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Smartphone Adoption Process and Customer Satisfaction: Innovation of Diffusion Theory (DIT) Perspective

By

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Abstract

The changing trend in customer choice and preferences have emboldened firms to ensure that; product developmental procedures must be in sync with 'customers' Adoption process', for the ultimate purpose of satisfaction of customers. The objective of this study is to examine the effect of product adoption process on customer satisfaction for selected *Smartphones. Additionally, other challenging issues to be considered include; Compatibility of product, outstanding relative advantage, and product Simplicity/Complexity. The study evaluates the concept of product adoption and customer satisfaction using systematic literature review process; Also, the diffusion of innovations theory was adopted as the theoretical basis of the research. Exploratory research design was adopted in which, three focus groups (Customers, Distributors and Technicians) of Smartphones were identified, and comprehensive interviews were conducted on product adoption process, questionnaires were also administered to the respondent to augment the process of data collection. The findings revealed that there is a significant relationship between Product Adoption Process and Customer Satisfaction. The study recommended that key towards outstanding performance by manufacturing firms', lies in their ability to effectively train their personnel to conduct effective compatibility of product to identify the preferences of the consumer, and deliver products that satisfies their exact need; as a pre-requisite for firms overall performance.*

Keywords: *Product Adoption Process, Customer Satisfaction, Innovators Preference, and Simplicity/Complexity of Products.*

INTRODUCTION

The processes involved in establishing entirely new products or extension of existing brand, help firms in augmenting existing product for the ultimate purpose of satisfying customers need and wants. New product Development (NPD) according to dictionary of business management 5th edition could be explained as the conversion of market openings/ideas into product services readily available to end users (Eshiett & Eshiett, 2022b). This adoption process often involves technologically innovative techniques by firms in creating product/service needed by customers, (Euromonitor, 2010), with increasing market share in tech beyond other product services (International Data Corporation (IDC, 2015). Products could be tangibles or intangibles, but valued based on standardized framework of service offering; calculated based on product cost, production time, and service quality competitiveness (Kim, et, al, 2022). The adoption process for tech products example smartphone, is a psychological phenomenon in which, customers/prospects learn from the stage of innovation, adoption to becoming regular users of such products (Kotler; & Amstrong, 2018; & Rogers 2003).

Adoption process for technological product begins with the desire by customers to adopt an innovation, this process is often determined by diverse behavioral components that influences consumer decision process. This idea is summed up by Donald Norman, (2002), book titled 'The Design of Everyday Things - Paradox of Technology' shows that the augmentation of component or services of a tech device is to mitigate the complexities faced by customers in previous version of the product, (Norman, 2002). Documented evidence has shown that global Mobile Cellular

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subscription(millions) affirms that, at least one-person own smartphone, (ITU, 2015). The unique aspect of the speed in smartphone adoption could be linked to increasing number of new functions not available in previous versions such as: diversities in Apps downloads, games, Wi-Fi, SMS, MMS, Global Positioning System (GPS), Bluetooth, Entertainment (Chang, et. al, 2016; & Euromonitor, 2010). Evaluating the adoption of smartphones economically, based on its cost and affordability globally, the International Telecommunications report (ITU, 2022), shows a gap between smartphone affordability and Gross National Income (GNI), indicating that smartphones cost over 25% of monthly GNI per capita ratio with (Nigeria indicating: smartphones =12; Feature phones =33; [ITU, 2022]). Hence, a gap exists in Lower-Middle-Income (LMI) countries such as Nigeria, where smartphone adoption is prevalent among the rich strata of the population, due to affordability, while the poor and most middle class lack the financial capability to adopt smartphones, rather resorting to; long commitment period of purchase, lower features, and 'fairly used or second-hand' smartphones (ITU and A4AI, 2022; ITU, 2018a; & ITU, 2018a).

Integrating ccustomer satisfaction into Smartphone adoption process, the research adopted the Diffusion of Innovation theory to explain the behavioral tendency of the consumer from the stage of product innovation to saturation on tech devices – smartphone within a social system (Rogers 2003). Diffusion of innovation as popularized by Everette Rogers a decision process that allows categories of product adopters (Innovators, Early Adopters, Early Majority, late majority, and Laggard) to make purchase decisions within the process (Rogers 2003). Other models have been widely adopted by various scholars such as; Customer adoption and usage of smartphones (Bag; & Lin, 2016), Customer satisfaction on smartphones based on trends, (Chang, et. al, 2016), individual behavioral tendency towards having the intention to accept and use tech products (Bag & Lin, Yao-Chin, 2018).

Additionally, beside the diffusion of innovation model, other models have been adapted to explain the same concept. An example is the Technology Acceptance Model (TAM), which examines "Perceived usefulness, perceived ease of use, and user acceptance of information technology", juxta-positioning of two theoretical modes on user acceptance of tech (Davis. et. al, 1989), an extension of theoretical basis TAM (Venkatesh; & Davis, 2000). Others include effort by scholars to unify the various TAM models (Venkatesh, et. al, 2003), and the intervention TAM model 3 (Venkatesh; & Bala, 2008). The adoption of Diffusion of Innovation theory is to establish a theoretical basis that holistically examines key elements of customers behavioral tendency such as; (Innovation [Rogers 2003], Adopters [Meyer. 2004], communication channels [Eshiett, et, al, 2022 a], time [Rogers, 2003], and social system [Panigrahi, et, al, 2020]). Empirical evidence on tech (smartphone) product adoption, is very scanty, for instance, in the (IDC 2022 report), developed nations and other regions of the world have data on smartphone adoption, hence there is paucity in data availability on smartphones adoption in Nigeria, hence the need for the conduct of this research to fill this huge gap.

Product adoption addresses changing trends in customers' choice and preference, the current volatile business environment in which global demand is yet to recover from the global lockdown by the COVID-19 Pandemic ((GSMA 2021b: ITU, 2020b: Feldmann et al. 2020; & Delta Partners, 2020), which further widened the global inequality gap (World Bank, 2021a; & Thorpe; & Gaventa, 2020), which also impinged on educational service delivery (Eshiett; & Eshiett, 2021), while the less privilege and vulnerable are still grappling with connectivity and safety issues during and after the pandemic (OECD, 2020; American Academy of Pediatrics 2021; & UNICEF, 2020b) should also be addressed. Other adoption issues include unpredictable product life cycle and the ever-increasing competitiveness amongst business rivals. The value addition in terms of satisfaction derived from the use of smartphones is the key index behind the pace at which tech device are adopted (Bag & Lin, Yao-Chin, 2017), This research explains the drive amongst customers of tech devices, to adopt smartphones that satisfies their needs and wants (Panigrahi, et. al, 2021), others have resorted to the use of smartphones based on its competitiveness (Gündüç, S, (2019)). Hence, for sustainable business ideals suggest that, firms must interact with customers to ascertain their exact needs, in order to satisfy them. Accomplishing optimal goal of satisfying customers in the adoption process, the customer according to Rogers (2003), is assumed to have gone through certain stages which include; i) Product awareness – the customer initial exposure to the innovation , ii) Persuasion- the customer personally seek information about the innovation , iii) Decision- the most crucial stage in which the customer decides to either accept or reject the innovation iv) Implementation-the stage in which the customer adopt the innovation, and v) Confirmation- the final stage which involves the decision to stick to the innovation.

Statement of the problem

The strategic aim of business organizations is to provide product/services to customers at profit. Profit made by firms is most often shared amongst stakeholders (shareholders, management, employees and community social responsibility). A percentage of this profit is often ploughed back for future expansion and development; part of which is meant for the development of new products. Based on this research by tech firm on new product ideas is incomplete, if the product adoption process has setbacks. Hence, issues to be considered in this research include the following;

The core basis of new product ideas and product line extension lies in the ability of firms to create a team that could identify perceived limitations of existing products, and how the customer will prefer future product; procurement, production, packaging, delivery and after sales service to be delivered by the firm. The problem most firms have is compatibility that is 'how innovations fit into customers preferences, values and behavioral pattern'. Such challenges have resulted in products lacking the ability to address

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customers' needs and wants, poor management strategic positioning and late product launch/arrival in the market.

Also, the issue of Product relative advantage has become a core challenge, most firms are faced with the challenge on how current innovation superweeds product offering by rival firms in the industry. This could involve extra budgetary allocation for the acquisition of infrastructural facilities/equipment and overhead cost for the creation of new products or product line extension. Sometime where such budgetary allocations are made, the funds are either diverted to other expense head or the projects are underfunded. This has led to existing products lacking in their capacity to compete effectively with their national and global rivals.

A key index in the products innovation or extension of existing product line is the Simplicity/Complexity at which complexities in product diffusion could be understood by customers and prospects. Where there are issues on basic knowledge about product processing, equipment handling, quality control, packaging, delivery and feedback processes, firm will find it extremely difficult to compete with rivals.

The main objective of the study is to examine the effect of product adoption process on customer satisfaction of Smartphones, other objectives include the following: i) To evaluate the effect of product compatibility on customer satisfaction for Smartphones , ii) To examine the significant effect of Product relative advantage on customer satisfaction on Smartphones, and iii) To determine the extent to which product Simplicity/Complexity affect customer satisfaction on Smartphones.

Review of Related Literature

Concept of Customer satisfaction

Customer satisfaction connotes a metric used in measuring customer experience prior to the consumption of a product/service expectation (Eshiett, et. al, 2023), if the product/service experience equates or surpasses customer expectation, the customer is adjudged to be satisfied (Abdulla et al 2014). The concept of customer satisfaction is often used in the tech industry to evaluate customer expectation has been met (Eshiett, et. al, 2022; & Kim, et, al, 2022). Several scholars have provided meanings for the concept of customer satisfaction; Kotler, et. al, (2018) define satisfaction as customers feeling of accomplishment or disapproval when product performance is placed side-by-side with perceived performance. Eshiett, et. al, (2023), opined that customer satisfaction is based on experience, and perceived value expectation. In the opinion of Eshiett, et. al, 2023), the authors argued that customer satisfaction means the accomplishment of customer expectation, based on product offering experience. In marketing, customer satisfaction has become a potential tool for tech firms to attract, retain and engage customers and prospects, based on perceived customer expectation, and actual product offering experience.

Satisfying customer(s) is the fundamental reason why businesses exist, this relationship fosters customer loyalty, satisfaction and sometime dissatisfaction (Panigrahi, et. al, 2021), and oftentimes, customer retention for continuous patronage (Godovykh; & Tasci, 2020). The basic theoretical foundation in which customer satisfaction operates is the expectancy disconfirmation theory (Eshiett, et. al, 2022), other theoretical propositions (Expectancy Disconfirmation theory [Anderson, 1973], Assimilation theory [Anderson, 1973], Equity theory [Stacy 1963], Attribution theory [Kelley, 1973], contrast theory [Hovland, et. al, 1957]), have been advanced to further obtain insight, on the debatable theoretical foundation for customer satisfaction. Hence, the strategic role of customer satisfaction in business have made the application of these theoretical basis, a key fundamental in determining Customer to Business Relationship (Eshiett, 2021).

Concept of Product Adoption

Product adoption according to Rogers, 1962, is the final stage in the adoption process (knowledge, persuasion, decision, implementation, and confirmation), which terminates in adopter's determination to continually use the innovation, based on trust and satisfaction (Soren, & Chakraborty, 2024). Product adoption could be an extension of the life of an existing product (Hoque & Sorwar, 2017). Firms must ensure that, new product ideas have the capacity to satisfy customers' needs and wants (Eshiett, et. al, 2022), such as diffusion of innovation on video calls for blind people (Chanjaraspong, (2016), diverse innovations for old people (Andrea & Fernández-Ardèvol, (2019). Others include; adoption in wildlife conservation management initiatives (de-Diego, et. al, 2020), and competitiveness, cost and environmental issues faced by firms in product adoption process (Takahashi, et. al, 2024)

According to Rogers (2003), in guaranteeing acceptability of innovation, effective product adoption process must have the following five elements which includes; comparative capacity, relative advantage, Complexity, trialability and observability. Hence, tech firms must communicate product ideas effectively through valid communication channels, within the framework of a social system (Eshiett et. al, 2022). This is based on willingness to adopt smart technological innovations [Elodie, et. al, 2022]) or rejection stage (decision not to adopt an innovation [Benolt, 2015]), is often taken by individual or groups based on their social network influences

Concept of Diffusion of Innovation

The origin of the Diffusion of Innovation (DOI) Theory, will be propounded by Everette Rogers (1962), Rogers explained diffusion of innovation as a process of communicating an innovation (Belch & Belch, 2016), through specific channels ([tech transfer and implementation knowledge in diffusion of innovation (Pitsillidou, et. al, 2021), in order to create mutual understanding within a social system ([network structure and innovation ambiguity, Panigrahi, et. al, 2020]; [role of network structure, and its effect in diffusion of innovation, McCaskill, 2019]; [diffusion of technological innovation, Elodie & Lars Meyer-Waarden, 2022]), at a given period of time. DOI is a practical model used by managers, in harnessing firms' capabilities towards competitiveness and sustainable growth. *(*Tranate, 2020; [social network threshold

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in diffusion of innovation, Herrero, et. al, 2017]; & [differential impact of social integration in diffusion of innovation, Panigrahi, et. al, 2020]), this explains the need for firms to efficiently craft strategies that could accommodate technologically-driven dynamic changes in the industry, example; whenever changes occur in the industry, managers are expected to formulate policies (operational, financial and logistic) that will keep the firm balanced between existing technology and acquiring new technological innovational processes. (Elodie & Lars Meyer-Waarden, 2022). for example, the speed of transition between 4G Network and 5G Network is due to 'innovative tech driven dynamic change'(Weissberger, 2019), that have resulted in speedy adoption of 5G over 4G based on network structure, and its effect in diffusion of innovations (McCaskill, 2019).

Innovation is a perception by individual/group about an idea as new, and the individual /group willingness to adopt it. Technology is systematic process designed to perform certain functions aimed at achieving desired results using models and theoretical basis ([Fuzzy cognitive models of innovation of diffusion [Mohammad & Yadegari, 2023]; [innovation diffusion model in new product growth Peres, et. al, 2010]; and a conceptual framework for integrating models of diffusion of innovation. Adoption of innovation comprises of two components; (a) Hardware (which is a composition of physical components that enables the tech idea to function, without any iota of uncertainty), and (b) Software (which comprises the skill foundation, with a cause-and-effect relationship, that enables hardware to operate (Roger, 2003). The process of adoption of innovation, is the degree in which customers adopt a specific innovation. The process measures the time frame as shown on each category such as; Innovators 2,5%; Early adopters 13.5%; Early majority 3%; Late Majority 34% and Laggard 10% (Rogers, 1995). Innovation can only be unconstrained when adoption curve attains a pivotal point, this point give birth to a new phase of innovative adoption as it diffuses.

Smartphone as Tech Device

Smartphones are tech devices that have combined capabilities to merge the functions of both the phone and Personal Computer (PC) .In addition to its traditional mobile telephony functions, smartphones can be distinguished from the features of older designs based on; augmented hardware capabilities, upgraded operating systems which enables multiple software installation, internet access, multimedia capabilities such as; (music, video, games, cameras), it has features that aid accessibility to wireless communication functions such as; Wi-Fi, Bluetooth, satellite navigation/messaging. Smartphones have effective replaced the use of other tech devices such as; E-reader devices, iPod, MP3 Players, Portable Media Player (PMP), Personal Digital Assistant (PDA), video game consoles, and Palm top PC's. The optimal capabilities of the smartphone have been enhanced by the Long-Term Evolution (LTE), which is synonymous with the 4G technology network. In 2022, the smartphones industry recorded that, about 1,43billion units of smartphones were shipped globally (Eshiett, et, al, 2022).

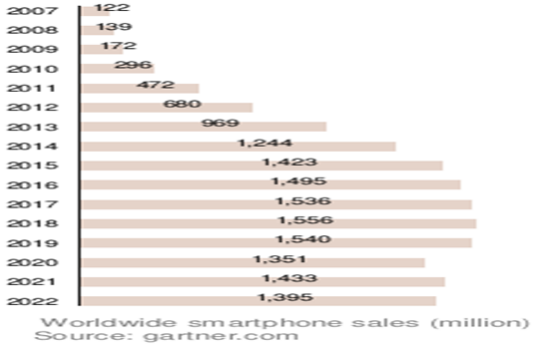
Historically, the present smartphone was invented by an International Business Machines (IBM) engineer Frank Canova in the early 1990's, the prototype was launched with the name 'Angler', and later demonstration of the invention by IBM in a tech industry trade show (Charlotte; 2014). The initial production of smartphone IBM Simon in 1994 had commercial limitations based on its bulky size, limited battery capacity (Mostefaoui; & Tariq, 2018). According to Pamela Savage, the tag 'smartphone' was coined after the introduction of IBM Simon (Savage, 1995). Ericson was the first tech firm to use the word 'smart phone, 'while launching its device GS88 in an international conference in 1997 (Andersen, et. al, 2011).

Additionally, between 2000 to 2010, the smartphone industry had an interface shift from the use of keypad to finger-operated capacitive touchscreens (Elgan, 2011), with LG launching its LG Prada in 2006 (Temple, 2007). This launch resulted in competitiveness in the industry, in 2007 Apple Computers launched its iPhone with augmented screen resolution (Jobs, 2007), with features such as pinching and zooming of web pages maps and photos, with a stripped-down browser and sophisticated operating system (Tristan, 2007). The introduction of iPhone resulted in mass departure by tech companies and customers from the keypad phones Mossberg; & Boehret, 2007). The 2020's innovation of high-speed smartphones with superb capabilities to host the 5G Network, there've been greater emphasis on reduction in environmental footprints by firms in all aspects of (procurement, production, distribution and disposal) of smartphones (Tranate, 2020; &. Alspach, 2019).

Global Smartphone Sales

According to gartner,com, documented evidence in Figure 1 shows a global smartphone sales between 2007 to 2022, which have been on a positive increasing trend from (2007 to 2018); (122million – 1,536billion) (Gartner, 2018; Gartner, 2016; & Meulen, & Janessa, 2013), when

Figure 1: Global Sales of Smartphones (2007-20220



smartphone sales records shrunk due to, global customer reaction to 'sharp practices' by some tech firms such as; (Huawei, Oppo and Xiaomi) introducing features meant for lower priced smartphones at higher cost (Leprince-Ringuet, 2019; Eadicicco, 2019; & Axon, 2019).

Further breakdown showed that in 2019 (using 2018 sales volume as base year), global sales dropped by 1.03% due to

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the emergence of COVID-10 Pandemic which distorted economic activities, as well as global demand (GSMA 2021b: ITU, 2020b: Feldmann et al. 2020; & Delta Partners, 2020), and a further drop of 13.17% in 2020 specifically due to the global shutdown, which disrupted global supply chain activities, in 2021, global sales volume increased due to global economic recovery effort resulted in 5.27% increase, and further drop of 10.34% in 2022, when compared to the base year. It is expected, that the introduction of the 5G Network will rejig global sales volume in the future, this projection is based on; robust performance, speed and overall capabilities of 5G network on the device (McCaskill, 2019; & Weissberger, 2019).

Trends in Smartphone Adoption and Projections

The growth and speedy development of the smartphone market as shown in Figure 1, is due to the fast pace of adoption of the device through; increasing adopters' innovation (Rogers 2003; & Meyer. 2004), smartphones becoming a key global communication device (Rogers, 2003); the increasing pace of new product launches with advanced capabilities (Eshiett & Eshiett, 2022b; & Rogers, 2003), and the encroaching impact of smartphone adoption on the social cultural system (Rogers, 2003). These have increased the level of customer satisfaction, specifically on smartphone adoption (Gartner, 2018; Gartner, 2016; & Meulen, & Janessa, 2013). Projections have shown that, in-spite of the drop in global shipment since 2018, the 5G Network launch could rejuvenate global sales volume (Weissberger, 2019), based on increased capabilities of the 5G Network, with prospective gain in market-traction once the market reach maturity stage (McCaskill, 2019; & Weissberger, 2019). Recent development has shown diverse market reactions one of which is; sharp practices by tech firms (Leprince-Ringuet, 2019; Eadicicco, 2019; & Axon, 2019), the slow pace of market recovery from the devastating effect of COVID-19 Pandemic (Scoones; & Stirling, 2020).

According to IDC 2022 quarterly report in figure 2, uncertainties in global demand have resulted in global decline in shipment of smartphones of 9.7% compared to shipment in the same period in 2021 which was 301.9 million units (3Q22), as shown in Figure 2.Also shown, are the top five smartphones with volume of shipment as in 2022Q3 (i) Samsung, ii) Apple, iii) Xiaomi, iv) Vivo, and v) Oppo.

Figure 2: Decline in Global Shipments in Q3 2022

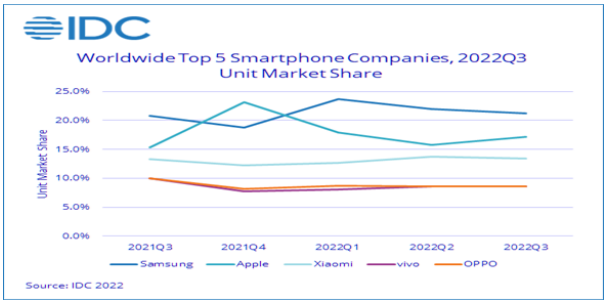

Table 1; shows a quarterly comparative analysis of amongst the global big five smartphone firms based on market share and shipment, a breakdown shows that the market leader Samsung between (3Q2022 – 3Q2021), the firm had a reduction of 5.5million shipment, while its market share went up by 7.6%; Also, Apple within the same period under consideration had a reduction of 5.5million shipment, while its market share went up by 7.6%; Also, Apple within the same period under consideration had an increase of 0.8million shipment, and a corresponding increase in market share by 1.9%.

Table 1: Top 5 Companies, Worldwide Smartphone Shipments, Market Share, and Year-Over-Year Growth, Q3 2022 (Preliminary results, shipments in millions of units)

Company	**3Q22 Shipments**	**3Q22 Market Share**	**3Q21 Shipments**	**3Q21 Market Share**
1. Samsung	64.0	21.2%	69.5	20.8%
2. Apple	51.9	17.2%	51.1	15.3%
3. Xiaomi	40.5	13.4%	44.3	13.3%
4. vivo*	25.9	8.6%	33.3	10.0%
5. OPPO*	25.8	8.6%	33.2	9.9%
Others	93.6	31.0%	102.7	30.7%
Total	**301.9**	**100.0%**	**334.2**	**100.0%**

Source: IDC Worldwide Quarterly Mobile Phone Tracker, October 2022

Also, Xiaomi, the third contender had a reduction of 3.8million in shipment, and 0.1% increase in market share, vivo had a reduction in shipment of 7.4million and a corresponding loss of 1.4% in market share, also, OPPO had a reduction of 7.4million in shipment, with a corresponding market share increase of 1.3%, finally, other smartphone firms combined had a decrease of 9.1million in shipment and 0.3% increase in market share within the same period under consideration. Hence, the dwindling market performance is an indicator of product adoption rate based on customer satisfaction with issues such as; customer reaction to 'sharp practices' by tech firms by introducing features meant for lower priced smartphones at higher cost (Leprince-Ringuet, 2019; Eadicicco, 2019; & Axon, 2019).

Global Smartphone Forecast (2020-2026)

According to (IDC, 2022) forecast, the optimism about the future of the smartphone lies in the full deployment of the 5GNetwork resources ((Tranate, 2020), it is expected that the innovations, and highspeed capabilities of the 5G Network will boost customer confidence, and by extension; customer satisfaction and drive towards innovative adoption (Gartner, 2018; Gartner, 2016), Also, the 5Gnetwork places greater emphasis environmental footprints by tech firms in its

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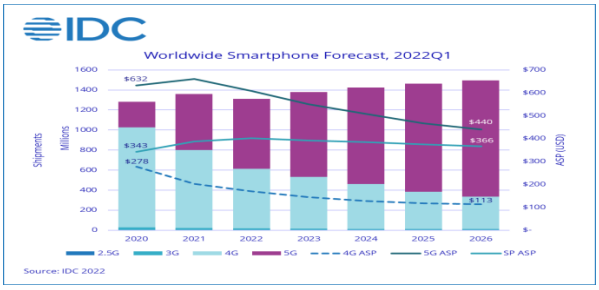
operational activities (Tranate, 2020; &. Alspach, 2019). Figure 3 shows that the (2G & 3G Networks) seem to give way for the entrenchment of the (4G & 5G Networks) based on the forecast. On the aspect of Supply Chain, the market fundamentals continue to focus on the 5G Network with an expected Supply chain growth of 25% annually, 2022 is expected to account for 53% shipment, totaling a projected 700million smartphone devices (IDC, 20220).

Figure 3: Global Smartphone Forecast (2020-2026)

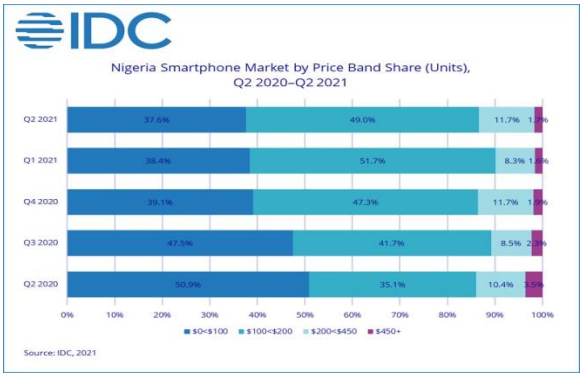


In essence, 5G is projected to reach 78% in supply chain activities by 2026. With the astronomical increased of activities in the 5G Network, the 4G Network will drop in terms of Average Selling Price (ASP) from $278 in 2020 to $113 in 2026 due to reduction in production activities in the network, for 5G Network, the ASP in 2020 stood at $632, but it is expected that, in the long-term due to increased adoption and customer satisfaction, increased sales volume and competitiveness by tech firms, will reduce the ASP to $440 by 2026 (IDC, 2022).

The Nigerian Smartphone Market Q22020-Q22022

The Nigerian smartphone market as evaluated by IDC in 2022 for the period Q22020-Q22022 as shown in Figure 4. Increased by 2%, with Smartphone accounting for 48.2% market share, while features phone accounted for the remaining balance of 52.8% within the same period of evaluation.

Figure 4: The Nigerian Smartphone Market Q22020-Q22022



Transition from feature phones to smartphones is becoming intense as a greater percentage of customer adopt smartphones based on need for access to the internet and other capabilities, resulting in and increased market share of 86.7% in Q22021.

The total population of smartphone users as at 2022 is estimated at 41.49million, with total revenue from smartphone sales amounted to $8.72 billion at the last quarter of 2022 (Adebayo, 2022: & Akintaro, 2022).

The essence of this research is to identify the reasons behind the transitional shift from feature phones to smartphones, one of the key reasons for speedy adoption of smartphone, compared to keypad phones are: a) ***Features***: larger storage, better battery life, and bigger screen sizes, augmented hardware capabilities, upgraded operating systems multiple software installation, internet access, and multimedia capabilities, b) ***Promotion*****:** The introduction of end of year promotional program tagged 'Black Friday' by online distributors and retail shops across major cities in the country, with large-scale discounts, based on retail brand adoption (Sinha, et. al, 2017), have increased the tendency at which customers adopts smartphones. based on their satisfaction with the discount allowed during such seasons (Eshiett; & Eshiett, 2021), c) ***Used Products***: The prevalent of 'fairly used' smartphones from developed countries and other regions of the world', creates opportunity for the lower and the middle class to own smartphones, this gives the user opportunity to adopt highly priced smartphone at reasonably reduced prices, when compared to the prices of brand new smartphones. d***) New Entrant***: The entrant of smartphones specifically from Asian Region with reasonable prices, provides the customer opportunity to adopt smartphones from a wide range of product availability. Hence, customers adopt these smartphones, and are satisfied transiting from keypad phones to smartphones.

Criticism of Smartphone Adoption Process and Customer Satisfaction

In spite of the derivable benefits of adopting the smartphone, various research finding has shown divers criticism and challenges encountered in the process of handling smartphones ranging from; socio-cultural issue, engagement with smartphones while driving, health issues, and security issues.

Table 2: Smartphone Innovation Adoption-Outcome of Findings

Item	***Author***	***Empirical Findings***	***Remarks***
Socio Cultural Issues	i) Panigrahi, et. al, 2020).	Accessibility to device use among low, moderate and high users, affects tech adoption	Psychological inclination to tech device could be disturbing when detached from it
	ii) Herrero, et. al,	Enhancement of interpersonal ties amongst adopters,	Need to monitor outcome of

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	(2017)	specifically peers o social networks	such ties, to avoid anti-social fallouts and risks
Driving, gaming and Cycling Engagement	i) Jang, Y & Park, E, (2019)	Engaging in text messaging while driving/cycling/gaming, could have effect on adopter behavior	Attitudinal change could avert accident, resulting from distraction while driving/cycling
	ii) Kim, et. al, (2023)	Involvement with smartphones in Airplane, while Driving, gaming, and cycling, could have implication on adopter behavior	Need for safety regulation on adopters while cycling, to avert risks such as accident, and sometimes death
	iii)Herrero, et. al, (2017)	Opportunity to reach respondent through social network on smartphone adoption rate	Effective legislation that guides adopters, on acceptable behavior
Health Issues	i). Shankar, et. al, (2020)	Resultant health implications such as; nutritional imbalance, muscular-related problems and deformity	Identifying related additions among adoption, and taking decisive measures to curb it
	ii) Dadhich, et. al, (2022),; & Aufa et. al, (2020)	Proliferation of medical applications could affect the safety of smartphone adopters	Need for government and regulatory agencies to regulate the use of these apps
Security Issues	i). Kim & Park, (2019)	Effective innovations in wearable devices for technicians and others in hazardous work environments	The use of third-party app stores should be banned globally, to avert risk on adopters
	ii) Pitsillidou, et. al, (2021)	Adoption based on application and implementation, based issues such as required for medics	Need to curb harmful consequences during implementation processes
	iii) Shahzad, et, al, (2024); & Ullah, et. al, (2022)	Hybridization cost savings for financial institutions using adoption of Blockchain Technology	Effort should be made by stakeholders globally, to secure devices, and guarantee adopters' safety
Energy Issues	i/). Da Silva, et. al, (2020)	Market diffusion of households using PV system	Sustainable energy development
	ii) dos Santos, et. al, (2018),	Residential low voltage consumers	Diffusion of photovoltaic systems
	iii) Jang & Park, (2020)	Social acceptance of nuclear energy,	The Fukushima Nuclear plant experience
Financial Sector Resources	i). Alalwan, et. al, (2017); & Al-Saedi, et. al, (2020)	Influencing mobile banking and developing UTAUT model M-Payment adoption	Diffusion of innovations in the finance sector
	ii) Singh, K. S, (2023; & Yoo, et. al, (2020)	Adoption of digital payments such as; Bitcoin and Cryptocurrency transactions	Diffusion of adoption in e-transactional system in the finance sector

The findings in Table 2, on empirical outcome of smartphone innovation adoption shows various implications on the health and wellbeing of adopters (Shankar, et. al, 2020; Aufa, et. al, (2020) & Dadhich, et. al, 2022), security challenges on adopters (Kim & Park, 2019; & Pitsillidou, et. al, 2021), riskiness to adopters driving and cycling on the road (Jang, Y & Park, E, 2019; Kim, et. al, 2023; & Herrero, et. al, 2017),

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hybridization cost savings for financial institution, through Blockchain Technology adoption (Shahzad, et. al, 2024; & Ullah, et. al, 2022) and socio-cultural norms (Panigrahi, et. al, 2020). Practical energy adoption issues include; sustainable energy development (da Silva, et. al, 2020), Diffusion of photovoltaic systems in residential low voltage consumers (dos Santos, et. al, (2018), Developing mobile banking and developing UTAUT model M-Payment adoption (Alalwan, et. al, 201; & Al-Saedi, et. al, 2020), Adoption of digital payments such as; Bitcoin and Cryptocurrency transactions (Singh, 2023; & Yoo, et. al, 2020), and social acceptance of nuclear energy, following the Fukushima nuclear plant accident (Jang & Park, 2020). The foregoing empirical studies was conducted in developed nations and other regions of the world, on smartphone adoption experience. It quite obvious that documented evidence on similar issues within the domain of this research, is either scanty or not available at all. Hence, this research was conducted in order to augment the wide gap in data availability on smartphone adoption process and customer satisfaction.

Review of Empirical Literature

In conceptualizing this research, Table 3 shows empirical evidence has shown that, various researches have been conducted in customer satisfaction on product adoption of tech devices, specifically on smartphones such as; Systematic review of diffusion of innovation (Ahmed, 2023), Customer adoption and usage of smartphones (Bag; & Lin, 2018), Customer satisfaction on smartphones based on trends, (Chang, et. al, 2016), Acceptance and Adoption of the innovative use of smartphones (Elodie, et. al, 2022), Adoption and use of smartphones (Bag & Lin, Yao-Chin, (2018),), Cognitive determinant of competitiveness smartphone device (Gündüç, 2019), and smartphone as a 'do-it-all' tech device (Panigrahi, et. al, 2021).

Table 3: ***Previous Conceptualization on Product Adoption Process***

Authors	***Conceptualization***	***Item Considered***	***Parameter of Measurement***
Ahmed, et. al, (2023)	Product Adoption	Diffusion and Innovation	Empirical Study; On Systematic review
Bag; & Lin, (2018)	Product Adoption using	Customer Satisfaction	Empirical Study; TAM
Chang, et. al, (2016),	Product Adoption using	Customer Satisfaction	Empirical Study; TAM
Elodie, et. al, (2022)	Product Acceptance	Customer Satisfaction	Empirical Study; Product Acceptance
Bag & Lin, Yao-Chin, (2018)	Product Acceptance	Innovation in new product	Empirical Study; Solution Innovation
Gündüç, S, (2019)	Product Acceptance	Competitiveness and Security	Empirical Study; Cognitive Perspective
Panigrahi, et. al, (2020)	Product Acceptance	Customer Satisfaction	Empirical Study; On Performance
Bag & Lin, Yao-Chin (2017)	Product Acceptance	Consumer behavior	Empirical Study; On user experience
Mascia; & Mills, (2018).	Diffusion and Innovation	Policies and Practice	Empirical Study; Biodiversity and Conservation
Ashokan, et. al, (2018).	Diffusion and Innovation	Product brand	Empirical Study; On Competitive pricing
Mohammad & Yadegari, (2023),	Product Adoption	Product Modelling	Empirical Study; On Fuzzy Cognitive map approach
Bernroider, et. al, (2014)	Product Adoption	Consumer behavior	Empirical: Addiction and usage
Mohammad & Yadegari, (2023)	Diffusion and Innovation	Complex Modelling	Empirical Study; Fuzzy cognitive model

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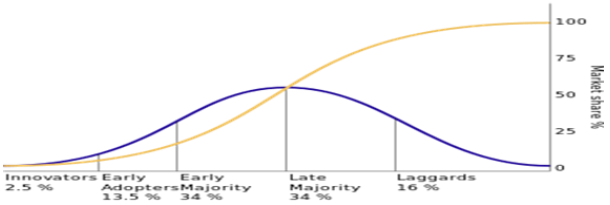
Pogacar, et. al, (2017),	Product Adoption	Consumer behavior	Empirical Study; Attitudinal Influence approach
Ahn & Park,(2022)	Adoption Promptness	Consumer behavior	Empirical Study; On Customer Rating

Others include, 'Users' Characteristics and Experiential Factors on the Compulsive Usage of the Smartphone', (Bag & Lin, Yao-Chin 2017), policies and practice (Mascia; & Mills, 2018), the tech device adoption effect on brand competitive pricing (Ashokan, 2018). Using fuzzy cognitive modelling approach (Mohammad & Yadegari, 2023), on Integrated Model of Smartphone. Smartphone addiction and usage have become issue of very serious concern, with tag such as; 'not without my smartphone' (Bernroider, et. al, 2014), measuring customer promptness in product adoption (Ahn & Park, 2022), and the attitudinal influence aspect of adopting tech devices (Pogacar, et. al, 2017). The foregoing shows that most of the evidence used the TAM model in the assessment of consumer behavior, preference and intentions, others were annual/periodic reports on smartphones adoption. Hence, this research is a step towards filling the gap in existing literature on product adoption process and customer satisfaction on tech devices, using diffusion of innovation model in assessing customer choice/preferences.

Diffusion of Innovation Theory (DIT)

The for adapting a theoretical concept in any study is to establish a basis which the study derives its foundation in figure 5. DIT explains how customers could be satisfied with tech product is gradually accepted, and diffuses (spread out) through a specific social system, the resultant effect is that, individual begins to adopt the product, idea or behavioral pattern (Everett, 2003). Adoption explain individual decision to act in a unique way, by perceiving a new product/idea, and innovating (taking a firm decision) to acquire and use it. Product adoption according to Rogers Everett (1962), is a model that outlines the various stages and percentage ratio at which individual accept a product/idea (Innovators, Early Adopters, Early Majority, Late Majority, and Laggards -2.5%, 13.5%, 34%, 34%, and 16%) within the tech adoption ecosystem (Rogers, 2003).

Figure 5: Diffusion of Innovations theory



Rogers E, (2003). Diffusion of Innovations, 5th Edition. Simon and Schuster. ISBN 978-0-7432-5823-4.

The theory argues that within a social system, certain individual who are venturesome/risktakers, are apt in adopting a product/idea (innovators) than others, while other set of individual that queue behind the innovators to adopt the same product/idea are the -Early adopters), these are opinion leaders with eagerness to adopt new product/idea (they accept implementation of product/ideas adoption by confirming it in product manual/information (Eshiett & Eshiett, 2022b;). Early majority adopt products once they have evidence that the innovation is works. Late majority are skeptics that adopt products after the early majority have adopted. While Laggards are the conservatives- very difficult group to convince about product/idea, they only adopt after the late majority have adopted (Rogers, 2003).

DIT is a practical model used by managers, in harnessing firms' capabilities towards competitiveness and sustainable growth. *(*Tranate, 2020), this explains the need for firms to efficiently craft strategies that could accommodate technologically-driven dynamic changes in the industry, example; whenever changes occur in the industry, managers are expected to formulate policies (operational, financial and logistic) that will keep the firm balanced between existing technology and acquiring new technological innovational processes. (Elodie & Lars Meyer-Waarden), for example, the speed of transition between 4G Network and 5G Network is due to 'innovative tech driven dynamic change'(McCaskill, 2019; & Weissberger, 2019), that have resulted in speedy adoption of 5G over 4G based on network structure, and its effect in diffusion of innovations (McCaskill, 2019), based on its comparative capability, relative advantage and operational Simplicity/Complexity (Rogers 2003).

Figure 1 shows the process of adoption which is the degree in which customers adopt a specific innovation. The process measures the time frame as shown on each category such as; Innovators 2,5%; Early adopters 13.5%; Early majority 3%; Late Majority 34% and Laggard 10% (Rogers, 1995). Innovation can only be unconstrained when adoption curve attains a pivotal point. A more comprehensive illustration is shown on the various stages in the decision innovation process in figure 6.

Figure 6: Stages in the Decision Innovation Process

Rogers E, (2003). Diffusion of Innovations, 5th Edition. Simon and Schuster. ISBN 978-0-7432-5823-4.

Figure 2 shows the five–step decision-making process in diffusion of Innovation. This involves a sequence of communication amongst members of a particular channel with a familiar social system. The Rogers' five stages: i) awareness,

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ii) interest, iii) evaluation, iv) trial, and v) adoption are theoretically interrelated. The decision to accept or reject an innovation, lies with the individual customer (Benolt, 2015). This method is currently practiced with outstanding successes by Apple, Google Android, IBM Linux. (Shuen & Sieber, 2009).

It is quite interesting to note that, while the critiquing of the new diffusion of innovations proposition is on-going, the theory still remains for now the best available approach for firms to tackle dynamic changes in tech product adoption (McCaskill, 2019), hence a tough challenge in the operationalization of this theory. (Lawson, 2001). It is expected that managers should make efficient and effective decisions at the end of each stage, based on available information and resources. Hence, this theory culminates with the fact that customer satisfaction have significant effect on tech product adoption**.**

Theoretical Framework

The main aim of this model is to assess the effect of product adoption process for technological device (smartphone) on customer satisfaction, the objective of this research is to adopt the innovation diffusion theory (Rogers, 2003). DIT has been used in examining blockchain technology adoption, by examining fundamental drivers (Li, 2020), network structure and its effect in diffusion of innovation (McCaskill, 2019), diffusion pattern in complex and general healthcare situation (Shankar, et. al, (2020), diffusion of innovation in viral biodiversity situation (Mascia, et. al, 2018), in service organization and policy transfer (Marsh; & Sharman, 2009), and in new product model (Eshiett & Eshiett, 2022b; Marsh, Renana, 2010). This research considers smartphone adoption process which is becoming the 'tech device not to go without' in a tech driven world (Bernroider, et. al, (2014), as a storehouse for vital information that must not be misplaced (Gündüç, S, (2019). In spite of its derivable benefits, this research has pinpointed smartphone driven excesses such as; risk of accident if engaged while cycling /driving (Jang, Y & Park, E, 2019). Security issues (Kim & Park, 2019), socio-cultural (Panigrahi, et. al, 2020)), and health risks (Shankar, et. al, 2020). However, the theoretical framework in Figure 7, shows the framework which covers the basic characteristics of diffusion innovation and customer satisfaction. Hence, the three elements that affect product adoption process and their effect on customer satisfaction are explained as follows:

Hypotheses Development

This research focuses on innovation diffusion theory (Rogers, 2003), previous research has adopted the Technology Acceptance Model (TAM), Product Innovation, Customer Satisfaction, and Brand Loyalty of Using Smartphones Among University Students (Panigrahi, et. al, 2021), Customers' Satisfaction on Technology Adoption: A Study on the Smartphones Usage (bag; & Lin, 2018), Customers' Satisfaction on Smartphone with Smartphone Trend (Ker Chang-Chang, et. al, 2016),

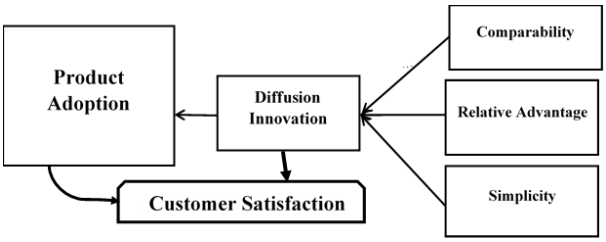
Hence, this study holistically examines the variables ([Compatibility, Relative advantage and Simplicity/complexity] (Rogers, 2003), as it affects customer satisfaction and product adoption process. The model is illustration in figure 7 thus;

Compatibility: This explains how well a specific innovation could blend with the values and norms of the society (Herrero, et. al, 2017). Smartphone model compatible when certain software/hardware is configured to run seamlessly on other models within the family/. The differentiating factor could be; features, reliability and accomplishments. Free and Open-source Software (FOSS), which are third party hardware/software created to smoothen the device interface with compatible models (Sery, 2007; & Fogel, 2005). Firms must ensure that innovations do not interfere with the socio-cultural system, norms, values and belief system of the adopters (Vanno, &, Palvia 2010), using adoption as a means of co-creating mutual value between firm and customers (Wang, et. al, 2016), since socio-cultural infringements could negatively affect the adoption process, the firm image and customer relationship (Herrero, et. al, 2017). Similar studies have been conducted on technology acceptance effect on compatibility (Wang, et. al, 2016; Panigrahi, et. al, 2014). This shows a wide departure from the current research which examines product adoption process and customer satisfaction.

Therefore, establishing a link between smartphone adoption, with replicate responses from diffrent cultures, this research therefore uses figure 7 to hypothesize the relationship between product adoption process and customer satisfaction thus;
Proposition 1; Product Compatibility have no significant effect on customer satisfaction for Smartphones.

Compatibility of smartphone innovations with certain elements of the people culture such as; this have been supported in research findings that, compatibility enhance willingness among peers to engage in interpersonal communications (Herrero, et. al, 2017), and ease of interfacing the device with other models, based on configured capability to run seamlessly.

Figure 7: Research Model



Relative Advantage:
According to Rogers 1962, relative advantage refers to the tendency in which an innovation is acceptable as being superior to other alternatives (Rogers, 2003). Sometime, the complex nature of a tech innovation could affect the possibility of adoption and diffusion, if the idea in relation to its compatibility is overwhelmingly acceptable, it could still be adopted (Rogers, 2003; & Meyer & Goes, 1988). Relative advantage could be driven by adopted product capacity to enhance customer satisfaction and adherence to socio-cultural norms ((Eshiett, et. al, 2022c). & Panigrahi, et. al, 2020).

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Also, dysfunctional innovations with high relative advantage, may not be adopted because of uncertainty, likewise, innovations with or without relative advantage, but with reduced taskings, have a higher tendency of being adopted. Research have shown that, adoption complexity could be resolved when adopters have a higher intention to adopt (Bhattacherjee, et. al, 2012; Choudhury & Karahanna, 2008), on the other hand, previous adopters of innovation are willing to support the diffusion of innovation process.

Hence, this research is an attempt to examine the significant effect of relative advantage on customer satisfaction of tech device. In essence, the hypothetical proposition was formulated from the model in figure 7, to show the relationship between relative advantage and customer satisfaction thus;

Proposition 2; Product relative advantage have no significant effect on customer satisfaction on Smartphones.

Complexity: The ease at which an innovation is adopted have a higher likelihood of its adoption and diffusion, also the tendency to which a product poses huge task in the adoption process (Rogers, 2003), other researchers have argued that, complexity (innovativeness or creativity) is one required element in the process of adopting tech devices (Oliveira; & Martins (2011), but Geissler, argued that, less complexities in tech devices, could hasten the process of adoption and diffusion, and vice-versa for less complex tech devices (Geissler, 2006; & Rogers, 2003), also, complexity could result in a higher learning curve for smartphones, as such affecting customer satisfaction on smartphone adoption and diffusion.

This research therefore proposes that, there is a hypothetical relationship between simplicity/complexity of an adoption and customer satisfaction on smartphones.

Proposition 3; Product Simplicity/Complexity have no significant effect on customer satisfaction on Smartphones.

Based on the foregoing hypothetical proposition from the research model in Figure 7, this research has made holistic contribution in filling the literature gap in Marketing, by examining; product adoption process and customer satisfaction on selected smartphones, using Diffusion of Innovation Theory (DIT). This study is unique in the sense that, the basic elements of innovations Comparability, Relative advantage, and Simplicity/complexity), were adapted in examining the relationship between the construct variables.

Research Methodology

This methodology adopted was exploratory design, based on the theoretical framework on, smartphone adoption process and customer satisfaction, using DIT review. The structured systematic review of literature was used to comprehensively review in previous research within the field of study, for the purpose of integrating it with this study (Thorpe et al., 2005; Tranfield et al., 2003). The choice of exploratory technique was based on the ease in procedural analysis and elucidation of the problem statement (Kothari, 2019). In-depth interviews through focus groups (Customers, Technicians and Distributors) was conducted in Uyo, Nigeria, using questionnaire to examine; how smartphone adoption affect Customer Satisfaction. Exploratory technique allows for ease in procedural analysis of the theoretical basis of the study (Kothari, 2019). Data for the study was obtained through questionnaire administered to the respondents

Reliability and Validity of the Study

The research instruments were subjected to thorough scrutiny by professionals and expert to affirm the validity and reliability of the data collected, to ensure that it was in line with standards. The study will also ascertain the validity and reliability based on the response from the respondents via the administered research instruments to resolve all highlighted issues.

Data Presentation, Analysis and Interpretation

This involves the presentation, analysis and interpretation of the data from the field study. Table 4 shows the analysis of data obtained from respondents, a total of (302) questionnaire were administered to the respondents, and the detailed analysis is shown on table 4.

Table 4 Analysis of Respondents Data

Questionnaires	Number of questionnaires	Percentage of questionnaires
Returned	263	87%
Rejected	16	5%
Not returned	23	8%
Total	302	100%

Source: Field study 2023

The questionnaires were collated and screened by the researcher. Further detail revealed the number of questionnaires which were returned, rejected and not returned. 263 questionnaires representing (87%) were returned and were validly used for the study, 23 respondents representing (8%) were not returned at all, while 16 respondents representing (5%) were rejected due to cancellation and mutilation by respondents.

Table 5: Descriptive Statistics

Demography	Classification	Relative Frequency	Percentage	Cumulative Percentage
Gender	Male	126	48	48
	Female	137	52	100
Age	Below 25	92	35	35
	26 -40	126	48	83
	41 and above	45	17	100

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Marital Status	Single	79	30	30
	Married	111	42	72
	Divorced	60	23	95
	Separated	13	5	100
Occupation	Students	26	10	10
	Service	50	19	29
	Technicians	89	34	63
	Distributors	21	8	71
	Others Please Specify	77	39	100
Educational Qualification	WAEC/SSCE and Below	97	37	37
	B.SC / HND	82	31	68
	Masters and above	29	11	79
	Others Please Specify	55	21	100
Income Level	Below 13 Years	29	10	10
	14-20years	112	37	47
	21-39years	104	35	82
	40years and above	55	18	100

The demographic analysis for respondents as shown in Table 5; were as follows; the profile for gender shows that male was 126(48%), female 137(32%), for age, research has shown that it is quite obvious that young persons between ages (18-25) are more prolific to smartphones (Panigrahi, et al., 2020), hence the age distribution were as follows; respondents below 25years 92(35%), respondents between 26-40years, were 124 (48%), and above 41years were 45(17%). For marital status, the analysis showed that; single respondents were 79(30%), married were 111(42%), divorced were 62(23%), and separated were 13(5%). For occupation, respondents categorized as students were 26(10%), service were 50(19%), Technicians were 89(74%), Distributors were 21(8%), and others represented 77(39%). In education, the distribution was as follows; respondents with high school qualification represented 97(37%), Bachelors' degree respondents were 82(31%), and those with masters' degree were 29(11%), and others were 55(21%), and for the level of income, below 13yeras of age were 29(10%), respondents between 14-20years were 112(37%), between 21-39years were 104(35%), and respondent for 40years and above were 55(18%).

Internal Consistency, Validity and Reliability

In ascertaining the internal consistency of the data use for the study, Cronbach's alpha must be used to measure the dependability of the data. (Hair et al. 2016), we ensured that that the value of Cronbach's alpha for the data used for the study ranged between 0.60 and 0.80. The validity measures the extent to which the dataset used in the study fits-into the construct variables (Chin et al., 2003). Test for validity is subdivided into three namely; criterion validity, content validity, and construct validity (Creswell, 2005). For the purpose of this study, Content validity is quite important for the purpose of measuring how well the research instrument is represented by the domain in scale used in the measurement, methodology and analysis (Shekaran & Bougie, 2010; DeVellis, 2000; & Allen & Yen, 1979). Reliability is attained when a valuation provides consistent values repeatedly at all times, such that the outcome could be dependable (Chakrabartty, 2020; 2013; & Blumberg et al., 2005). The coefficient of reliability must lie between 0 and 1, with a superb reliability = 1, but on the average, the general rule is that reliability higher than 0.8 is acclaimed as high (Downing, 2004). In research, it is quite practicable to have a higher reliability with low validity due to error, or theoretical relationships of the variable measured (Forza, 2002), this is because reliability is derivable from validity (Willis, 2007; & Keller, 2000).

Data Analysis and Interpretation

The data collected was analyzed based and each of the null hypotheses were tested to affirm the relationship between the variables of the construct. We conducted a pre-test to evaluate the value addition to brand by influencers on live streamed endorsements, to identify and harmonize the effect of participation or non-response bias (Floyd, 2009), a key issue in consumer behavior (Armstrong; & Overton, 1977); which we countered by juxtaposing early respondents with late respondents, then we did a follow up survey to correct the anomaly before final data analysis (Imam, et. al, 2014). We then analyzed the relationship between the variables of the constructs using Pearson Correlation Analysis for the three null hypotheses.

Test of Hypotheses

Hypothesis One;

Product compatibility have no significant relationship on customer satisfaction on Smartphones.

Table 6 **Correlation**

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		Product Adoption	Compatibility of product
Product Adoption	Pearson Correlation	1.000	.863
	Sig. (2-tailed)		.000
	N	263	263
Compatibility of product	Pearson Correlation	.863	1.000
	Sig. (2-tailed)	.000	
	N	263	263

**. Correlation is significant at the 0.01 level (2-tailed).

Table 6; shows the correlations coefficient analysis obtained was .863 which indicates that compatibility of product has significant effect on product adoption. The sample represented by N used for the analysis was 263, the level of significance of the study or otherwise known as the p value of the study is 0.000 which is less than the 0.05 alpha level of significance. Hence, the outcome of the analysis affirms that there is a positive correlation between the dependent and independent variables. The analysis result summary could be expressed as follows; [r=.863, n=263, p<.0005].

Hypothesis Two;

Product relative advantage have no significant effect on customer satisfaction on Smartphones.

Table 7 **Correlation**

		Product Adoption	Product relative advantage
Product Adoption	Pearson Correlation	1.000	.711
	Sig. (2-tailed)		.000
	N	263	263
Product relative advantage	Pearson Correlation	.711	1.000
	Sig. (2-tailed)	.000	
	N	263	263

**. Correlation is significant at the 0.01 level (2-tailed).

Table 7 shows an outcome of the correlation coefficient analysis obtained which is represented by r was .711 which reveals Product relative advantage has facilitating effect on product adoption for Smartphones. The sample represented by N used for the analysis was 263, the level of significance of the study the p value was 0.000 which is less than the 0.05 alpha level of significance. Considerably, the result of the study analysis confirms that there is a significant relationship between the dependent and independent variables. The outcome of the correlation analysis could be summarized thus; [r=.711, n=263, p<.0005].

Hypothesis Three;

Product Simplicity/Complexity have no significant effect on customer satisfaction on Smartphones.

Table 8 **Correlations**

		Product Adoption	Product Complexity
Product Adoption	Pearson Correlation	1.000	.702
	Sig. (2-tailed)		.000
	N	263	263
Product Complexity	Pearson Correlation	.702	1.000
	Sig. (2-tailed)	.000	
	N	263	263

**. Correlation is significant at the 0.01 level (2-tailed).

Table 8; is the outcome of the correlation coefficient analysis obtained which is represented by r was .702 which reveals that there is a significant effect between product Complexity and customer satisfaction in Smartphone adoption. The sample represented by N used for the analysis was 263, the level of significance of the study the p value was 0.000 which is less than the 0.05 alpha level of significance. Consequently, the result of the study analysis affirms that there is a significant relationship between the dependent and independent variables. The outcome of the correlation analysis could be summarized thus; [r=.702, n=263, p<.0005].

Discussion of Findings

1) Analysis: This study findings and discussions is drawn from its objective of the study which set out to determine the effect of product adoption on customer satisfaction for Smartphones, the result of the study shows that, there is a significant relationship between compatibility of product and customer satisfaction for smartphones.

Based on the study findings in hypotheses one which states that compatibility of product has significant effect on customer satisfaction for Smartphone adoption, this is summarized thus; [r=.863, n=263, p<.0005]. Consequently, the outcome of the study in hypotheses two also revealed that product relative advantage has facilitating effect on customer satisfaction for Smartphones adoption, and is summarized as follows; [r=.711, n=263, p<.0005]. Apparently, the result of the analysis of null hypothesis three shows that; product complexity has significant effect on customer satisfaction for Smartphone adoption, this is also summarized thus; [r=.702, n=263, p<.0005].

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In essence, the implication of the study based on its findings confirms that, product compatibility, relative advantage, and complexity could enhance overall customer satisfaction for smartphones adoption.

Theoretically

DIT is adopted on the theoretical framework could assist product managers in measuring the time frame required to accomplish specific organizational objectives based on each category such as; Innovators 2,5%; Early adopters 13.5%; Early majority 3%; Late Majority 34% and Laggard 10% (Rogers, 1995). The results show that DIT could enhance the adoption process, thereby enhancing customer satisfaction, this could be affirmed based on consistent repurchases (Eshiett, 2021), DIT is a model that enhances the adoption process (Rogers, 2003), based on its contributory effect at each stage of the diffusion transitory process such as; the speedy transition between 4G Network and 5G Network due to 'innovative tech driven dynamic change'(McCaskill, 2019; & Weissberger, 2019). Other theories such as the TAM models have eexamined "Perceived usefulness, perceived ease of use, and user acceptance of information technology", (Eshiett & Eshiett, 2024; Panigrahi, et. al, 2014; & Wang, et. al, 2016), by juxtaposing the two theoretical modes on user acceptance of tech (Davis. et. al, 1989), Hence, DIT application in this study is a step towards filling the gap in existing literature on product adoption process and customer satisfaction on smartphones, using diffusion of innovation model in assessing customer choice/preferences

Research Results

The result of the study shows a significant relationship between smartphone adoption and customer satisfaction, the result also shows that, smartphone model compatibility is enhanced when software/hardware is configured to run seamlessly on other models within specified innovation, such as, Free and Open Source Software (FOSS), which are created to smoothen the device interface with compatible models (Sery, 2007; & Fogel, 2005), also with a blend with the values and norms of the society (Herrero, et. al, 2017). DIT element of compatibility ensures that, tech firms' innovations should not interfere with the socio-cultural system, norms, values and belief system of the adopters (Vanno, &, Palvia 2010), product adoption process should be an avenue of co-creating mutual value between firm and customers ((Eshiett, et. al, 2022c & Wang, et. al, 2016), though its' product ideas (Eshiett & Eshiett, 2022b & Herrero, et. al, 2017). This shows that product adoption goes beyond Business to Customer (B2C) relationship, based on the fact that compatibility connotes mutual relationship between innovative ideas, firm and the customer.

Secondly, the hypothetical proposition on relative advantage of smartphones refers to the propensity at which an innovative idea is assessed as superior to alternative ideas (Rogers, 2003). Customers will prefer to adopt products with relative advantage, based on its capacity to enhance customer satisfaction, and in line with socio-cultural norms (Panigrahi, et. al, 2020). Where a product has outstanding relative advantage, adopters will be willing to support the diffusion of innovation process. In essence, customer satisfaction based on relative advantage could result in consistent repurchase, brand loyalty, and Word-of -Mouth (WoM) advertising by users (Eshiett, 2021),

Thirdly, DIT shows that customer satisfaction could be enhanced if the element of complexity shows a higher likelihood of adoption and diffusion (Oliveira; & Martins 2011), based on the tendency to which product poses huge task in the adoption process (Rogers, 2003), other scholars have argued that; less complexities in tech devices, could hasten the adoption and diffusion process (Eshiett & Eshiett, 2022a; Geissler, 2006; & Rogers, 2003). Hence, complexity in product usage should be minimized by tech firms' since very complex process of adoption and usage could ward-off customers, based on perceived difficulty in adoption and diffusion. We also suggest the need for regulatory authorities to ensure that smartphone innovative ideas are not inimical to socio-cultural norms, within the smartphone ecosystem,

Additional Findings of the study

The outcome of this study revealed other aspects that smartphone adopters were influenced which includes;

a) Technology literacy:

The speedy transition at each of the stages of smartphone development have resulted in a more enlightened set of adopters, in-spit of the level of illiteracy within the domain of this study. The core reason for ease in Diffusion of Innovation is due to the sophisticated capabilities of social networks, this has resulted in the enhancement of interpersonal ties amongst adopters, specifically peers o social networks (Herrero, et. al, 2017). Social network has become a valid threshold in diffusion of smartphone innovations. The element of simplicity which is one of the study propositions (Oliveira; & Martins 2011), It is quite important to acknowledge the existing technological gap within the domain of this study (Eshiett & Eshiett, 2025), hence, stakeholders should make frantic effort in filling tese gap, in order to enhance the ease of innovation of diffusion for smartphones.

b) *Adopters experience with smartphones*:

The ease in transitional shift from one version of smartphones to another, have resulted in speedy adoption, based on previous experience, adopters have become addicted to each version of smartphones due to the following features; Meanwhile, improved storage capacity, improved battery life, and bigger screen sizes, augmented hardware capabilities, upgraded operating systems multiple software installation, internet access, and multimedia capabilities. Moreover, the introduction of end of year promotional program tagged 'Black Friday' by online distributors and retail shops, with large-scale discounts, based on retail brand adoption (Sinha, et. al, 2017), have increased the tendency of innovation of diffusion for smartphones (Eshiett, 2021). However, other avenues of adopting smartphone for the mid and low-income earners is adoption through 'fairly used' smartphones from developed countries and other regions of the world', creates opportunity for the lower and the middle class to own smartphones, this gives the user opportunity to adopt highly

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priced smartphone at reasonably reduced prices, when compared to the prices of brand-new smartphones.

c) Adopters' attitudes towards innovation.

Since the first smartphone invention by IBM in a tech industry trade show (Charlotte; 2014). The limitations observed such as; bulky size, limited battery capacity was improved upon in newer versions (Mostefaoui; & Tariq, 2018), this improvement have resulted in the increasing surge in the number of smartphone adopters globally; see figure 1 on Global Sales of Smartphones (2007-20220), which have been on a positive increasing trend from (2007 to 2018); (122million – 1,536billion) (Gartner, 2018; Gartner, 2016; & Meulen, & Janessa, 2013. . Adopters have often aided the process of smartphone diffusion through consistent feedback through channel intermediaries on specific areas of expected improvements (Eshiett, 2021). Other aspects of adopters' behavior is the excesses of usage of smartphones, to the detriments of adopters health, uncontrollable usage of smartphone to the extent of it becoming an health risk to the adopter (Shankar, et. al, 2020), adopters security, the uncontrollable cloning of original inventions has become commonplace in the industry (Kim & Park, 2019), and adopters' safety. In-spite of these shortcomings, statistics have shown consistent increases in the number of adopters globally

Conclusions

The objective of this study is to examine the effect of product adoption on customer satisfaction of Smartphones. The study revealed that conducting effective compatibility of product on the needs and wants of consumers, budgetary allocation and implementation and training/re-training of personnel could aid the firm to 'weather the storm' of competitiveness in the industry and harness its market leadership in the industry . The study was conducted in the urban and semi-urban areas of Uyo, Nigeria, detailed information was gathered using questionnaire as research instrument, 263 questionnaires were received from the field. The study hypotheses were tested; data collected were subjected to statistical analysis using Pearson Correlation Analysis, the outcome of the study showed positive relationship between the dependent and independent variables.

Based on the study outcome, it was quite revealing that the actualization of customer satisfaction through sustainable product life cycle could be achieved by; effective and customer-centric compatibility of product on new products, provision of Product relative advantage for the procurement of resources needed to develop new products and the training/re-training of personnel required to implement the development of new products, these activities could trigger the growth of the firm and by extension the industrial revolution in Nigeria.

Recommendations

Based on the findings of this study, the following recommendations were made; Product adoption should be enhanced to increase level of customer satisfaction in Smartphones, firms should make affordable products, with enhance compatibilities, that reveal the exact need and wants of the consumers. The relative advantage of adoption of innovation encourages adopters of better product offering, than that provided by firm rivals. Hence, product offering must not be mere launch, but value addition to product adopters, and product complexity is essential to bar competitors from replicating same innovation, but at the same time, enhancing its simplicity, for ease of adoption and usage by customers. This will result in consistent repurchase of adopted product, enhanced customer loyalty retention

Additional practical recommendations for smartphone manufacturers and adopters, in line with the basic elements of relative advantage, compatibility and simplicity is that; since the element of ***Relative Advantage*** deals with the tendency in which an innovation is acceptable as being superior to other alternatives (Rogers, 2003), hence, future versions of smartphones must have superior capabilities beyond previous adopted versions, as well as rival brands (Ashokan, et. al, 2018). Relative advantage also has the capacity to enhance customer satisfaction (Panigrahi, et. al, 2020). To this end, smartphone firms should take cognizance of customers perception, to facilitate the process of diffusion pf innovation. ***Compatibility*** in diffusion of innovation could be adapted by smartphone firms by ensuring that specific innovation blend with the values and norms of the society (Herrero, et. al, 2017). Firms must ensure that innovations do not interfere with the socio-cultural system, norms, values and belief system of the adopters (Vanno, &, Palvia 2010), using adoption as a means of co-creating mutual value between firm and customers (Wang, et. al, 2016), since socio-cultural infringements could negatively affect the adoption process, the firm image and customer relationship (Herrero, et. al, 2017). Similar studies have been conducted on technology acceptance effect on compatibility (Wang, et. al, 2016; Panigrahi, et. al, 2014). The element of ***Simplicity/Complexity*** could be harnessed by smartphone manufacturers shows the ease at which an innovation is adopted have a higher likelihood of its adoption and diffusion, other researchers have argued that, complexity (innovativeness or creativity) is one required element in the process of adopting tech devices (Oliveira; & Martins (2011), in essence, this element explains the need for innovation to be simple enough, such that is enhances diffusion of innovation amongst adopter, while at the same time, innovation should be complex enough to the extent that, it could not be easily replicated by rival brands in the industry

Suggestions for further studies

The researcher acknowledges the fact that the findings of the study may not be exhaustive enough because it was limited to a specific product, 'smartphones' in Uyo, Nigeria, hence the need for future research to investigate the possibility of conducting investigations on the effect of adoption for other tech devices, and make appropriate recommendations as well.

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