Innovations

Service System Innovation and Service Quality of Telecommunication firms in Nigeria

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Abstract
This study explores the relationship between service system innovation and service quality in Nigerian telecommunication firms. The objective is to determine the relationships between service system innovation and service quality and identify the key drivers of service system innovation in the telecommunication industry. The study adopts a quantitative research approach, using a survey questionnaire to collect data from 200 customers of three major telecommunication firms in Nigeria. Data analysis is conducted using descriptive statistics and partial least square – structural equation modelling (PLS-SEM). The findings reveal a significant positive relationship between service system innovation and service quality in the Nigerian telecommunication industry. The results also indicate that the key drivers of service system innovation in the industry include idea generation, service development and commercialization. The study concludes that telecommunication firms in Nigeria can enhance their service quality by investing in service system innovation and focusing on the key drivers identified in this study. This research contributes to the existing body of knowledge by providing empirical evidence of the relationship between service system innovation and service quality in the Nigerian telecommunication industry, as well as identifying the key drivers of service system innovation in the industry. The study recommends that telecommunication firms in Nigeria should prioritize service system innovation to remain competitive in the industry and meet the increasing demands of customers.

Keywords*: service system innovation, service quality, telecommunication industry, Nigeria, drivers, customer feedback, employee training.*

1. Introduction

Telecommunication is an essential service that is vital to the economic and social development of any country (Lukitasari, 2020). In Nigeria, the telecommunication sector has witnessed significant growth over the years, with several players in the industry competing for a share of the market (Ezenwakwelu, Akpan&Ogbogu-Asogwa, 2021). In this competitive environment, service quality has become a critical factor in determining the success of telecommunication firms (Opele, Afolabi&Adetayo, 2020). Further, service system innovation has been identified as a crucial driver of service quality in the telecommunication industry (Awuku, Agyei, &Gonu, 2023). It involves the introduction of new and improved ways of delivering services to customers.

However, the extent to which service system innovation affects service quality in Nigerian telecommunication firms remains unclear (Lukitasari, 2020).

Despite the importance of service system innovation and service quality in the telecommunication industry, there is a research gap regarding their relationship in Nigerian firms. The nexus between SSI and service quality has been explored by several scholars however with differing results which necessitated further investigation (Danjuma&Rasli, 2012). Furthermore, most of the studies focused on oil and gas services firms, banks and manufacturing firms (Danjuma&Rasli, 2012; Etale&Akpi, 2022). However, this study focused on telecommunication firms in Nigeria. Besides, whereas innovation is mostly measured with product/service, process, market and administrative innovation in previous studies (e.g., Wang & Ahmed, 2004), this study considered innovation through service and systems perspectives, hence, service system was added to the construct making it service system innovation (SSI). Furthermore, while some studies have investigated the relationship between service system innovation and service quality in the telecommunication industry in other countries, such as China, Ghana and Malaysia (Wang &Hing-Po & Yang,2004; Lukitasari, 2020; Awuku, et al., 2023), the contextual differences between these countries and Nigeria make it imperative to conduct a study in Nigeria. Therefore, this study aims to fill this research gap by investigating the relationship between service system innovation and service quality in telecommunication firms in Nigeria. This study will help telecommunication firms in Nigeria understand the importance of service system innovation in enhancing service quality and customer satisfaction.

2. Literature Review

Service System Innovation

Service System Innovation (SSI) is the ability to continuously generate novel ideas, transform the ideas into new or improved services/processes or systems and get the new services to the final consumer. Strategic SSI gives rise to service quality. Service system innovation can be traced back to the emergence of the service economy in the 20th century. With the growth of service industries such as banking, insurance, healthcare, and telecommunications, there was a need to develop new methods and technologies to deliver services more efficiently and effectively (Kubickova&Benešova, 2022). One of the earliest examples of service system innovation was the development of call centers, which allowed companies to centralize customer service operations and handle large volumes of inquiries and requests. The use of information technology and automation in call centers helped to improve service quality and reduce costs (Bon & Mustafa, 2013).

In the 1980s and 1990s, the concept of total quality management (TQM) emerged as a key driver of service system innovation (Chen, Reyes, Dahlgaard&Dahlgaard-Park, 2022). TQM emphasized the importance of customer satisfaction, continuous improvement, and employee empowerment in delivering high-quality services. This led to the development of new service delivery models, such as self-service kiosks, online customer portals, and mobile apps, which allowed customers to interact with service providers in new and more convenient ways (Meuter, Ostrom, Roundtree&Bitner, 2000; Chen, et al., 2022; Kubickova&Benešova, 2022).

More recently, the rise of digital technologies and the internet has enabled even greater innovation in service systems (Economic Commission for Latin America and the Caribbean (ECLAC) (2021). For example, the development of big data analytics, artificial intelligence, and machine learning has made it possible to personalize services and create new value propositions for customers (Haleem, Javaid, Qadri& secure and transparent transactions in industries such as finance and healthcare (Haleem, et al., 2022).

Overall, service system innovation was developed as a response to the changing needs and expectations of customers, as well as the competitive pressures faced by service providers in a rapidly evolving marketplace (ECLAC, 2021). By continuously innovating and improving their service systems, companies can stay ahead of the curve and deliver more value to their customers (Kubickova&Benešova, 2022).

In the telecommunication sector, service system innovation can be traced back to the emergence of the telephone in the late 19th century (Malik, Chaudhry, Abbas & Scholar, 2009). With the invention of the telephone, people could communicate with each other over long distances, and this led to the development of new services and technologies to facilitate communication.

One of the earliest examples of service system innovation in the telecommunication sector was the development of the telephone exchange, which allowed users to connect to other users on the same network (Abraham &Ackah, 2015). The telephone exchange enabled telecommunication service providers to handle a large number of calls and offer new services such as call waiting, call forwarding, and three-way calling (Bubou, Ejim-Eze&Okrigwe, 2012).

In the 1970s and 1980s, the telecommunication sector experienced a period of rapid innovation driven by the development of digital technologies. This led to the introduction of new services such as digital signaling, which improved the quality and reliability of voice calls, and digital switching, which allowed service providers to handle a larger volume of calls (Abraham &Ackah, 2015).

The rise of the internet in the 1990s and 2000s brought about a new wave of service system innovation in the telecommunication sector (Edquist, 2003). The development of internet protocols such as Voice over IP (VoIP) enabled service providers to offer new services such as internet telephony, which allowed users to make voice calls over the internet. More recently, the advent of 5G technology has enabled even greater innovation in the telecommunication sector. 5G technology offers faster speeds, lower latency, and greater bandwidth, which has opened up new possibilities for services such as virtual and augmented reality, autonomous vehicles, and remote surgery (Tony-Mayeko, 2022). Service system innovation in the telecommunication sector response to the changing needs and expectations of customers, as well as the competitive pressures faced by service providers in a rapidly evolving marketplace (Tony-Mayeko, 2022).

In the Nigerian telecommunication sector, service system innovation can be traced back to the liberalization of the sector in 2001, which opened up the market to private sector participation and competition (John &Tasie, 2011). Prior to this, the sector was dominated by a single state-owned operator, the Nigerian Telecommunications Limited (NITEL), which provided limited and unreliable services. The liberalization of the sector paved the way for the entry of private sector players such as MTN, Airtel, Glo, and 9mobile, who brought with them new technologies, services, and business models (Ogbo, Okechukwu&Ukpere, 2012). This led to a period of rapid innovation in the sector, with service providers competing to offer the best services at the lowest prices.

One of the earliest examples of service system innovation in the Nigerian telecommunication sector was the introduction of the Global System for Mobile Communications (GSM) technology in 2001, which allowed for more reliable and efficient voice and data communication (Ogunode&Adejimi, 2022). This was a major improvement over the outdated analogue technology that was previously in use. The introduction of mobile money services in 2011 was another example of service system innovation in the Nigerian telecommunication sector (Ogunode&Adejimi, 2022). This allowed users to perform financial transactions using their mobile phones, and it helped to increase financial inclusion in the country.

In recent years, service providers in the Nigerian telecommunication sector have been investing in new technologies such as 4G and 5G, which offer faster speeds, lower latency, and greater bandwidth (Ademe&Opuene, 2022). This has opened up new possibilities for services such as video streaming, online gaming, and remote working. The development of service system innovation in the Nigerian telecommunication sector is a response to the changing needs and expectations of customers, as well as the competitive pressures faced by service providers in a rapidly evolving marketplace (Ogunode&Adejimi, 2022).

Today's business environment is dynamic and highly competitive (de lasHeras-Rosas, & Juan, 2021; Calof, &Sewdass, 2020). Therefore, contemporary firms are confronted with radically changing and higher-competitive operating environments, especially telecommunication firms (Obayemi, 2014). Thus, the need to continuously innovate in order to provide new processes, quality and cost-effective services to

customers.Hence, drawing attention to service system innovation in the telecommunication sector (Doroodian, Ab-Rahman, Kamarulzaman, &Muhamad, 2014).

Service system innovation has recently attracted much attention among business managers and operators of service firms, especially telecommunication firms (Ying, Hassan & Ahmad, 2019). This is because telecommunication firms are under intense pressure from stakeholders including mobile line subscribers, industrial clients, financial institutions, government institutions and regulators to deliver high quality and cost friendly services (Alter, 2008; Perano, Casali, &Abbate, 2018). Therefore, service system innovation helps telecommunication firms to withstand these sustained pressures from the environment (Ying, Hassan & Ahmad, 2019).

Innovation has become a necessity for all contemporary organizations that want to survive in a world characterized by competition, frequent technological changes, and recurring crises (Aragón-Correa, García-Morales &Cordón-Pozo, 2007). The concept of innovation refers to the use of new technology or new management practices in an organization to achieve a targeted improvement in its operations and products or services (Adams, Bessant& Phelps, 2006).

From a systems perspective, innovation commonly encapsulates new products or processes that address customer needs more competitively and profitably than existing ones (Adam &Alarifi, 2021). In this study, the term "service system innovation" refers to the effective implementation of new solutions to challenges faced by telecommunication firms, which include effective implementation of new ideas in relation to the organization's product, services, or processes; new marketing mechanisms; or new administrative practices for work amelioration and upgraded performance (Damanpour, 1992; Yıldız, Baştürk&Boz, 2014).

Service system innovation addresses broad concerns that are somewhat distant from the realities of traditional decision making and action related to systems that actually produce services. Service system innovations set the context by encouraging transformations within service organizations (Perano, Casali, &Abbate, 2018). In this study, service system innovation dimensions are idea generation, service development and commercialization (Doroodian, et al., 2014).

Idea generation as a dimension of service system innovation supports the achievement of organizational goals by providing potentially useful ideas aimed at solving service problems or providing ways to explore new opportunities (Alexe, Alexe, &Militaru, 2014). Moreover, without new ideas, an organization stagnates, abates and finally is ousted by competitors who have novel and better ideas (Khaled&Hadia, 2014; Salunke, Weerawardena, & McColl-Kennedy, 2019).

Service development has been a hot issue in the innovation literature. This reflects the rapidly increasing contribution of service development to the wellbeing of service firms and the economy in general (Weerawardena& McColl-Kennedy, 2002). Service development refers to the ability to redesign current services or create new services in order to satisfy the changing needs of the customers and other stakeholders. A growing number of scholars believe that service development gives organizations a competitive edge over their contemporaries (Weerawardena& McColl-Kennedy, 2002).

More importantly, the success of service organizations operating in a dynamic environment relies mostly on its ability to commercialize their products or services (Rahimli, 2012), therefore Commercialization capability is critical for firms in intensive competitive markets because the organization cannot get its products and services to the end users without commercialization capability (Neslihan&Hüseyin, 2012). Commercialization has been stressed to positively affect performances of firms (Lee & Chung, 2010). Service firms make use of their commercialization capability to create cordial relationships with their actual and potential customers, therefore ensuring superior performance and customer satisfaction (Rahimli, 2012).

Commercialization, otherwise known as marketing ability, emphasizes the improvement of relationship with customers, leveraging technology and marketing, reading markets to pursue innovation, getting market-oriented vision and value (Ha, 2010). Therefore, commercialization ability has a great impact on the innovative output of service-based firms (Neslihan&Hüseyin, 2012), and it represents the capacity to

commercialize innovation and the ability to industrialize innovation (creating customer-oriented service). Thus, commercialization capability is critical for telecommunication firms (Neslihan&Hüseyin, 2012).

Service Quality

Service quality as used in this study, is a dimension of competitiveness which reflects the ability of the company to deliver services that match the needs and desires of customers (Alamri, 2018). Wang, Lin and Chu (2011) state that in order to align with its mission, a company must identify customers' expectations and desires for quality and strive to meet them. Quality is a crucial competitive advantage, as affirmed by Ware (2014), and refers to delivering products that accurately meet customers' needs. Companies that fail to provide quality products that fulfill the expectations and desires of customers cannot thrive or sustain competition. Flowing from above, Chen, Hsu, Huang, and Yang (2013) argue that delivering high-quality products can improve the company's reputation and customer satisfaction, and can allow the company to charge higher prices.

The concept of quality has been defined in several ways. Feigenbaum (1951) views quality as value, while Shewhart (1931), Crosby (1965, 1979), and ISO 9000 (2005) define quality as adherence to requirements and specifications. Juran (1974) sees quality as fitness for use, Tuchman (1980) as excellence, Leffler (1982) as product desirable attributes, and Taguchi (1987) as loss avoidance. Ryall and Kruithof (2001) and ISO 9000 (2005) define quality as meeting customer expectations. Similarly, Parasuraman, Zeithaml, and Berry (1985) view quality as a measure of the volume of desirable attributes in a product. Juran and Godfrey (1998) define quality as those product specifications that satisfy customer needs and provide them with satisfaction. Noble (1997), Ward, McCreery,Ritzman, and Sharma (1998), and Barnes (2008) define quality as the extent to which the core products offered by a firm meet customers' needs and expectations. Additionally, Sylva (2020) suggests that quality is a measure of durability, reliability, functionality, superiority, and overall excellence of a product or service that leads to a positive user experience.

In addition, service quality refers to the level of compliance of the firm’s service to standards and specifications in terms of durability, reliability of services rendered to clients when compared to competitors (Akben-Selcuk, 2016). Service quality is acknowledged as one of the most important parameters and global competitive tools for a service firm (Nunkoo, Teeroovengadum, Ringle&Sunnassee, 2020). Nie and Wang (2021) argue that service quality is a difficult concept to define due to the intangible, heterogeneous, and inseparable nature of service attributes. Karunaratna (2022) suggests that quality is mostly determined by customers' perception of the competence, responsiveness, and empathy of the individuals they interact with during service provision. Lopentus and Erdiansyah (2020) distinguish between superior and inferior service quality, with the former leading to positive behavioral intentions that encourage customer retention, while the latter results in negative intentions and customer defection. Therefore, providing high-quality service is crucial for customer retention and business growth (Dehghanpouri, Soltani&Rostamzadeh, 2020).

Hypotheses Development

Several previous studies have been conducted on the relationship between service system innovation and service quality (Yoon, Shin, & Lee, 2016; Wang, Lo, & Yang, 2004). Some studies have suggested that service system innovation has a positive impact on service quality. For example, Wang, Lo, and Yang (2004) found that service innovation positively influenced service quality. Similarly, Yoon, Shin, and Lee (2016) found that service system innovation positively influenced service quality in the context of the airline industry. This implies that service system innovation is essential for service quality and can lead to increased revenue and profitability, improved competitiveness, and cost savings. Therefore, it is crucial for telecommunication firms in Nigeria to invest in service system innovation to improve their service quality and remain competitive in the industry.

On the other hand, some studies have suggested that service system innovation may not always lead to improved service quality. For example, Seesaiprai (2016) found that service system innovation did not

necessarily lead to improved service quality in the context of the car service firms in Bangkok, Thailand. Similarly, Sundbo and Gallouj (2000) found that service system innovation may not always lead to improved service quality in the context of the hotel industry. Therefore, based on the literature review, the following hypotheses are proposed for this research:

H1: There is a positive relationship between idea development and service quality of telecommunication firms in Nigeria.

H2: There is positive correlation between service development and service quality of telecommunication firms in Nigeria.

H3: There is a positive relationship between commercialization and service quality of telecommunication firms in Nigeria.

3. Methodology

Research Design/Study Participants

This study adopted the cross-sectional research design. The study was a mixed method research because both quantitative and qualitative data were used. Primary data were collected from the respondents via the administration of a structured questionnaire. The population of this study consists of two hundred and twelve (212) workers from five (5) telecommunication firms operating on the global system for mobile communication (GSM). The study focused on only managerial staff (e.g., general managers, branch managers, head of operations, head of marketing, supervisors), and customer service attendants at the Headquarters of the telecommunication firms. The population (212) was adopted as the study sample since the number is relatively small and accessible. From the 212 copies administered, 158 copies were filled and returned. This represented 74.5 percent return rate.

Validity of the research instrument was ascertained using construct, content and face validity. Construct validity was via the average variance extracted (AVE) and the heterotrait-monotrait ratio of correlations (HTMT) approaches. Content validity was established by ensuring all facets of the variables were covered in the instrument. Face validity was confirmed by my supervisor and two experts from the telecommunication sector. The research instrument was tested for reliability through Cronbach Alpha values and composite reliability. The reliability values were above the 0.7 threshold.

Measures of Variables

Service system innovation is the study's independent variable. Idea development, service development, and commercialization were adopted as dimensions of service system innovation. An 18-items scale was used to describe the three dimensions of service system innovation. These items were adopted Froehle and Roth (2007), and Mahmood, et al. (2014) and include items such as “we develop both formal and informal methods of evaluating new service ideas; new services initiatives are encouraged and applauded; and we adopt innovative means to deliver our services to our customers”. Service quality serves as the dependent variable and was measured with four (4) statement items such as “we offer services that are highly reliable; we offer high quality products to customers” adopted from Sachitra (2016), and Ismail (2013). The statement items were modified to fit the mobile telecommunication firms, and anchored on a five-point Likert scale.

4. Results and Discussions

Descriptive Statistics

Table 1 below shows the demographic details of the respondents. The result indicated that there are 83 female and 75 male respondents which represent 52.5 and 47.5 percent respectively. This showed that there are more female respondents. Also, the table indicated that 61 (38.6 percent) are married, while 97 (61.4 percent) are singles. This implies that the majority of the respondents are single. Further, the result revealed that 52(32.9 percent) are within the age bracket of 18-35 years, 85(53.8 percent) are within the 36-50 years

bracket while 21(13.3 percent) are 51 years and above. This implies that the telecommunication firms have a young workforce.

Table 1:A Summary of Demographic Profiles of Respondents

Variable	Item	Frequency	Percent
Gender	Male	75	47.5
	Female	83	52.5
	Total	**158**	**100**
Marital Status	Married	61	38.6
	Single	97	61.4
	Total	**158**	**100**
Age	18-35	52	32.9
	36-50	85	53.8
	51- Above	21	13.3
	Total	**158**	**100**
Years of work experience	0-5	53	33.5
	6-10	64	40.5
	11-15	34	21.5
	16-20	7	4.5
	Total	**158**	**100**
Highest level of educational attainment	0'level	-	-
	OND/NCE	21	13.3
	HND/B.Sc	97	61.4
	MBA/M.Sc	35	22.2
	DBA/Ph.D	5	3.1
	Total	**158**	**100**

Note: OND = Ordinary National Diploma, NCE = National Certificate of Education, HND = Higher National Diploma.

Source: Field Data, 2023.

In addition, the result show that the majority (64) of the respondents have spent between 6-10 years (40.5 percent) with their firms, followed by 53(33.5 percent) who have spent 0-5 years. 34 of the respondents have worked for 11-15 years represented 21.5 percent. Lastly, 7(4.5 percent) of the respondents filled 16-20 years. This implies that the firms have adequately experienced staff who are capable of responding to the study questionnaire. Lastly, the result indicated that 21(13.3 percent) have obtained the Ordinary Diploma or National Certificate in Education, 97(61.4 percent) have a Higher National Diploma or Bachelor's Degree, 35(22.2 percent) have obtained Master Degree, and 5(3.1 percent) have earned Doctorate. As a result, telecommunications workers are well-educated. This might be due to telecommunication companies' rapid technology adoption. As a result, only the most qualified employees are recruited (Ezenwakwelu, Akpan, &Ogbogu-Asogwa, 2021).

Hypotheses Testing

The research hypotheses were tested using partial least square – structural equation modelling (PLS-SEM). The t-statistics and beta (β) values at 5% level of significance were observed for statistical decisions (Fornell&Lacker, 1981; Hair et al., 2014). Having fulfilled the requirements of the measurement model, we can go on with the structural model. The structural model is where the actual of the hypotheses is carried out. That is, the test of the effect of service system innovation on service quality. Service system innovation was

measured in three proxies – idea generation, service development and commercialization. Next, service quality was assessed as a mono-dimensional construct.

The last part of the structural analysis (for the main effect) is the evaluation of the effect size of each path in the model using Cohen's f^2 (Cohen, 1988). The effect size measures if an independent latent variable (LV) has ample impact on a dependent latent variable. It is the increase in r^2 of the LV to which the path is connected, relative to the LV's proportion of unexplained variance (Chin, 1998). Values for f^2 between 0.020 and 0.150, between 0.150 and 0.350, and exceeding .350 indicate that an exogenous LV has a small, medium, or large effect, respectively, on an endogenous LV (Chin 1998; Cohen 1988).

The conditions to either accept or reject the stated hypotheses, for path coefficients (β values), values from .10 to 0.29, .30 to .49 and .50 to 1.0 are considered as weak, moderate and strong correlations, respectively (Cohen, 1988). Then, for a two-tailed test, t values greater than 1.96 are significant, while t values less than 1.96 are non-significant (Hair, et al., 2014).

Here are the study hypotheses as developed in the literature review section:

H_1: There is a significant relationship between service development and service quality of the telecommunication firms.

H_2: There is a significant relationship between commercialization and cost leadership of the telecommunication firms.

H_3: There is a significant relationship between commercialization and service quality of the telecommunication firms.

Table 2: Results of Hypotheses Testing

Hypotheses	Path coefficient	Standard error	T. value	P. value	Decision
ID -> SQ	0.741	0.002	9.546	0.010	Supported
SD ->SQ	0.559	0.023	6.842	0.001	Supported
CM -> SQ	0.679	0.045	7.695	0.000	Supported
Note: ID = Idea Generation, SD = Service Development, CM = Commercialization, SQ = Service Quality, T-Statistics greater than 1.96 at 0.05 levels of significance.					

Source: SmartPLS 3.2.9 Output on Research Data, 2023.

Table 2 shows significant paths between idea generation and service quality($\beta = 0.741$; $t = 9.546$; $p < 0.05$), service development and service quality ($\beta = 0.559$; $t = 6.842$; $p < 0.05$), and commercialization and service quality ($\beta = 0.679$; $t = 7.695$; $p < 0.05$). Hence, stated hypotheses were supported.

Table 3: Effect sizes (f^2)

Paths	f^2	Effect Size
ID -> SQ	0.14	Small
SD -> SQ	0.21	Medium
CM -> SQ	0.35	Large
Note: ID = Idea Generation, SD = Service Development, CM = Commercialization, CL = Cost Leadership. Effect size (f^2) of 0.02 = small; 0.15 = medium, while 0.35 = large effect.		

Source: SmartPLS 3.2.9 Output on Research Data, 2022.

Table 3 shows the effect sizes of idea generation, service development, and commercialization on service quality (endogenous constructs), with f^2 values of 0.02, 0.15, and 0.35. These values represent small, medium, and large effects respectively (Cohen, 1988; Hair et al., 2017). The results in table 4.22 shows that commercialization has the largest effect on service quality of the telecommunication firms with an f^2 value of

0.35. Service development has a moderate effect on service quality. Lastly, idea generation made the smallest contribution to the model with a value of 0.14.

4.8 Discussions of Findings

The study concentrated on determining the effect of service system innovation (SSI) on service quality (SQ) of telecommunication firms in Nigeria, an emerging economy. Data were collected from managers and customer service attendants of ten telecommunication firms. The validity, reliability and suitability of data were first confirmed before the study's hypotheses were tested using PLS-SEM via SmartPLS 3.2.9 software. The finding that service system innovation is positively and significantly correlated with service quality which was in consonant with several previous studies such as Blommerde (2022), and Littunen, Tohmo, and Storhammar (2021).

The three dimensions of service system innovation (idea generation, service development and commercialization) were correlated with service quality. The results showed positive relationships between the dimensions of service system innovation and service quality, hence the alternate hypotheses were accepted.

Specifically, hypothesis one stated that idea generation has a significant relationship with service quality, this hypothesis was accepted. This implies that novel and innovative ideas drives service quality within the telecommunication firms which is in line with the finding of Danjuma and Raslia (2012), who examined service innovation and service quality among service firms and found that the advent of globalization made service innovation very important especially to service firms which are easily affected by competition. A similar result was also obtained by Bozic and Ozretic-Dosen (2015) in Serbia, they concluded that innovation and creativity is essential to service quality in market-oriented establishments. Also, in a study on service innovation and firm performance in China, Feng, Ma and Jiang (2020) affirmed that service innovation propels service quality among Chinese firms. Thus, this finding indicates that the more the telecommunication firms cultivate and utilize a variety of sources for new ideas as well as developed both formal and informal methods of generating innovative service ideas, the more they will improve their service quality. It is believed that the development and utilization of novel ideas will make their services more reliable, flexible as well as customer friendly. This finding shows the application of the theory of innovation by Schumpeter in the Nigerian work environment. Schumpeter believes that competitive edge could be achieve through the application of skills such as innovativeness, critical thinking, and relational abilities (Bailey, Kleinhans& Lindbergh, 2018). Further, Schumpeter asserted that innovation starts with the development of new ideas which leads to the changes in the methods of production and transportation, production of a new product, change in the industrial organization, opening up of a new market and ends with the introduction of improved products and services.

The second hypothesis stated that service development has a significant effect on service quality. The result affirmed the hypothesis. Thus, the output suggests that an increase in service development has a corresponding increase in service quality. This result shows the significant contribution of service development to service quality, reflecting the rapidly increasing contribution of new services development to the telecommunication firms. The finding agrees with the suggestion of Weerawardena and McColl-Kennedy (2002) that service development leads to service firm competitive advantage. Further, Grabowska and Saniuk (2022) noted that organizations develop new or modified their services with the intention of achieving competitive edge and effectiveness in their operations. Likewise, Grabowska (2016) concluded that organizations that want to be successful in the market, have to build a competitive open business model that will distinguish it from its competitors and the condition for achieving a competitive advantage is the efficiency of operation through improved services. The finding also resonates with previous findings such as that of Tajeddini, Martin and Altinay (2020), who studied tourism firms in Japan and found that service innovation increases business performance in terms of service quality. The finding that service development has a significant relationship with service quality is also in line with the submission of Thakur and Hale

(2013), who studied American and Indian service firms and found that service innovation plays a significant role in the achievement of higher quality of service. In addition, Tether (2005) found that service innovation is important for service quality among European firms.

The third hypothesis focused on commercialization and service quality. The outcome shows that commercialization has a significant relationship with service quality which shows that achieving service quality is a function of firms ability to market their novel services to their customers. This finding supports the finding of Roberts and Amit (2003), who investigated the effect of innovative activities such as commercialization on competitive advantage in the Australian banking sector and found that commercialization capability positively influences bank services. This implies that innovation through commercialization facilitates the company to implement an appropriate technological process in developing new products that fulfill the market's need and improve service quality (Rajapathirana&Hui, 2018). Hence, commercialization capability is helpful to form and to manage kinds of company's skills to support the integration of ability and stimulus to successfully innovate. Excellent innovation capability tends to implement and develop a variety of new products and existing product portfolios (Dadfar et al., 2013). Rajapathirana and Hui (2018) explained that a company should improve their leadership, people, partnership, and organization's capability before implementing the initial innovation process and establishing new products. Some researchers conclude that innovation capability is the capacity of a company to expand new products through a combination of innovation behaviour, strategic skills, and internal technological process (Bhat&Momaya, 2020; Vicente et al., 2015). The result of research proved that innovation capability influences the quality of service (Ngo &O'Cass, 2013). Lastly, the finding that commercialization positively influenced service quality aligns with current reality in the telecommunication industry as submitted by Hassan (2021) that commercial applications of new technology, new material, new methods and new sources of energy by telecommunications in Nigeria shows their level of innovation and help to manage their quality and cost of services.

5. Conclusion and Recommendations

Conclusion

The study adopted a cross sectional design to examine the empirical link between service system innovation and service quality with a focus on telecommunication firms in Nigeria. The results proved that service system innovation via its dimensions of idea generation, service development and commercialization influenced the service quality of the telecommunication firms. The study concluded that an increase in idea generation, service development and commercialization is needed for an improved service quality.

The study emphasizes the need for telecommunication firms to put in place mechanisms to generate novel ideas and services as well as create markets for their services in order to harvest higher levels of cost leadership and service quality. Moreover, the study pinpoints to managers of telecommunication firms that their firms stand to gain more competitive edge provided their managers are competent alongside an effective service system innovation.

Recommendations

Based on the findings and conclusion, the following recommendations were suggested for the telecommunication firms in Nigeria:

- Effective idea generation is one of the most important keys to a successful business. Without a proper idea generation strategy by the telecommunication firms, they will not be able to develop new and improved services. Hence, it is recommended that the telecommunication firms should adopt several sources of generating novel ideas and utilize such ideas to develop quality and cost effective services.

- Service development is a major driving force behind service quality because it gives the business access to new markets by offering to customers the leading-edge innovative services. Thus, this study recommends that management of telecommunication firms in Nigeria should encourage employees and other stakeholders to suggest new services to the management.
- Commercialization capability helps telecommunication firms sense and respond to market changes such as competitors' moves, technological evolution and revolution and facilitate telecommunication firms to foretell and anticipate customer explicit and latent needs. Thus, this study recommended that telecommunication firms should conduct frequent market analysis in order to know the expectations of the customers and devise innovative means of satisfying these needs.

Contributions to Knowledge

The study charted a new path in research by exploring the role of service system innovation on service quality from a Nigerian perspective which was unexplored before now. The study has managerial implications that in the context of telecommunication firms in emerging markets such as Nigeria, the firms need service system innovation to withstand the competitive nature of the industry. Additionally, they require competent managers to achieve service system innovation as well as improve service quality.

Practically, the study provides evidence on the characteristics of service system innovation and service quality within the context of the telecommunication industry. In addition, the study developed and validated an instrument for measuring service system innovation and service quality within a developing economy which may be adopted by future studies when examining these variables. Furthermore, the study extends the theory of dynamic capabilities theory in service system innovation literature.

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