

# Impact of Information and Communication Technology (ICT) on New Service Development

Mark Dirikorigha Salvation  
Faculty of Industrial Management, Universiti Malaysia Pahang  
Gambang, Pahang, Malaysia

*Abstract* - While developed countries have long begun using ICT for service innovation, many sub-Saharan African nations are still lagging behind in the use of ICTs for new service development (NSD) because of knowledge gap caused by lack of studies conducted in this area in the continent. Thus, this study attempts to close this knowledge gap by evaluating the impact of ICT on NSD in order to help service providers maximize the full potentials of ICT, including the service innovation potential. Using a survey method, a sample of 379 service-based small and medium enterprises are selected randomly from the Nigerian service industry. The data are analyzed using the Statistical Package for Social Sciences. This study is designed based on the underlying theory of Davis' technology acceptance model (TAM) which is significant to this study. This study used the TAM theory as a basis to enhance its predictive power and the outcome of the study. The expected results show that ICT plays multiple roles in NSD. Thus, service firms are likely to use ICT for service innovation, especially if it is perceived to be useful, easy to use and with a supportive organizational culture. The study helps managers to effectively coordinate their ICT infusion into NSD to improve firm performance.

*Keywords*- *Information, communication, technology, TAM, service, development*

## 1. INTRODUCTION

The rapid development of ICT makes a great impact on the process of developing new services. The use of ICTs makes innovation development relatively easier and cost-effective and the effects derived from the use of ICTs can be a source of greater productivity for SMEs (Jin, Dan and Tong 2004; Sulistyono and Siyamtinah 2016; World Bank 2016). Thus, incorporation of new systems and information technologies in the NSD process facilitate new ideas development and execution of production programmes, through innovation diffusion processes, usage practices and commercial success (Cuevas-Vargasa, Estrada and Larios-Gómez 2016). This is because ICT allows service providers and external parties, such as customers, suppliers, product developers and industry associations, to collaborate and share new ideas and concepts needed for developing services.

Hence, the adequate use of ICT allows organizations, primarily in small businesses, to improve production activities in substantial ways (Tung and Rieck 2005). This is especially so for dynamic companies with a highly competitive environment that requires the use of advanced ICTs to improve their efficiency and cost effectiveness. From the feedbacks provided by the users, firms can offer high quality services to their clients (Mosleh and Shannak 2009). For these reasons, ICTs are valuable source of NSD because personalization requirements that were not operational and economically feasible prior to the use of ICTs are now made available. Scuotto, Giudice and Carayannis (2017) state that social media provide a wealth of information about individuals, which can be used for NSD because they enable enterprises to create online communities and share user-created content. Within this context, enterprises actively interact with external participants to acquire and absorb external knowledge and then generate new services. The increasing importance of new services to businesses has driven the growth of literature on service innovation (Chesbrough, Vanhaverbeke and West 2006; Mention and Torkkeli 2012; Papastathopoulou and Hultink 2012). Despite the growth of research about NSD, several authors have criticized the lack of attention paid to NSD compared with new product development (NPD) (Martovoy and Mention 2016; Scuotto, Giudice and Carayannis 2017; Helm and Graf 2018). Thus, this study tries to resolve this issue by analyzing the effect of ICT use on NSD in Nigerian SMEs using grounded theory approach.

While developed countries have long begun using ICT for service innovation, many sub-Saharan African nations are still lagging behind in the use of ICTs for NSD because of knowledge gap caused by lack of studies conducted in this area in the continent (Asongu and Roux 2017; Wakunuma and Masika 2017; Ghozali 2018). Danquah and Joseph (2017) reveal that

understanding the impact of ICT on NSD in sub-Saharan Africa remains limited because the existing body of research has concentrated mainly in developed economies where there is a more stable and well-developed institutional environment. According to Danquah and Joseph, it remains unclear whether the findings from the studies done in developed countries will hold in sub-Saharan Africa, where the “rules of the game” are often uncertain. Although few studies on ICT have been done in Africa, most of them focused on the impact of ICT on education, governance and transformational development (Okunola, Rowley and Johnson 2017; Shirazi, Ngwenyama & Morawczynski 2017; Wakunuma and Masika 2017), economic growth (Niebel 2018). However, an explicit focus on NSD is found to be lacking in most of these works. Thus, less attention has been paid to whether ICT has potential as a significant enabler for NSD within the African context and this causes a knowledge gap in the use of ICT for service creation. Thompson & Walsham (2017) reveal that the limited studies done in Africa affects SMEs’ ability to effectively use ICT for NSD due to knowledge gap in ICT use. Njoh (2018) states that the link between ICT and NSD remains to be adequately tested in Africa, where knowledge on how the consumption of ICT affects service development is characterized by large gaps.

A second issue that motivates this study is the shortcomings of the TAM. Although TAM has had an incredible effect on empirical research for long (Muk and Chung 2015; Lai 2017), it has reached a turning point because the model leaves out important variables and recent extensions of TAM are patchwork of many largely unintegrated and uncoordinated abridgements (Bagozzi 2017; Hamed 2018). Bagozzi claims that TAM’s main weaknesses are the neglect of group, social and cultural aspects of decision-making and the absence of identifying the determinants of perceived usefulness (PU) and perceived ease of use (PEU). While decisions of technology use are often done collaboratively or based on others influence, TAM is conceived largely as a framework for explaining decision-making by individual persons. Thus, it is important to consider group, social or cultural aspects of technology acceptance because people act interpersonally or as agents of organizations (Hamed 2018). So, social influence and organizational culture are added to the TAM framework to improve its predictive power because it will deepen the theory and suggest fruitful avenues for better understanding how, when and why decisions are made in various technology applications. While prior studies introduced some predictors for PU or intentions (Fathema, Ross & Witte 2014; Fathema, Shannon & Ross 2015), Bagozzi claims almost no research has deepened TAM by explaining PU and PEU, reconceptualizing existing variables in the model or introducing new variables to explain how the existing variables produce the effects they do and this leaves a large gap in TAM. Bagozzi indicates that determinants of PU and PEU have been given scant attention. Thus, Bagozzi suggests that desired goals or motives can be treated as independent variables that predict PU and PEU because of their ability to identify the relative efficacy of individual goals or motives and the influence of linkages between them on PU and PEU. Thus, the study intends to evaluate the role of desired goals or motives on PU and perceived ease of using ICT, the effects of PU and PEU on NSD and the moderating roles of social influence, organizational culture and proportion of qualified staff on the relationship between PU, PEU and NSD.

## **2. LITERATURE REVIEW**

### *2.1 New Service Development*

NSD refers to the process of devising a new or improved service, from idea or concept generation to market launch (Bettencourt 2010). The NSD literature has evolved over the last 30 years. Starting with pioneering studies in the 1980s, the first articles focusing on service innovation has received consistent attention since the mid-1980s, thereby resulting in approximately over 30 years of empirical NSD research. Early NSD studies used largely qualitative methods to explore the nature and stages of the service innovation process (Johns and Harborne 1985; Easingwood 1986; Bowers 1989 as cited by Biemans, Griffin and Moenaert 2016). However, Mendes, Oliveira, Gomide and Nantes (2017) state that the earliest studies of NSD focused on understanding success factors, following quantitative research methods borrowed from NPD research. Several studies acknowledge that much of the initial understanding of NSD was derived from NPD, which is considered a mature research field (Durisin, Calabretta and Parmeggiani, 2010). Thus, there were ongoing discussions about using the theoretical foundations of NPD to study NSD. Therefore, several prominent researchers in the field at that time (e.g., De Brentani, 1989, 2001; Storey and Easingwood 1993; Edgett 1994) published numerous articles applying the methods used in the early NPD success or failure studies to the new discipline of NSD even though NSD differs significantly from NPD because of the inherent characteristics of services. The earliest studies focused on understanding success factors, following quantitative research methods borrowed from NPD research. The earlier researchers of NSD perhaps applied the techniques of NPD studies due to lack of appropriate frameworks needed to study the new discipline of NSD. This indicates that earlier studies on innovation were strongly biased toward products with little attention being given to services innovation. Besides, earlier research investigated narrow areas of NSD. During this first time period of NSD research, more than four out of five research focused on NSD process and its execution while few research covered NSD strategy, although this topic is declining over time. As Papastathopoulou and Hultink (2012) find, the NSD topics investigated in this early era were rather narrowly focused. Nevertheless, earlier research in NSD laid the foundation for further research that would explore more areas in NSD.

Subsequently, these earliest studies were quickly followed by new wave of researchers in the mid-1990s to early 2000s who began to study NSD in different context. However, researchers of this era applied the quantitative research methods of NPD success or failure studies to identify key NSD success factors (Storey and Easingwood 1993; Edgett 1994). Several studies acknowledge that much of the initial understanding of NSD was derived from NPD, which is considered a mature research field (Durisin, Calabretta and Parmeggiani 2010). Thus, there are ongoing discussions about using the theoretical foundations of NPD to study NSD. To this end, research has shown that, though similarities exist, service management differs from product management in several key aspects. While scholars acknowledge the key differences between products and services, they are not clear on how this impact the NSD process. However, integrated offers have contributed to minimizing this difference (Alam, 2002; Menor, Tatikonda and Sampson 2002; Stevens and Dimitriadis 2005; Papastathopoulou and Hultink 2012). Therefore, studies have explored NSD in terms of its own advancements and challenges and provided definitions, classifications, and frameworks designed specifically for services. Despite this evolution of NSD research, its maturity remains inconclusive.

Furthermore, some authors have conducted literature reviews to clarify the state-of-the-art and evolution of the NSD research field. The first literature review of the growing body of research about service innovation was carried out by Johnes and Storey (1998). The review provides a comprehensive analysis of the NSD literature. It identifies six key research areas: corporate environment, process, people involved, analysis of opportunities, development of new services and implementation. After the review, Johnes and Storey concluded that more research was needed in several NSD areas that were well covered in the NPD literature, such as objective procedures for evaluating success, teamwork, NSD across different industries and international aspects of NSD. Also, Menor, Tatikonda and Sampson (2002) identify NSD topics in need of further knowledge refinement (exploitation) and highlight topics that require full investigation (exploration). They recommend the following topics for exploitation: categorization of different types of new services and their impact on the development process, clarification of NSD process models and application of NPD tools for NSD. For further exploration, they suggest the following topics: design and development of internet services and application of modularity to NSD projects. In a related development, De Jong and Vermeulen (2003) analyze the literature and organize NSD into two evolutionary stages: managing key activities in the NSD process and creating a climate for continuous innovation. Besides, Droege, Hildebrand and Forcada (2010) provide a literature review with regard to three main areas of study: taxonomies of service firms, classification frameworks of service innovation and success factors for various service dimensions and innovation types.

Recent reviews have adopted a quantitative approach for analyzing the NSD literature. Papastathopoulou and Hultink (2012) perform bibliometric and content analyses to identify developments and patterns in the NSD research field. Considering criteria such as research topics and research design, they conclude that the field has matured over the years. Regarding future directions, they identify the need for an interdisciplinary focus. Similarly, Carlborg, Kindström and Kowalkowski (2014) depict the evolutionary pattern of NSD in terms of volume and topicality, confirming a level of maturity that Papastathopoulou and Hultink (2012) also suggest. However, Biemans, et al. (2016) disagree on the maturity assumption after reviewing 230 NSD research articles due to the lack of a strong network of authors, a coherent body of knowledge and high-impact articles. Also, a recent study using a bibliometric-based literature review of 277 NSD articles published over a period of 30 years by Mendes, Oliveira, Gomide and Nantes (2017) found that the NSD research field has not yet reached maturity although it is consistently moving toward it. Also, Helm and Graf (2018) assert that while the topic of developing new services has extensively been examined by researchers for the past 30 years, we are far from fully grasping the concept of NSD. Besides, Helm and Graf state that despite years of research regarding service innovation, there is no generally recognized model for the process of new service development. As a result, there is a clear sense of divergence about the maturity of the NSD research field.

Over the years, researchers have developed a finer grained interest in NSD. Thus, the focus has shifted toward internal competences (e.g., dynamic capabilities), customer understanding (e.g., experience-centric services) and the service innovation context (e.g., clusters and networks) and organizing NSD to the role of frontline employees, customer involvement and knowledge management. Thus, the literature has moved toward a broader research agenda and the number of researches addressing new NSD topics, such as customer involvement and organizational issues, has increased (Menor and Roth 2007; Cavalieri and Pezzotta 2012; Papastathopoulou and Hultink 2012; Carlborg, Kindström and Kowalkowski 2014). As Papastathopoulou and Hultink found, over the last 30 years, NSD research has gone from being narrowly focused to covering a much broader set of topics. This is because of the clear difference between the first 15 years of NSD research when only a few empirical studies were published each year and the last 10 years when the number of published empirical studies increased dramatically, with year 2012 alone recording 32 empirical NSD studies published. However, after a review of 230 empirical NSD studies published in 50 journals, Biemans, Griffin and Moenaert (2016) discovered that NSD strategy has become more popular in recent years among researchers from 2009 to 2012. According to Biemans, Griffin and Moenaert, 30% of the articles investigate strategic issues while almost 20% of the articles are about customer and market research, typically investigating information quality (for example, assessing the quality of user generated ideas for new services) and how service companies collect customer information to design new services. In view of important contemporary trends in this field (such as “big data” and social media), this domain is expected to gain momentum in the future. This is because of data mining potential of social media in accessing quality user generated ideas for the design of new services.

Another topic garnering increasing attention in NSD literature is co-development and alliances, which includes several studies about how firms collaborate with customers in developing new services. For example, Alam and Perry (2002); Melton and

Hartline (2010) recognized the importance of collaborating with or integrating the customer in developing new services. Also, Vargo and Lusch (2008) assert that value creation is an interactive procedure with customers being co-creators. This indicates that NSD process is a multi-actor matching one between needs and technologies as stated by Makkonen and Komulainen (2014). Thus, the process of innovating services entails the customer's idiosyncrasies which hold as important as those of the firm. However, Helm and Graf (2018) argue that these considerations are not sufficient regarding the NSD process of industrial manufacturers because the perspective of the client and thus the actual incorporation of its idiosyncrasies is lacking. Besides, Helm and Graf state that despite the importance of co-creation in service innovation, it still remains unclear which characteristics of the participating actors are necessary for executing NSD process. This assertion supports a recent call for improving the understanding of customer interaction during the NSD process made by Carlborg, Kindström and Kowalkowski (2014). This is because by focusing on NSD in the area of industrial manufacturers, one is entering a field of research which is in an early stage as stated by Kindström and Kowalkowski (2009).

Looking at geographic scope, most of the research on NSD were conducted in Europe followed by North America and Australia and Asia. However, there has been a sharp decline of the number of studies conducted in North America in recent years while there is an increasing number of studies in Australia and Asia. From a review of 230 empirical NSD studies published in 50 journals over a period of 30 years, Biemans, Griffin and Moenaert (2016) found that studies using data from North America (51.2%) have sharply decreased over time. This decline is not surprising because several earlier North American scholars who were highly active in the NSD research have moved out of the field. On the other hand, the authors indicated that the number of studies based on data from the Australia or Asia region (12.9%) has recently increased significantly. However, none of the studies reviewed were conducted in Africa or used data from the African continent. This means that the data or results obtained from these NSD research may not represent the views and experiences of the service industry in Africa due to geographically diverse cultures and their roles in the new service creation process. Although a number of NSD research has been carried out in Europe, Americas and Australia and Asia, there are missing actual research studies of NSD in the service industry in Africa. This means that research needs to document different voices in the NSD, especially those areas that have been marginalized. This provides academics an opportunity to demonstrate to Africans the worth of their studies of NSD. In this regard, findings from the current studies carried out in other regions can be replicated in Africa so as to improve on the current stock of knowledge about service innovation by adding the African perspective in the picture and provide service managers in Africa with a set of generally accepted tools and guidelines for successful creation and delivery of new services.

However, the opinions among the scholars differ when it comes to assessing what these three decades of NSD research have amounted. Some scholars conclude that the field has become mature (Bryson and Monnoyer, 2004). Cainelli, Evangelista and Savona (2004) conclude that there is nowadays a rather detailed picture on the relevance and nature of innovation activities in services. More grounded findings of a recent literature review was carried out by Papastathopoulou and Hultink (2012). Using bibliometric and content analyses to identify developments and patterns in the NSD research field, the scholars analyzed 145 conceptual and empirical articles from almost three decades of NSD research and split them into three-time periods containing roughly the same number of articles: 1982–1995 (“the early writings”), 1996–2001 (“advancing the literature”) and 2002–2008 (“the recent works”). From the articles reviewed, 90 were empirical NSD studies, which were classified according to research methodology. Considering criteria such as research topics and research design, Papastathopoulou and Hultink concluded that NSD research methods have matured over the years and that there is an emergence of a sophisticated NSD discipline. Regarding future directions, the scholars identify the need for an interdisciplinary focus. Similarly, Carlborg et al. (2014) depict the evolutionary pattern of NSD in terms of volume and topicality, confirming a level of maturity that Papastathopoulou and Hultink also suggest. However, their conclusion is based predominantly on an analysis of the evolution over time of the research methods employed. They do not evaluate the nature and impact of researcher networks or the overall body of knowledge that has been generated.

On the other hand, Biemans, Griffin and Moenaert (2016) disagree on the maturity assumption due to the lack of a strong network of authors, a coherent body of knowledge, and high-impact articles. As a result, there is a clear sense of divergence about the maturity of the NSD research field. This is because the field of NSD is shaped by a few researcher networks consisting of loosely connected researchers focusing on their own topics and failing to build a consistent body of NSD knowledge. Typically, researcher networks have focused on a narrow field of interest within the overall domain, resulting in more limited, isolated contributions. For instance, the Swedish/ Swiss research sub-network has produced numerous articles on user involvement in NSD. However, rather than exploring the complexities of when, where, and how to involve which users in developing new services, their articles repeatedly investigate the quality of user-generated ideas for new mobile phone services (Kristensson, Magnusson and Matthing 2002; Magnusson, Matthing, and Kristensson 2003; Matthing, Sandén, and Edvardsson 2004; Kristensson, Matthing and Johansson 2008 as cited by Biemans, Griffin and Moenaert 2016). While this strategy results in valuable insights, it does not build an overall body of knowledge.

Moreover, majority of scholars emphasize that the NSD domain remains underdeveloped and that much additional research is needed (De Jong and Vermeulen 2003; Droege, Hildebrand and Forcada 2009; Toivonen and Tuominen 2009; Salunke, Weerawardena and McColl-Kennedy 2011). For example, Storey and Hull (2010) state that NSD remains among the least

studied and understood topics in both the service management and the innovation literatures. Similarly, Kuester, Schuhmacher Gast and Worgul (2013) conclude that although researchers have shown growing interest in NSD issues, this area is still underutilized. More recently, an analysis of 230 empirical articles on NSD published over a period of 30 years by Biemans, Griffin and Moenaert (2016) found that despite the growing popularity of NSD as an innovation discipline, the field has not moved forward substantively. According to the study, NSD is a subject specialty but lacks an “invisible college” of researchers addressing the topic. Biemans, Griffin and Moenaert claimed that NSD research remains a young discipline, scripting its own paradigm as it proceeds. In doing so, it continues to oscillate between exploratory and conclusive studies. This is because era four of the NSD research is not only characterized by a major acceleration in publications, but the research methods used differ strongly from those used in the previous decades. Besides, the study found a lack of consensus across NSD findings with a rather fragmented new service development literature and does not provide managers with a set of generally accepted tools and guidelines for success. Therefore, this has resulted in a body of research that fails to provide managers with consistent answers to basic questions about how to most effectively manage NSD processes when compared with the NPD literature. However, the analyses of the research methodologies employed in empirical NSD studies paint a limited picture that, by itself, is insufficient to draw a clear conclusion about the status of NSD research.

Furthermore, others have proclaimed that NSD is moving toward a mature field of research. A recent study using a bibliometric-based literature review of 277 NSD articles published over a period of 30 years (i.e. published from 1984 to 2014) by Mendes, Oliveira, Gomide and Nantes (2017) used quantitative and qualitative analyses. These articles were organized into four periods to improve the analyses from an evolutionary perspective: Early Writings (1984-1995), Advancing of Literature (1996-2001), Progressive Literature (2002-2008) and Recent Works (2009-2014). The study found that the scientific production in the NSD field has grown significantly over these four periods, and the entry of new authors has extended the social structure. However, collaboration networks seem disconnected from one another. Nonetheless, the intellectual structure has shown great progress, making NSD an independent area of research and discovery from the NPD domain, with its own foundations and expansions into new topics. They claimed that the NSD research field has not yet reached maturity even though it is consistently moving toward it

The disagreement about the current state of NSD research has caused an absence of a generally accepted body of knowledge. In sharp contrast to the field of NPD, the increased level of NSD publications has not resulted in an integrated, holistic body of knowledge. In this regard, NSD researchers have not yet succeeded in building a true school of thought. NSD, which originated as a spin-off from NPD and consists of scholars researching many different aspects of NSD, can clearly be characterized as a subject specialty. But, it is still a far cry from being an invisible college. As a result, the NSD literature lacks cohesiveness and fails to build cumulative knowledge. For example, although it emphasizes the familiar characteristics of services (intangible, heterogeneous, inseparable and perishable), it fails to describe their role in and impact on NSD. While the inseparability of services implies that service employees are key to successful service delivery (De Jong and Vermeulen, 2003), the role of service employees remains largely ignored. Driven by the failure to build a cumulative body of knowledge, key questions such as “What does the NSD process look like?” and “How can NSD be effectively managed?” remain largely unanswered. In this regard, managers who want to start or improve their service offerings will find only limited help from the available NSD literature.

One of the main causes for the lack of coherence in the knowledge on NSD may stem from the fact that, rather than initially approaching research in the domain without in-going bias and using grounded theory approaches to create initial understanding, many of the early researchers applied the concepts, frameworks and methods used to understand NPD to the NSD domain. Another reason for the inability to build a cumulative body of knowledge was caused by early NSD researchers neglecting to build the field from the bottom up, by starting with unbiased qualitative research to explore the nature of NSD without preconceptions. Instead, early researchers applied well-tested research methods and frameworks from NPD success or failure studies to the NSD context. This is because majority of the studies published during the first era of NSD research tested specific hypotheses, often about the effect of various antecedents on NSD success. This resulted in the quickly accepted conclusion that NSD is not significantly different from NPD (Biemans, Griffin and Moenaert 2016)). This early perspective is probably best portrayed in the highly influential study by Cooper and De Brentani (1991). The authors summarized their findings as follows: In summary, factors that underlie new product success are remarkably consistent across different types of products—manufactured items versus financial services.

To correct this problem, Biemans, Griffin and Moenaert (2016) proposed that the field of NSD needs to move forward in a significantly different manner. Biemans, Griffin and Moenaert provided several recommendations, including encouraging more research that would focus on special issues on NSD and focus on broad themes, such as developing Internet-based new services, NSD taxonomies and the differences and similarities between NSD and NPD. Also, a coherent research agenda for the NSD domain was proposed. Moreover, several scholars have emphasized a need for basic research in this area (Droege, Hildebrand and Forcada 2009; Griffin, Josephson, Lilien, Wiersema, Bayus, Chandy, Dahan, Gaskin, Kohli, Miller, Oliva and Spanjol 2013). It was further proposed that key NSD concepts must be (re)defined, including a taxonomy of services. This is because most of the extant literature investigates financial services or lumps all services together in an effort to obtain large samples

that allow statistical analysis. But variation in the service landscape is large, with significant differences between different types of services. The NSD theory will benefit from a better understanding of the service context and how this impacts the NSD process. Besides, it was proposed that an accepted model of the NSD process must be developed. This is because the extant literature is quick to point out the relevance of customer participation and the role of service employees (Cadwallader, Jarvis, Bitner, and Ostrom 2010; Alam 2011) but does not present the equivalent of the Stage-Gate model for the development of new services. Considering the many different types of services, such a general model of the NSD process may need to be made contingent on the service context.

When these new research directions are combined with an influx of academics into the NSD domain, this should both deepen and broaden our understanding of NSD, encourage cumulative knowledge building and create the accepted school of thought that is so sorely lacking in the current NSD literature. This will provide an in-depth understanding of how firms develop new services and the factors governing that behavior. According to Biemans, et al. (2016), these new research directions will elevate the visibility and status of NSD as a research domain and also presents a research agenda that may help reorient future research in this area so that a more complete and coherent body of knowledge is generated that both advances the field and helps practitioners manage NSD more effectively and efficiently.

Over the last decades, organizations all over the world have tried to take advantage of ICT to improve their operations and communication with consumers. Thus, organizations have invested heavily in IT to support their work processes. In today's organizations, intra- and inter-organizational work systems are increasingly IT-enabled. Although adoption of ICT has increased in most countries, the rate of successful adoption and operation varies from country to country. For example, developing countries such as Nigeria are lagging behind in ICT adoption compared with developed countries. Available evidence suggests the functional potential of IT applications is underutilized in developing countries. Most IT users in such developing countries apply a narrow band of features, operate at low levels of feature use and rarely initiate extensions of the available features, especially in product or service innovation (Mohammed and Yarinchi 2013). In this regard, Jaspersen, Carter and Robert (2005) argue that organizations need aggressive tactics to encourage users to expand their use of IT-enabled work systems so as to realize their full potential and achieve success. Also, Liu and Yuan (2015) state that for developing countries to successfully adopt ICT and try to leapfrog some of the obstacles encountered by early ICT adopters in developed countries, systematic analyses need to be conducted to understand the interactions among stakeholders and ICTs and co-create the institutional environment to lead to a positive impact of ICT on innovation. Only when this relationship is clearly understood can innovative ICTs be seamlessly integrated into the innovation activities of firms.

Currently, most of the research on ICT have focused on information technology enabled work systems (Jaspersen, Carter and Robert 2005; Pijpers and Montfort 2005; Thiraput 2013; Park, Rhoads, Hou and Lee 2014), online or offline connection through social media and instant messaging platforms (Leung and Wei 2000; Wei and Lo 2006; Boyd and Ellison 2007; Verkasalo, Lopez-Nicolas, Francisco and Bouwman 2010; Osman, Talib, Sanusi, Shiang-Yen and Alwi 2012; Pawłowska and Potembska 2012; Wang, Ngai and Wei 2011; Tossell, Kortum, Shephard, Rahmati and Zhong 2012; Sarwar and Soomro 2013), online marketing and advertisement (Norris 2007; Kaplan and Haenlein 2010; Jothi, Neelamalar and Prasad 2011; Neti 2011; Bashar, Ahmad and Wasiq 2012; Bruhn, Schoenmueller and Schafer 2012; Wang, Yu and Wei 2012; Kim, Seo, Ra, Lee and Hwang 2013; Leung, Bai and Stahura 2013), the emergence of electronic commerce, social commerce and social shopping (Choi Lee 2003; Rubel 2005; Beisel 2006; Kim, Ferrin and Roa 2007; Cha 2009; Chen, Hsu and Lin 2010; Stephen and Toubia 2010; Harris and Dennis 2011; Huang 2012; Wang and Zhang 2012; Li and Liu 2014), privacy issues and cybercrime (Marci, Roosta and Sastry 2016), adoption of ICT in public administration, communication with citizens and government operations otherwise known as e-governance (Liu and Yuan 2015; Yang and David 2017), civic behaviour and community involvement (Zuniga, Jung and Valenzuela 2012; Stout, Fisher and Levesque-Bristol 2012; Ye, Xu & Zhang 2016) and media education and ICT facilitated education (Griffith and Liyanage 2008; Teo, Luan & Sing 2008; Junco, Heiberger and Loken 2010; Edmunds, Thorpe & Conole 2012; Prescott, Johnson, Mark and Prescott 2012; Lin and Wang 2012; Tang, Tang and Chiang 2012; Ezemenaka 2013; Bakon and Hassan 2013; Mohammed and Yarinchi 2013; Simuforosa 2013; Wong, Osman, Choo & Rahmat 2013; Yeboah and Ewur 2014; Baker-Eveleth and Stone 2015; Hamid, Razak, Bakar and Abdullah 2016).

However, there is limited empirical research that specifically examines the effects of ICT use on NSD, especially among SMEs in the service-based industry from emerging markets. This is because less attention has been paid to the issue of whether the adoption of ICT tools by SMEs from developing countries such as Nigeria can enhance their NSD process. Aguilera, Cuevas-Vargas and González (2015); Cuevas-Vargasa, Estradab and Larios-Gómez (2016) confirm that the majority of the empirical studies about the use of ICTs for innovation purposes have been centered on large companies in developed countries. Furthermore, Sambamurthy, Bharadwaj and Grover (2013) conclude that there are relatively few theoretical studies and published surveys that correlate ICTs, innovation and business performance, but there are even fewer studies that correlate these three variables in the context of SMEs (Izushi 2013; Tanabe and Watanabe 2017). Therefore, Franquesa and Brandyberry (2017) state that there is need for more research about ICTs, innovation and small-scale business performance using data from developing nations.

## 2.2 The Relationship Between ICT Use And NSD In Smes

A number of researchers have found ICT capabilities of SMES to be linked to their innovativeness. IT tools such as email, discussion forums, online surveys and other internet-based toolkits help to harness consumer creativity for new product and service development process (Von Hippel 2005; Desouza, Awazu, Jha, Dombrowski, Papagari, Baloh & Kim 2008). For example, software applications are associated with a significant increase in the extent and quality of product and service design and decrease time spent on it (Banker 2006). Similarly, Gretton, Gali and Parham (2004) suggest that the use of ICTs makes innovation development relatively easier and cost-effective and that the effects derived from ICT use can be a source of greater productivity. Driven by this, more innovative group of small firms often use computer-aided design and computer aided manufacturing processes twice or three times more respectively than their less innovative counterparts during product and service innovation (Laforet 2006). Furthermore, Froehle, Roth, Chase and Voss (2000) state that service innovation and development processes benefit from the use of information technology when high levels of synergy, usability and support are achieved. Also, Neu and Brown (2005) indicate that a company's ability to use ICT in developing and delivering services can enhance its success. For example, by applying more advanced marketing information systems based on the data acquired from their customers, firms are able to create more quality services to explore potential markets (Lin, Chen and Chiu 2010). This is because information technology helps to gather useful information internally and externally and make it available to the right people in the company, who use such information for the purpose of developing new services.

However, in order to ensure an effective diffusion of the knowledge gathered through external knowledge sourcing (Leiponen 2005), a free flow of information (Van Riel, Lemmink and Ouwersloot 2004) and collective ownership of knowledge (Leiponen 2006) should be promoted. A study on a network perspective of the development of new services by Syson and Perks (2004) indicate that although direct participation by customers in most NSDs is still low relative to NPD, it is noteworthy that new technologies, through virtual reality, facilitate this process. Driven by this, service companies can further obtain immediate feedback from customers through new technologies during NSD process, which permits rapid correction of potential design or delivery problems.

Also, Carbonara (2005) state that ICT contributes to NSD because it facilitates the exchange of opinions, information sharing and work coordination. Furthermore, Roman (2012) finds the usage of IT in SME internal communication to have positive effect on innovation activity. For example, the Internet serves as an accessible knowledge source where organizations can mine valuable new ideas necessary for developing new products and services (Ignas 2012). This indicates that ICT enables small firms to tap into critical new external knowledge sources and apply it to commercial ends. Since some SMEs cooperate with external sources such as customers (Carbonell, Rodriguez-Escudero and Pujari 2012), universities, research institutes and suppliers in their attempt to generate innovations, ICT tools allow them to easily tap into the external knowledge networks as an input to enhance their service innovation process. Zeng, Xie and Tam (2010) found a significant positive relationship between inter-firm cooperation, cooperation with intermediary institutions, cooperation with research organizations and innovation performance of SMEs. However, the study being reviewed used 137 Chinese manufacturing SMEs as sample, while my research is examining the situation in Nigeria using a larger sample of service-based SMEs. Besides, Zeng, Xie and Tam's study did not specifically examine the role of ICT on service innovation while my research intends to establish the contribution of ICT in the NSD process of SMEs.

In the same sense, a research on service and manufacturing companies belonging to countries in the OECD by Spiezia (2011) found that ICTs are innovation facilitators, particularly in product and service innovations, both in service companies and manufacturing plants. So, the results suggest that ICT facilitates innovativeness of companies, although it does not increase their invention capabilities. In another study conducted with 271 American businesses by Arvanitis, Loukis and Diamantopoulos (2011) found that different types of ICTs, including the internal information systems, have strong positive impact on product and process innovation. Also, the study found electronic systems to have an impact on process innovation while electronic recruitment turned out not to be an engine of innovation. Yet, ICTs give a strong drive towards innovation, even in opposite national contexts, in which the determinant traditional factors of innovation do not boost innovation in process, product or service. Likewise, a study of 186 ceramic tile producers from Italy and Spain by Fernández-Mesa, Ferreras-Méndez, Alegre and Chiva (2014) found a direct positive and significant relationship between ICTs and the commercial success of innovation. Furthermore, an analysis of 743 hospitals in 18 European countries by Arvanitis and Loukis (2015) found that the electronic applications used by the hospital have a positive impact in the product and process innovation of the organization.

Furthermore, a study determined to examine the effects of ICTs as facilitators of innovation for Micro, Small and Medium Sized Enterprises (MSMEs) on a developing country by Cuevas-Vargasa, Estradab and Larios-Gómez (2016) found that there exists enough empirical evidence that ICTs are facilitator of innovation. Using a sample of 288 MSMEs established in Guanajuato (Mexico) and analyzing the data through the Structural Equation Modeling (SEM), the study further found that the use of ICTs and innovation substantially impact the performance of the businesses studied. However, the study being reviewed

used Mexican small businesses as sample, while my current research is examining the situation in Nigeria, with significant socio-cultural and technological differences.

However, Apulu and Latham (2011); Piget and Kossai (2011); Cuevas-Vargas, Aguilera, González and Servín (2015) state that little research exists about the use of ICTs in developing countries. Also, Aguilera, Cuevas-Vargas and González (2015); Cuevas-Vargasa, Estradab and Larios-Gómez (2016) confirm that the majority of the empirical studies about the use of ICTs for innovation purposes have been centered on large companies in developed countries. Furthermore, Sambamurthy, Bharadwaj and Grover (2013) conclude that there are relatively few theoretical studies and published surveys that correlate the ICTs, the innovation and business performance, but there are even fewer studies that correlate these three variables in the context of SMEs (Izushi 2013; Tanabe and Watanbe 2017). Hence, Franquesa and Brandyberry (2017) state that there is need for more research about ICTs, innovation and small-scale business performance using data from developing nations.

### 2.3 Theoretical Framework

In this study, the technology acceptance model (TAM) is applied. The TAM was developed by Venkatesh and Fred Davies in 1996. The theory models how users come to accept and use a technology. The model suggests that when users are presented with a new technology, a number of factors influence their decision about how and when they will use it and the most notable factors are PU and PEU. While PU is defined as the degree to which a person believes that using a particular system would enhance his or her job performance, the PEU entails the degree to which a person believes that using a particular system would be effortless. Figure 2.1 below shows Davies' TAM framework. The model indicates that when a new technology is perceived to be easy and useful, it will create a favorable attitude towards using it and the users will be more likely to use it frequently in order to enhance their performance. But, users of the new technology may be less inclined to use it when there is difficulty in operating it (Davis, Bagozzi and Warshaw 1989; Bagozzi 2017; Lai 2017; Hamed 2018).

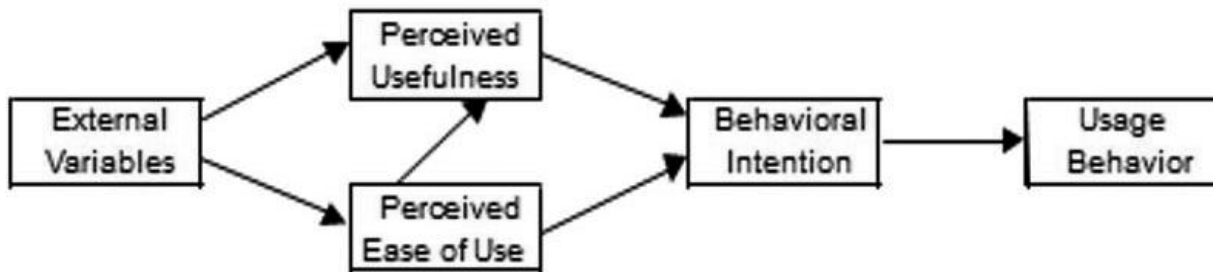


Figure 2.1 The Technology Acceptance Model  
Source: Venkatesh and Davis (1996)

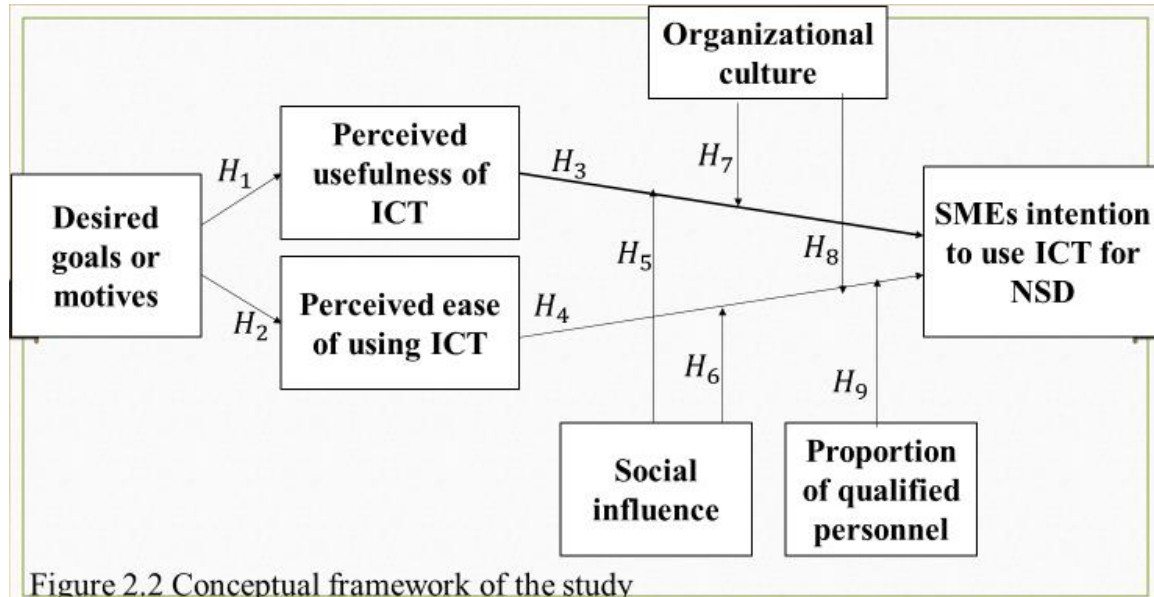
Nearly from its inception, researchers have attempted to add to TAM. Most of these efforts have constituted a broadening of TAM in the sense of introducing additional predictors for either PU and PEU or intentions (Fathema, Ross, Witte 2014; Fathema, Shannon, Ross 2015). However, it seems to have reached a turning point because it leaves out important variables and processes and recent extensions of TAM have been a patchwork of many largely unintegrated and uncoordinated abridgements. Bagozzi (2017) maintains that the primary shortcomings of TAM reside in two critical gaps in the framework, which are the absence of a method for identifying the determinants of PU and PEU and the neglect of group, social and cultural aspects of decision making. The TAM is conceived largely as a framework for explaining decision making by individual persons. However, it is important to consider group, cultural or social aspects of technology acceptance because people act interpersonally, or as agents of organizations. Since decisions regarding technology acceptance and actual usage are often done collaboratively, the networking and organizational culture attributes of SMEs characteristics are added to the TAM framework as shown in the new model (see Figure 2.2) so as to improve its predictive power. This will result in deepening the theory while suggesting fruitful avenues for better understanding how, when, and why decisions are made in various technology applications.

Likewise, the few attempts that have been made by introducing moderators into TAM to qualify the effects of PU and PEU on intentions, have focused on demographic variables (e.g., gender, age), experience or a crude classification into voluntary versus mandatory contexts of use (Venkatesh, Morris, Davis and Davis 2003; Ghalandari 2012). The problems with most tests of moderating effects to date are that little theoretical insight is provided into the mechanism, or “the why”, behind proposed interaction effects, and a potentially infinite list of such moderators exists, making such broadenings of TAM both unwieldy and conceptually impoverished. Also, the bases for PU and PEU, including basic and applied determinants, have been given scant attention in the field. Thus, Bagozzi (2017) suggests that individual desired goals or motives, plus their linkages, can be treated as independent variables predicting PU and PEU and this forms the basis of the new model shown in Figure 2.2 below. The advantage of such an approach is that it identifies the relative efficacy of individual goals or motives and the influence of linkages between them on PU and PEU.



## 2.4 Conceptual Framework

Figure 2.2 below shows the conceptual framework of the study. It illustrates the interrelationship among the variables. The new framework is an extended version of the Davies' TAM. The framework shows that the outcome of NSD will depend on whether the ICT is easy to use or useful for performing the desired tasks. But, the PU and PEU will be determined by how well the technology fits the desired goals or motives. Also, the framework shows that SME characteristics such as social influence, organizational culture and the proportion of qualified personnel will moderate the relationship between ICT use and NSD.



### 2.4.1 Desired Goals

Desired goals can be construed as the desired results that a person or a group of people envisions, plans and commits to achieve (Creek and Lesley 2008). It is known as the aim or the anticipated result which guides reaction. According to the Goal-setting theory developed by Edwin Locke and Gary Latham after an empirical research in 2002, goals direct attention and effort toward goal-related activities (Edwin and Gary 2002). This means that one's goal will determine the nature of activities he or she will engage in hopes of attaining the anticipated result. For example, if a person's desired goal is to connect with people and socialize, he or she may find social media to be useful. Also, one may find YouTube very useful if the desired goal is to either upload or download videos for viewing purpose. However, the relationship between desired goals and perceived usefulness of ICT has not been tested by any prior research. In this regard, Bagozzi (2017) suggests that individual desired goals can be treated as independent variable predicting perceived usefulness of technology. According to Bagozzi, the advantage of such an approach is that it identifies the relative efficacy of individual goals or motives and its influence on perceived usefulness. Thus, this study intends to evaluate the relationship between desired goals and PEU and PU of ICT because the usefulness of ICT will be determined by how well the technology fits the desired goals or motives. Thus, it is proposed that individual desired goal or motive of the user will determine the PEU and PU of ICT. Therefore, it is hypothesized:

$H_1$ : There is a significant relationship between individual desired goals and PU of ICT

$H_2$ : There is a significant relationship between individual desired goals and PEU

### 2.4.2 Perceived Usefulness

PU refers to the extent to which a person believes that using a particular technology will enhance her or his job performance (Hamid, Razak, Bakar and Abdullah, 2016). In TAM framework, PU is hypothesized to be the direct predictor of one's attitude and behavioral intention to use technology of interest (Park, Rhoads, Hou, Lee, 2014). Previous studies indicate that PU is positively associated with continuance intention in the context of e-text (Stone & Baker-Eveleth, 2013; Baker-Eveleth & Stone, 2015), instant messaging (Wang, Ngai, & Wei, 2011), mobile service provider (Abbas & Hamdy, 2015) online travel services (Li & Liu, 2014) e-learning (Lin & Wang, 2012) blog learning (Tang, Tang, & Chiang, 2012), knowledge creation (Chou, Min,

Chang & Lin, 2009). Thus, PU is posited to have a direct effect on attitudes towards the use of technologies. A study on the influence of PU and PEU on attitudes toward usability by Guritno and Siringoringo (2013) show that PU influences the respondents' attitudes towards the use of the technology. This indicates that if people do not have positive attitudes towards the usefulness of incorporating technology into their activities, then even the best systems and methodologies will remain unused. Thus, it is proposed that PU will influence Nigerian service-based SMEs to use ICT for NSD. Therefore, it is hypothesized:  
 $H_3$ : PU of ICT has a positive impact on NSD

#### 2.4.3 Perceived Ease of Use

Perceived ease of use is the degree to which a person believes that using a technology will be free from effort. In the context of this study, PEOU refers to the extent to which users believe that their continued use of ICT for NSD is free of effort. Perceived ease of use is posited to have a direct influence on people's attitude towards ICT use. If a system is relatively easy to use, individuals will be more willing to learn about its features and finally intend to continue using it. Chiu & Wang, (2008) found that PEOU is positively associated with continuance intention in the context of Web-based learning. Also, the studies of Teo & Van Schaik, (2009); Edmunds, Thorpe, & Conole, (2012); Wong, Osman, Choo, & Rahmat, (2013) show that perceived ease of use has a direct influence on the way people perceive the usefulness of technologies. In this regard, it is posited that perceived ease of using ICT will stimulate a positive attitude towards using it for developing new services. Therefore, it is hypothesized:  
 $H_4$ : Perceived ease of using ICT has a positive impact on NSD

#### 2.4.4 Social Influence

Social influence occurs when a person's emotions, opinions or behaviors are affected by others. Social influence is a powerful notion that has the potential to influence all people's decisions. It is defined as a directive role that "actors" play in shaping the beliefs and actions of an individual. The impact of social influence on individuals has been studied in many disciplines such as marketing (Khare, Mukerjee and Goyal 2013), politics and management (Wang, Meister and Gray 2013) and criminology (Young and Weerman 2013). Such studies demonstrate that social influence can change the mindset of individuals even after they have made rational choices. A study on the moderating effect of social influence on travel experience by Sedera, Lokuge, Atapattu and Gretzel (2017) found that social influence is sought and acquired through social media before people travel. This indicates that decisions about certain things, including the acceptance of new technologies, is influenced by social factors such as peer groups, family members, colleagues, role models, famous celebrities and others because people are influenced by someone who is liked and respected. A study on the factors influencing students' adoption of Massive Open Online Courses (MOOC) in a developing country by Khan, Hameed, Yu, Islam, Sheikh and Khan (2018) found that social influence has a positive and significant effects on the behavioral intentions of the students to use the MOOC. However, still lacking are studies that evaluate the moderating role of social influence on the relationship between PU of ICT and NSD. Thus, this study intends to measure the moderating role of social influence. Therefore, it is hypothesized:

$H_5$ : Social influence moderates the relationship between PU and SMEs intention to use ICT for NSD

$H_6$ : Social influence moderates the relationship between PEU and SMEs intention to use ICT for NSD

#### 2.4.5 Organizational Culture

Organizational culture is an important factor that influences the acceptance and use of new ICT in NSD. An empirical research design comprised two sets of data collected from service managers by Thomas (2016) found that innovative culture mediates service innovation and competitiveness of the studied companies. This is because innovative organizational culture promotes, encourages and provides incentives for all members of the organization to engage in innovative behaviors and practices as indicated by Caeneghem and Fujii (2016). Furthermore, a study of the moderating role of organizational culture on the relationship between innovation and organizational performance of the telecommunication sector in Islamabad and Rawalpindi by Suhag, Solangi, Larik, Lakh and Tagar (2017) showed that product innovation, process innovation and organizational innovation have a positive impact on organization performance as moderated by organizational culture. Also, an empirical investigation on the role of organizational culture on the innovation performance of the software industry in Pakistan through the survey of 215 software firms by Shahzad, Xiu and Shahbaz (2017) show that organizational innovation performance is backed and affected by organizational culture. According to the study, flexibility or support to change and organizational climate are the comparatively significant factors for creativity and innovation performance in the examined software firms. This indicates that organizational culture is believed to have some impact on the use of ICT for NSD. Therefore, it is hypothesized:  
 $H_7$ : Organizational culture as a SME characteristic moderates the relationship between PU and SMEs intention to use ICT for NSD

$H_8$ : Organizational culture moderates the relationship between PEU and SMEs intention to use ICT for NSD purposes

#### *2.4.6 Proportion Of Qualified Personnel*

A firms' ability to accept and adopt a new ICT in its service innovation initiatives may depend on the number of qualified personnel, which is characterized by level of education and experience and technical skills of manpower. The role of qualified personnel on firms' innovation capability has been tested intensively by prior studies and the findings provide a significant effect. For example, an empirical study of 50 SMEs in the United Kingdom by Romijn and Albaladejo (2000) reveals that the significant determinants of organizational innovation capability of the firms are internal factors, such as level of education and owners' experiences of the business, technical skills of manpower and investment in training and human resource development and financial support for training and development. A study conducted by John (2013) reveal that basic computer knowledge and previous computer experience positively influence an individual's intention to use social networking programs. Also, Al-Ammary, Al-Sherooqi and Al-Sherooq (2014) found that one's ability serves as a moderating factor between PU and PEU and behavioral intention to accept and use social networking sites. Thus, one's ability to successfully perform a technologically sophisticated new task can enhance ICT acceptance and adoption. Although less attention has been paid to the moderating role of qualified personnel on the relationship between PEU and intention to use ICT, the proportion of qualified personnel of SMEs are believed to have significant impact on the use of ICT for NSD because the ability to use any information technologies for service innovation depends on technical skills and experience. Therefore, it is hypothesized:

$H_9$ : The proportion of qualified personnel in SMEs moderate the relationship between PEU and intention to use ICT for NSD

### **3.0 RESEARCH METHODOLOGY**

#### *3.1 Research Design*

The study uses a correlational research design because it helps to identify the most important factors associated with the issue being studied. Correlational design helps to determine the strength and direction of the relationship so that later studies can narrow the findings down and, if possible, determine causation experimentally (Sekaran and Bougie 2010; Derek and Pedersen 2016). The study attempts to find an association between ICT usage and NSD in Nigeria SMEs service-based firms. The correlational research design was preferred because of its numerous benefits over some other designs. First, unlike experimental design that typically collect data in a lab, the test subjects in the correlational research design are more likely to behave naturally and the findings are more likely to be applicable to everyday life. Another benefit of the correlational research design is that large amounts of data can be collected through surveys, creating a large sample size. Besides, the relationship can be displayed in a graphical form that allows for relatively easy interpretation.

#### *3.2 Location and Subjects of the Study*

The location of the study is Yaba town in Lagos state of Nigeria. Yaba was chosen because it is the heart of Nigeria's technology innovation ecosystem and it is a thriving centre of entrepreneurial spirit characterized with numerous startups and small businesses where young technologists, social entrepreneurs, tech companies, impact investors and other service providers co-create new services and solutions to the many social problems in Nigeria. The level of innovation in this market is amazing. The target subjects of the study are content creators, product and service developers, entrepreneurs, startup owners and other SME owners in the Yaba area of Lagos state. These subjects are chosen because they often use mobile technology, video and social media platforms to create new inspiring applications and services for their customers and communities (Vanguard 2017). The study is designed to understand how Nigerian small and medium business owners leverage digital platforms for service innovation and better serve the emerging service needs of the customers.

#### *3.3 Target Population and Sample Size Analysis*

The target population in this study is the SMEs in the service industry in Yaba town in Lagos state of Nigeria, consisting of 30,000 firms. SMEs were chosen because they are more innovative than large companies since small businesses are more flexible than big corporations. The study conducted by Baldwin (1995) in Canada concludes that more intense innovation activities occur in SMEs. This is because small-scale firms have a competitive advantage associated with slender organization structure, closeness to customers and proximity to suppliers, rapid in decision-making, flexibility in operation that enable the business to respond rapidly to changing market conditions and a simple administrative structure that promote free flow of information and knowledge sharing among the lower and senior management staff as stated by Sulistyo & Siyamtinah, (2016). Also, Mazzeo, Oyer and Schaefer (2014) stated that innovation can work better in smaller businesses because an entrepreneur or small business innovator captures more of the resulting value (and hence has stronger incentives) than big companies and small-firm innovators rarely have to overcome resistance from internal rivals who favor the status quo. Besides, small scale

businesses were chosen because Izushi (2003); Tanabe and Watanbe (2005); Cuevas-Vargas et al. (2016) stated that majority of the empirical studies about the use of ICTs on innovation have been centered on large companies and only fewer studies have attempted to focus on small and medium enterprises. Meanwhile the data for the study is designed to be collected from Yaba because it is considered as the industrial headquarter of Nigeria with several startups and new small businesses. Yaba can be considered as the Silicon Valley of Nigeria, which serves as the regional center for high technology, venture capital, innovation and new startups. Gaffey (2016) reports that Yaba is the center of West Africa's burgeoning tech scene with startups emerging every day that focus on solving Nigerian social problems. Also, Bright (2016) reports that Yaba in Lagos state is increasingly becoming a centre for big tech investment and commercially oriented startups with several electronic commerce startup and digital payments ventures as well as entrepreneurial incubators that partner with Microsoft, Facebook and others to groom entrepreneurs and startups that focus on creating new services and products.

The sampling unit is the individual firms, from where the data are collected. From the sampling unit, a sample of 379 respondents would be selected from the sampling unit to represent the whole population. In the process of determining the sample size for this study, Krejcie & Morgan (1970) sampling table is used. According to Krejcie & Morgan (1970), when the population of the study is 30,000, the sample size will be 379. Since the data collected from the Nigeria's Minister of Industry, Trade and Investment (2018) showed that there are 30,000 listed SMEs in the study area, the researcher selected 379 firms to represent the population. Other factors considered in the sample size selection are based on the available budget and time required to complete the study. Bryman and Bell (2011) proposed that a manageable sample size should be chosen to represent the population so as to save time and money. Furthermore, the sample size would be used in this study because it is unique as compare with prior studies. Most previous studies reviewed used smaller sample size. For example, a study on the effects of ICTs as innovation facilitators for a greater business performance among Mexican micro, small and medium firms by Cuevas-Vargas, Estrada and Larios-Gómez (2016) used a sample of 288 manufacturing industrial firms. Also, a study on the effect of social networking sites and absorptive capacity on SMES' innovation performance by Scuotto, Giudice and Carayannis (2017) used 215 different sets of SMEs across the globe. Meanwhile Fosgate (2009) argued that the probability of a study to yield a statistically sound results depend on large sample size. This is because larger sample provides proper representativeness of the population. Therefore, the current study meets the large sample size requirements that increases representation of the population.

### *3.4 Sampling Technique*

In this study, a systematic sampling technique is used. The information of the number of registered SMEs in Yaba are obtained from the City Council's trade division and the researcher will go through the number of listed service firms in order to select every 3<sup>rd</sup> SME until the desired number of sample is obtained. A systematic sampling technique is preferred because it ensures high representativeness of the population and it is easy and quick to choose the desired sample. Sekaran and Bougie (2010) state that systematic sampling technique is easy to use if the sampling frame is available. Also, Collis and Hussey (2009) state that random sampling reduces sampling error because it gives every unit in the population an equal and independent chance of being chosen as a subject. Thus, the random sampling was preferred because it has a statistical power that that minimizes potential sampling errors.

### *3.5 Data Collection*

The data collection method employed in this study is questionnaire. The service innovation managers will ask answer questions. While some of the questionnaires are personally administered to the subjects, others are sent through email to the target subjects. The emailed questionnaires allow the respondents to answer the questions at their own convenient time, especially for the subjects with busy schedule while the personally administered approach allows for the clarification of doubts with almost 100% response rate ensured. The questionnaire method was chosen because it has the advantage of obtaining data more efficiently in terms of researcher's energy and cost. Also, questionnaire was used in this study because it is less expensive in collecting a large amount of data as indicated by Sekaran and Bougie (2010). Since the study uses quantitative research method, questionnaire is used to collect the required data. Questionnaire was used in this study because it is less expensive in collecting a large amount of data within a short period of time. Also, questionnaire was used because the respondents can answer at their convenience and the response rate is high. In supporting these claims, the study of Bluman (2001); White, Vaughan, Renwich and Barker (2005) assert that questionnaire happens to be the only feasible tool for collecting quantitative data when conducting quantitative studies. Similarly, the study of Lefever, Michael and Matthiasdottir (2007) opines that questionnaire is easy to administer and when personally administered, it can establish rapport and motivate respondents to answer the questions at their own convenient time.

### 3.6 Organization of Questionnaire Design

The questionnaire is structured into 11 sections. The first section focused on the demographic profile of the respondents. However, the other sections focused on types of ICT use by SMEs, desired goals, familiarity, user skills, perceived usefulness, perceived ease of use, SME characteristics, attitudes toward ICT use and NSD. A total of 64 close-ended questions were designed using ordinal, normal and Likert scales statements for easy understanding and time saving data collection so as to enhance data analysis as recommended by Bryman and Bell (2011). Table 3.1 below summarizes the structure of the questionnaire.

Table 3.1: Structure of the Questionnaire Design.

Sections	Variables	Number of items	Source
1	Demographic profile	5	
2	Types of ICTs	6	Njoh (2018)
3	The uses of ICT	10	Aguilera, Cuevas-Vargas and González (2015)
4	Desired goals or motives	5	Bagozzi (2007)
7	Perceived ease of using ICT	5	Guritno and Siringoringo (2013)
8	Perceived usefulness of ICT	5	Guritno and Siringoringo (2013)
9	Social influence	5	Guritno and Siringoringo (2013)
10	Organizational culture	7	Umidjon, Shuhua, Jayathilake and Renyan (2014)
11	New service development	6	Scuotto, Giudice and Carayannis (2017)
12	proportion of qualified personnel	5	
	<b>Total</b>	<b>59</b>	

### 3.7 Measurement Of The Variables

Multi-dimensional indicators are used to measure the variables. The types of ICT are smartphone apps, tablet PC, personal computer, internet, social media platforms, cloud system, robots. These are an interval variable standardized in terms of percentages (Njoh 2018). NSD performance is measured with 6 items. NSD is measured with how well it meets its performance targets including quality, target service cost, serviceability and how well it meets the schedule. Other measures of NSD are faster time to market and faster to product adoption. The use of ICT was measured with 16 items scale which is measured with a Likert-type scale of a 1 to 5-point range 5 items adopted from Aguilera, Cuevas-Vargas and González (2015). Perceived usefulness is measured with 5 items such as being fast (or quick), time saving, effort saving, cost reducing and overall usefulness. Perceived ease of use is measured with 4 items such as frequency of use, effort saving, cumbersome to use and confidence in using the system. It indicates that using ICT provides effectiveness, better performance and productivity in service innovation when it is easy to use (Guritno and Siringoringo 2013). Social influence and proportion of qualified personnel are measured with 5 items each while organizational culture is measured with 5 indicators. A five-point Likert scales is used, from 1 'strongly disagree' to 5 'strongly agree'.

### 3.8 Data Analysis

The data of the study are computed and analyzed using Statistical Package for Social Sciences (SPSS) version 23. In the analysis of the results, both descriptive and inferential statistics were used. While the responses of the respondents are analyzed using frequency and percentages, the correlation between ICT and NSD is analyzed using Pearson correlation test and Multiple Regression analysis is used to determine the effects of ICT and SMEs characteristics on NSD outcomes. Also, the reliability of the data is measured with scale measurement instrument. Furthermore, the results of the study would be presented using tables, figures and charts. The data analysis procedure used in this study is unique compared to prior studies. For example, a study on the effect of social networking sites and absorptive capacity on SMES' innovation performance by Scuotto, Giudice and

Carayannis (2017) used the Partial Least Square-Path Modelling the relationships between social networking sites, absorptive capacity and innovation performance as analysis while Cuevas-Vargas, Estrada and Larios-Gómez (2016) used Confirmatory Factor Analysis under the Maximum Likelihood Method, counting with reliability and validity and the results were obtained through the Structural Equation Modeling. However, the correlation analysis has the benefit of allowing the study to draw conclusions about the causal relationships among variables unlike some others.

#### 4.0 Expected Results

The expected results show that ICT plays multiple roles in NSD. The study will show that the use of ICT in NSD will improve the service quality, offer service customization to improve customer satisfaction, make NSD relatively easier and more cost-effective and faster. This is because ICT offers customers opportunities to participate in service production and delivery, facilitates communication and cooperation between service providers and external parties while enabling customers and employees to co-create customized services. Thus, service firms that intend to improve their NSD outcome would likely use ICT for service innovation, especially if it is perceived to be useful and easy to use. However, how likely service firms will use ICT for NSD will be determined by social influence, supportive organizational culture and the technical skills of the employees. The study will help managers to effectively coordinate their ICT infusion into NSD so as to maximize the full-service innovation potential of ICT. Also, the study will extend the current technology acceptance literature by utilizing an updated instrument to measure the role of ICT in NSD in service-based SMEs context. This is because prior work did not utilize these updated measures in a Nigerian setting and did not explore the use of ICTs for service creation purposes. By using TAM, the study will improve the explanatory power, specificity and the predictive power of the model.

#### 5.0 Limitations and Future Research Areas

The current study is limited to four service sectors: transport, financial service, communication and design services. Therefore, the findings may not be generalizable to other service sectors. Future research can extend the investigation to other service sectors. Also, the sample of this study is restricted to Nigerian service firms. So, the results may not be completely generalizable to other countries. While Nigerian service firms are likely to have some similarities to their American, European and Asian counterparts, their practice of NSD and its socio-economic environment may have been somewhat different and may have played a distinct role in the findings of this study. Therefore, the results of this study should be interpreted carefully, while future research can investigate other regions.

#### 6.0 Conclusion

This study is an early attempt to conceptualize and investigate the role of ICT in NSD among service-based SMEs from the sub-Saharan African context. The findings of this study will facilitate future research toward exploring the role of ICT in NSD. The study is conducted with the understanding that it could enrich theoretical arguments that explain the roles of ICT in NSD. The findings indicate that business managers should recognize the ICT infusion in NSD as strategic-level issues. Specifically, managers should determine which approach can best explain the role of ICT in their NSD efforts. Consequently, this study provides practical steps for managers interested in using ICT to achieve success in NSD and improvement in business performance.

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