effectively implementing and utilising developed ICTs, claim Jin and Hurd [27]. This is due to the fact that small company businesses have constrained resources and think investing in ICT facilities will have a low return.

This conclusion is supported by a number of studies [25,34,57] that found that one of the main obstacles to the poor adoption of these technologies among SMEs in Cyprus is the lack of sufficient money available to the SMEs for the acquisition of newly developed technologies. According to Orser et al.'s [39] assessment, one of the reasons for the low integration of established ICTs among SMEs is due to technological constraints such security, cost of acquisition, and maintenance of ICT facilities. According to the study, small company organisations would not adopt newly created technologies if the advantages outweighed the entire cost of acquisition and deployment [53].

One of the key elements included under the technologically linked hurdles is the calibre of the Internet service. Other factors are allegedly included in this. For example, the stability/reliability of the network, the speed of the Internet service provided by the Internet service provider and the level of internet access are some of the setbacks identified and discussed in the literature related to this study [71]. Numerous studies in the literature have found that one of the biggest barriers to SMEs in less developed nations integrating developed ICTs is the calibre of the Internet connection [41]. The non-availability of good Internet services may inform the SMEs' decision of whether to adapt to the newly developed technologies while the high speed of the Internet, on the other hand, encourages both the firms and their customers to spend more valuable time online. Therefore, slow Internet connections, according to [62], are said to discourage SMEs from adapting and using the newly developed technologies more effectively [70]. However, little research has been conducted in this regard in the developing countries, particularly amongst the rural SMEs [67].

Organisational obstacles

In the literature, certain factors have been identified as organisational-related barriers. The barriers identified under this category include the lack of resources at the disposal of the firm, the lack of ICT knowledge and skills amongst the employees and the time involved in implementing such technologies [12]. Small business firms may refuse to adapt to the new technology if such technology is not compatible with their existing organisational structures. This was

evidenced in [27] which revealed that many business organisations refused to adapt to new technology that does not support their existing structures. Many scholars have echoed this finding in the literature; for instance, [5,39,63] argued that many SMEs would not adapt to or use a newly developed technology if it was too complex and may therefore not support their business growth and expansion. This was supported by [20], who pointed out that most SMEs fail to adapt or use a developed ICT because they

Lack of sufficient time for implementation is another factor identified under the organisational-related barriers in the literature. Many studies have identified and discussed this factor as one of the most significant barriers affecting the adoption of developed ICTs. Adane [22] argued that the lack of implementation time is one of the key reasons for the low integration of developed ICTs, which is a result of not taking time to investigate how the newly developed technology works and how it can be beneficial in both the short and the long run.

Environmental Obstacles

Apart from the inhibiting factors discussed above, there are some environmental- related barriers that have been identified in the literature and that are of great significance for the successful integration and use of developed ICTs, particularly amongst small business firms [32]. Many studies have identified and discussed some external-related factors inhibiting the effective implementation of newly developed technologies in the literature related to this study, which include government policies [53], cultural issues and regulatory issues [61]. The findings of most studies in the literature revealed that government policy is the most significant environmental factor affecting the successful integration of ICTs amongst the SMEs in the less developed countries. For instance, Orser et al. [39] argued that government policies are necessary to protect both buyers and sellers of goods and services online from online malpractices such as fraud and unauthorised access to personal information that could be harmful for a business.

The government, through its policies, can encourage a healthier competition in the telecommunication sector, thereby giving more Internet access to SMEs [52]. This result was echoed by Teece and Pisano [67], who concluded after conducting a study on the adoption of ICT amongst SMEs in Botswana that the lack of adequate government support was the reason for its low adoption. Dassisti et al. [43] emphasised that a lack of government support can destabilise the growth of developed ICTs in SMEs, especially when the country does not have standardised policies to regulate and allow for competition to thrive in the telecommunication industry. Agwu [30] submitted the theory that government support can help accelerate the ICT uptake amongst SMEs by encouraging a more open competition within the telecommunication sector. The lack of government support was, however, intertwined with legal and regulatory policies [27].

III. CONCLUSION

The integration of developed ICTs in rural parts of Nigeria is still a new explorative area that is currently gaining momentum. The findings of this study show that the technological-, organisation- and environmental-related factors have significantly contributed to the determination of factors influencing the successful integration of developed ICTs by rural SMEs. Similar to all the empirical studies conducted in the context of developing countries in the literature; this study has some limitations. First, this study lacks a sampling framework which motivated the need to employ the snowball sampling methods which could be a source of bias in the research study. This means that the generalisations of the findings as shown throughout the study should be established with absolute care. The study was conducted in less developed countries, which means that its findings may be difficult to generalise, particularly in the context of developed countries due to contextual issues and technological differences. On the contrary, some findings can be generalised to some countries that are within the same region, particularly those in the western part of Africa (e.g., Ghana, Sierra Leone, and Togo).

The self-reporting strategies adopted wherein the participants' views, knowledge and previous learning/experience that were gathered during the interviews were considered as the only measures of assessing the level of implementation of developed ICTs amongst the rural SMEs. Consequently, the researcher interviewed only one participant per SME. Therefore, it may be very advisable for the future researchers to use other ways of measuring the level of implementation of developed ICTs, e.g., through the websites of the SMEs. This means that these websites can be used with some self-reporting strategies to confirm the information they are presented with. The research study only

considered the factors affecting the successful integration of developed ICTs amongst the rural SMEs. Future researchers could consider other areas of the economy in the future.

It was suggested that future studies should be conducted on the effect of the Internet access on mobile phones in the perspective of developing countries such as Nigeria. Despite the increasing use of mobile phones to gain access to the Internet in Nigeria, it was suggested that future researchers should replicate the integrated model (i.e., the stage growth model and the TOE framework) proposed by this study to analyse the factors influencing the integration of developed ICTs and use in a diversity of contexts.

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