Relationship between Perceived Characteristics of Innovating (PCI) and Adoption of New Mobile Phones: Evidence from Ekiti State University, Ado-Ekiti, Nigeria

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ABSTRACT

The study examined the relationship between perceived characteristics of innovating (PCI) and adoption of new mobile phones among students in Ekiti State University, Ado-Ekiti, Nigeria. Based on Rogers' (1983) theory of adoption, Moore and Benbasat (1991) identified constructs such as relative advantage, ease of use, result demonstrability, compatibility, visibility, trialability, and image as characteristics of innovation that could influence adoption. The study population comprised 13,798 full-time undergraduate students of the institution, out of which 389 respondents were drawn using Yamane sample size model and stratified random sampling technique. An aggregate of 380 structured questionnaires were duly completed and useable giving a 97.6% response rate. Pearson Product Moment Correlation was the method used to test the relationship between consumer perception of mobile phone as innovative and adoption of new mobile phones. The result showed that factors such as relative advantage, ease of use, result demonstrability were highly significant (r= 0.859; p<0.05, p=0.000) in their relationship with adoption; whereas visibility and image were weak (r=0.482; p<0.05, p=0.006) in their relationship with adoption. The study recommended that awareness of the functionality of new and sophisticated mobile phones needs to be raised by marketers if they want customers to adopt and use them. Furthermore, knowing that students are becoming ICT compliant and having taken to the use of social media in their interactions, it is important that mobile phone design and functionality should correspond to the social lifestyle and academic requirements of scholars to ensure sustained adoption.

1. Introduction

The world's first cellular mobile telephony systems went live in October 1981 (Mobile World Centre, 2013). The best known was the Nordic Mobile Telecommunications (NMT) network, which initially operated in Sweden. This was rapidly aggrandized to proffer automatic roaming that cuts across Sweden, Denmark, Norway and Finland. A special committee, the Groupe Spécial Mobile (GSM), was established by the European Telecommunications Standard Institute (ETSI) with the goal of developing a single mobile technology across Europe. The group determined that digital technology offers the best way forward for European mobile communications (Mobile World Centre, 2013). This digital technology, which was named GSM after the founding committee, was established to describe protocols for second-generation (2G) digital cellular networks used by mobile phones (Wikipedia, 2015). As of 2014, it has emerged the global standard for mobile communications - with market share, above 90% functioning countries and regions (Wikipedia, 2015).

According to International Telecommunication Union (2008) and the Economist (-2009) as cited in Peres, Muller and Mahajan (2010), at the end of 2008, the census of people using mobile phones was 4 billion globally. This figure, according to Peres et al. (2010) included 100% penetration level for developed countries which is rising in developing countries with consumers making use of two or more mobile phone, possessing two or more phone numbers and patronizing not one service provider. Mokhlis and Yaakop (2012) remarked that the development of mobile communication technology, that is, wireless internet, the mobile phone, MP3 player, GPS navigation system, has involved a long journey of innovation and updating occasioned by consumers' changing needs and preferences. In the words of Bauer, Reichardt, Barnes, and Neumann (2005), since the mid-1990s, the incursion of mobile phones into the economies of advanced countries has been dramatic. Whereas in 1997, just 215 million people used mobile communication gadgets worldwide; by 2001, it had increased significantly to 961 million, progressing to 1.16 billion by 2003. Today, Western Europe exhibits the highest infiltration of mobile phones (79%), and North America following with (48%), and Asia (12%).

The mobile phone subsector of Nigeria's telecommunications industry since the introduction of GSM in 2001 often referred to as the 'GSM Revolution' has witnessed the induction of various brands and models of mobile phones by different manufacturers such as Nokia, Samsung, Sony Ericsson, Blackberry, Siemens, Sagem, Techno, Motorola, Alcatel, Haier, to make a short reference to a few. The GSM has become a significant device for communicating across and beyond national borders among both young and old people.

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While older Nigerians only use mobile phones for voice interaction, teenagers and young adults have adopted the use of voice and short message service (SMS) and internet chatting media such as blackberry messenger (pinging), 2go, my space, Facebook, twitter, yahoo messenger, and Badoo as their major way of socializing and maintaining real-time relationships.

Mobile phones are peculiar products of the 21st century and as observed, have a special attraction for students in higher educational institutions. The print and electronic media are saturated with advertisements and information on the features of different mobile phones with the intention to attract more prospective customers and patronage. Consumers, in turn, have adduced several reasons for buying new mobile phones. When considering new mobile phones, customers take into account features such as functionality, size, weight, or colour (relative advantage); usefulness or complexity (ease of use); relevance to lifestyle and work (compatibility); value (result demonstrability); image, or prestige it gives to the owner for owning the mobile phone (visibility) − little wonder why users often flaunt mobile phones in public places. The rate at which students in higher institutions switch to new mobile phones when launched into the market and their response to this technological innovation calls for a close empirical study. The crave for new mobile phones among students has led to problems like stealing, pick-pocketing, gambling, selling of household property and personal effects, and in addition students diverting tuition fees and levies to purchase new phones. This is because not having these latest mobile phones could create inferiority complex as it is widely seen as a person's standing symbol, especially, among the youth.

In a number of studies and models, consumer adoption of current products has been predicated by perception of the product as innovative (Rogers,1983, 1995; Davis, Bagozzi & Warshaw, 1989; Moore & Benbasat, 1991; Tan & Teo, 2000; Carter & Belanger, 2003; Odumeru, 2012) along with a myriad of other causes like social and interpersonal influence (Oladele, 2011); perceived risk (Cheah, Teo, Sim, Oon, & Tan, 2011; Khraim, Shoubaki, & Khraim, 2011); media (Wei, Franwick, Gao, & Zhou, 2011; Nwagwu & Odetumibi, 2012); and price (Agarwal, Wang, Xu, & Poo, 2007; Mokhlis & Yaakop, 2012). However, to the best of our knowledge, a study that localizes the PCI variables among consumers in Ado-Ekiti, Nigeria, does not seem to exist; this study, therefore, intends to fill this gap in knowledge by establishing empirically the connection between PCI and adoption of mobile phones in the midst of students in Ekiti State University, Ado-Ekiti.

2. Literature Review and Theoretical Framework
Concept of Innovation

There existed a lack of consensus about the meaning of innovation (Stefanovitz, Negano and Santos, 2010). Narayanan (2001) in Dasanayaka (2013) referred to innovation as both the output and the process of arriving at a technologically feasible solution to a challenge based on a favourable technological, circumstance or customer need. Process, in the framework of innovation represents a problem-solving model; output refers to a product or service. However, Stefanovitz et al. (2010) declared that scholars from various branches of learning appeared to have agreed on a common definition of what innovation entails as given by Garcia and Calantone (2002) who conceived the term as referring to development and production of current products and services

which can attract buyers in large numbers. According to this definition, innovation involves two fundamental dimensions – novelty and feasibility (Leonard and Sensiper, 1998). Novelty means new ideas, solutions, new ways of explaining realities and solving problems. Feasibility means transforming ideas and inventions into commercial products that will appeal to the market. An example of innovation is the creation of the GSM technology**.**

Grewal and Levy (2008) viewed innovation as the process by which ideas are changed into current products and services that assist firms to grow and expand; without which, according to Grewal and Levy (2008), firms have just two options of either selling the existing products to their current buyers or take the same product to another market with similar customers. By finding new solutions or modifications to old problems, Hauser, Tellis, and Griffin (2005) added that, innovation not only destroys the current market trend and alters old ones but also establishes new ones; but the fact cannot be refuted that the overall success of innovation rests solely on consumers having not only interest in them but also adopting them. Effective innovation depends on understanding consumer needs and then developing products that meet those needs. This was the scenario in Nigeria as the monopoly hitherto enjoyed by the defunct Nigerian Telecommunications Limited (NITEL) turned out to be frustrating as consumers did not enjoy quality services. Further challenging this situation was the global need for new mobile phone services (Bradner, 2002; Wagstaff, 2002).

Adoption of New Product

Rogers (1995) clearly distinguishes the dispersion process from the adoption process. While the dispersion process spreads through society and groups, the adoption process is most relevant to the individual (Couros & Kesten, 2003). The adoption process deals with the study of how individuals make decision (Klonglan, Beal, Bohlen, & Coward, 1966). Klonglan et al. (1966) further assert that when writers in the adoption-diffusion research tradition use the concept "Adoption Model", they are usually referring to the acceptance process. According to Couros and Kesten (2003), it is generally agreed that the adoption of technology is a more composite process than the technical superiority of a product (Rogers, 1995; Ryan & Gross, 1943; Valente, 1995).

Rogers (1983, 1995) put forward five features of innovation as observed by individuals and they are considered significant in that they affect the way in which potential adopters may view the innovation and these features might influence the adoption behaviour of the adopter (Schiffman & Kanuk, 1987; Williams, 1982). These characteristics, which form the basis for perceived attribute theory, include, (i) relative advantage, (ii) compatibility, (iii) complexity, (iv) trialability, (v) observability, and (vi) image.

Relative Advantage

Relative advantage is the degree to which an innovation is perceived an improvement on the idea that comes before it (Rogers, 1983; Moore & Benbasat, 1991). The degree of improvement may be viewed in terms of more benefits, reduced risks, economic profitability, status, convenience, or satisfaction. Relative advantage has been proven to be among the best anticipators and is positively inclined to an innovation rate of adoption (Rogers, 1983, 1995; Tan & Teo, 2000; Tornatzky & Klein, 1982; Khraim et al., 2011; Carter and Belanger, 2003; Cheah et al., 2011). As observed, compared to fixed landline technology that operated in Nigeria, mobile has provided cost saving, convenience and economic profitability

benefits for users and business enterprises. Ahmed and Ahmed (2007) in Nwagwu and Odetumibi (2012) compared to fixed line approach, mobile offering of payment-by-seconds strategy adopted by Nigerian mobile operators has encouraged the adoption of the technology. In the Technology Adoption Model (Davis et al., 1989; Bauer et al., 2005; Rosen, 2005), the concept of relative advantage is described as perceived usefulness, which is the degree to which an individual has the belief that using a particular technology would enhance his/her lifestyle or work. This translates to the fact that the potential adopter assesses the outcome of his adoption behaviour in the light of the ongoing desirability of the value derived from the innovation (Chau, 1996; Venkatesh & Davies, 2000; Khraim et al., 2011; Carter & Belanger, 2003; Cheah et al., 2011). In this study therefore, it was hypothesized that:

Ho1: Relative advantage has no significant relationship with adoption of new mobile phones among students in Ekiti State University, Ado-Ekiti, Nigeria

Compatibility

Compatibility is the extent to which an innovation is felt to be associated and in line with the current values, needs and history of potential adopters (Rogers, 1983; Moore & Benbasat, 1991; Khraim et al., 2011; Carter & Belanger, 2003; Cheah et al., 2011); practices (Schiffman & Kanuk, 1987); culture (Grewal & Levy, 2008); lifestyle (Lancaster & Massingham, 2001); and habits (Williams, 1982). Tornatzky and Klein (1982) discovered that individuals are likely to embrace innovation, when it is in harmony with their job's responsibility and value system. Organizing the day's job routine like keeping contacts with friends and families, recording documents and assignments, organizing meetings and rallies, recording lecture sessions, etc., which are characteristics of students' activities and lifestyles in the Nigerian campus environment can be performed easily with a mobile phone. In view of this background, it was hypothesized that:

Ho2: Compatibility has no significant relationship with adoption of brand new phones among students in Ekiti State University, Ado-Ekiti, Nigeria

Complexity

Complexity is the rate at which an innovation is understood as more or less complicated to grasp and utilize (Rogers, 1983; Moore & Benbasat, 1991; Khraim et al., 2011; Carter & Belanger, 2003; Cheah et al., 2011). Potential adopters are curious as to whether the new technology is complicated in use than the existing one. Rogers (1983, 1995) was of the opinion that the adoption of a technology will be hindered if it is deemed complex or complicated to use. Complexity is similar to several studies named as perceived ease of use (Adams, Nelson, & Todd, 1992; Moore & Benbasat, 1991; Agarwal & Prasad, 1997; Davis et al., 1989). New mobile phones launched into the market come with some level of complexity in functions and use, but among students with their drive for knowledge and adventure, they are eager to acquire such phones in order to study their functions so as to be regarded as more technology compliant. Therefore, complexity of mobile phones does not stop students from adopting the technology because they regard new phones with advanced functions as things that will make life not difficult for them. Consequently, an invalid hypothesis was formulated that:

Ho3: Ease of use has no significant relationship with adoption of new mobile phones among students in Ekiti State University, Ado-Ekiti, Nigeria

Trialability

Trialability is rate at which an innovation may be put to the test on a limited basis. Novel ideas which can be tried out on a partial basis are more speedily embraced than innovations that are not (Rogers, 1995; Tan & Teo, 2000; Khraim et al., 2011; Carter & Belanger, 2003; Cheah et al., 2011, Nwagwu & Odetumibi, 2012). Gatignon and Robertson (1985) claimed that repetitive buying of different consumer products is essentially a trial process and is the key to adoption of an idea in marketing discipline. In essence, customers have faith in a new technology when they have the opportunity to test its functions (Khraim et al., 2011). Rogers (1995) argued that when potential adopters have the chance to assess an innovation before being committed to its usage, then, they are more favourably disposed to adopting it (Agarwal & Prasad, 1997; Tan & Teo, 2000). In the new product adoption process, this is represented by the trial stage, when the potential adopter tries the novel technology on a small scale and he is satisfied that he can proceed to purchase the product. In the case of mobile phones, students often see mobile phones of their friends, classmates, and roommates, and have the opportunity of testing and operating the functions and when they are impressed with the features, they could be motivated to proceed and adopt the phone. Therefore, this warranted the formulation of the hypothesis that:

Ho4: Trialability has no significant relationship with acceptance of novel mobile phones among students in Ekiti State University, Ado-Ekiti, Nigeria

Observability

Observability simply refers to the extent to which the aftermaths of an innovation are evident to others (Rogers, 1995). Moore and Benbasat (1991) argued that the observability construct can be looked at from the angles of result demonstrability and visibility; that is, the rate at which the outcome and advantage of using an innovation can be validated by early adopters; and the innovation can be seen with the adopters. The features of an innovation can enhance the degree of its adoption as it is positively correlated. The use of mobile phones among students of higher institutions can be observed anywhere they go – the classroom, restaurant, bus, hostel, etc. Students with the latest models of phone brands seem to flaunt them consciously or unconsciously. They can be walking along the road and 'pinging' or chatting with others with Android and Wireless Access Protocol (WAP) enabled phones. Therefore, it was hypothesized that:

Ho5: Outcome demonstrability has no significant relationship with adoption of new mobile phones among students in Ekiti State University, Ado-Ekiti, Nigeria

Ho6: Visibility has no significant relationship with adoption of new mobile phones among students in Ekiti State University, Ado-Ekiti, Nigeria

Image

Image is the extent to which the use of an innovation is felt to promote the image or status of its users (Moore & Benbasat, 1991; Khraim et al., 2011; Carter & Belanger, 2003; Cheah et al., 2011). In their attempt to measure supposed features of innovations, Moore and Benbasat (1991) discovered that image is a vital feature. Tornatzky and Klein (1982) submitted that image (social approval) is different from relative advantage. Image is closely related to new mobile phone adoption as students want to show that they are fashionable and up-to-date with modern trends. Consequently, it was hypothesized that:

Ho7:   Image has no significant relationship with adoption of novel mobile phones among students in Ekiti State University, Ado-Ekiti, Nigeria

Rogers' Theory of Adoption

The adoption process refers to the mental activity through which an individual passes right from the initial time of hearing about an innovation to its final adoption (Rogers, 1983, 1995; Klonglan, et al., 1966; Couros & Kesten, 2003). In the words of Rogers (1983) adoption of technology is seen as "a choice to utilize a creative idea as the best course of action available". Wilkening and Santopolo as cited in Klonglan and Coward (1970) used the term acceptance as referring to both endorsement and acceptance of technology. Buttel, Larson and Grillispie (1990) claimed that the adoption of a new idea or practice fully by an individual is a function of a complex pattern of mental process which combined with certain actions.

Rogers (1962) observed that extension workers are aware that people embrace a new idea immediately it is made available to them. Rogers (1962) commented that, the notion of the existence of stages in the adoption activity is predicated upon psychological learning theory, social psychology, and empirical research by rural sociologists. Accordingly, various paradigms and concepts have been formulated to explain the process which human mind undergoes "the mental process". The traditional paradigm of adoption as proposed by Rogers (1962) and acknowledged today (Lancaster & Massingham, 2001; Etzel et al., 2007; Couros & Kesten, 2003, Klonglan et al., 1966; Pride et al., 1997; Williams, 1982; Kotler, 1971; Wright & Bennett, 2006) are as follows: (i) Awareness Stage: The individual has the advantage of being exposed to the innovation but without full information on it; (ii) Interest Stage: The individual becomes interested in a new idea and makes more enquiry on it; (iii) Evaluation Stage: The individual mentally weighs the usefulness of the creative idea viz-a-viz his present and anticipated future situation and then takes a decision on whether or not to try it; (iv) Trial Stage: The individual uses the innovation on a small scale to ascertain its utility in his own situation; (v) Adoption Stage: The person chooses to fully use the innovation continuously.

Theory of Planned Behaviour (TPB)

In the Theory of Planned Behaviour (Figure 1), a dynamic mix of the attitude, subjective norm and perceived behavioural control variables influence behavioural intention. Actual behaviour is derived largely from behavioural intention, but is intercepted to some extent by perceived behavioural control (Ajzen, 1991). Behavioural intention is predicted, in turn, by three main determinants: reaction to the behaviour, subjective norm, and perceived behavioural control. The level at which individuals view a certain behaviour positively (attitude), think that significant others want them to engage in the behaviour (subjective norm), and think that they are capable of performing the behaviour (perceived behavioural control), serve as direct determinants of the strength of their intention to carry out the behaviour (Lee et al., 2010). Attitude describes a person's perception towards an innovation (Tan & Teo, 2000). Attitude is defined as an individual's positive or negative feelings (evaluative affect) about performing a target behaviour (Fishbein & Ajzen, 1975; Tan & Teo, 2000). It is related to behavioural intention because people form intentions to perform behaviours toward which they have positive affect. The attitude-behavioural relationship is fundamental to Theory of Reasoned Action (TRA) (Bagozzi, 1981).

Taylor and Todd (1995), in Tan and Teo (2000) suggested that the different dimension of attitudinal belief toward an innovation can be measured using the five perceived attributes (relative advantage, compatibility, complexity, trialability and observability) of an innovation (Rogers, 1983).
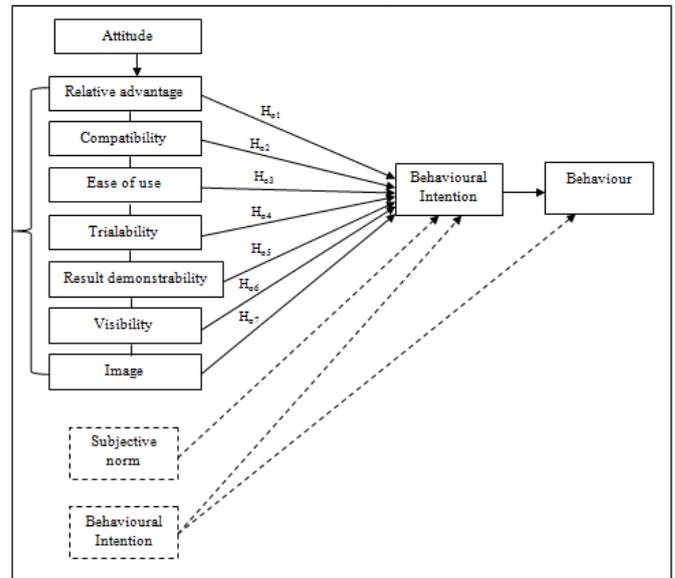

Figure 1. Framework for adoption of mobile phones adapted from the Theory of Planned Behaviour (Ajzen, 1991, Tan & Teo, 2000; Lee *et al*, 2010).

Empirical Review of Related Literature

Odumeru (2012) carried out a study on acceptance of e-banking by customers in Nigeria using the modified Technology Acceptance model (TAM) as research framework. A sum of 400 questionnaires was distributed to customers of different banks in Nigeria; out of which 249 were found useful. Using linear multiple regression analysis, the result showed that e-banking was significantly influenced by age, educational background, income, and perception of the these factors such as perceived benefits, usabilty, risk, and enjoyment.

Nwagwu and Odetumibi (2012) conducted a study on factors influencing adoption of mobile telephony by students at the University of Ibadan, Nigeria using the Rogers' innovation theory and characteristics of innovation such as relative advantage, compatibility, observability, complexity, and trialability. Using a sample of 370 undergraduate and postgraduate students, the study found that all the characteristics of innovation had significant relationship with adoption except observability ($p > 0.05$, $p = 0.422$).

Oladele (2011) undertook a qualitative evaluation of factors influencing consumers' choice of telephone handset among students in selected universities in southwestern Nigeria. Focus group discussion (FGD) was adopted as the data collection technique. Factors that were identified among the respondents were cultural, psychological, religious, social and personal. A total of six FGDs were conducted across six selected universities in southwestern Nigeria. Analysis of data was presented and done thematically using ZY index tables. The study revealed that social factors such as reference group, made up of family, friends and social class were dominant in influencing the respondents' choice of telephone handsets.

Jayasingh and Eze (2009) conducted an empirical analysis of consumer behavioural intention toward mobile coupons in Malaysia. The study used the extended technology acceptance model (TAM) as its research framework.

A total of 1,000 questionnaires were distributed to mobile phone users, but 781 were returned and used. The study confirmed that TAM could be applied to explain adoption of mobile technology. Constructs such as perceived usefulness, perceived usability, perceived credibility, compatibility, and social factors all influence behavioural intention of consumers in using mobile coupon.

Agarwal *et al.* (2007) investigated the factors affecting 3G adoption among young working professionals in Singapore. The authors described 3G (third generation) mobile telephone technology that allows high-speed transfer of both voice and data. The instrument was administered to 101 working professionals who could afford 3G services in Singapore. The variables measured included variety of service, convenience, price, service quality, value, behavioural intention, and IT self-efficacy. The study concluded that price, convenience and service quality were all essential to perceived value. The relationship between variety of service and perceived value is mediated by convenience. In addition, perceived value has a strong relationship with purchase intention.

Tan and Teo (2000) conducted a study on factors influencing the adoption of Internet Banking in Singapore. Based on the theory of planned behaviour (Ajzen, 1991) and diffusion of innovation theory (Rogers, 1983), the study aimed to identify and understand the attitudinal, social and behavioural control factors that were significant in explaining intentions to adopt internet banking services in Singapore. Since the study was about internet banking, an online questionnaire was designed and hosted on the server of the Faculty of Business Administration at the National University of Singapore. Out of a sum of 2,002 personalized e-mails sent out, only 454 sets of completed and valid questionnaires were used. The results of the study showed that all the hypotheses, with the exception of complexity, subjective norms, and technology support, had significant influence on adoption of internet banking.

Cheah *et al.* (2011) also investigated the factors that influence Malaysians' intention to adopt mobile banking. The study was hinged on the extended framework of the Technology Acceptance Model (TAM). A self-administered questionnaire consisting scales for different variables like perceived usefulness, perceived ease of use, relative advantage, perceived risk, personal innovativeness, including social norms were distributed to 400 respondents through the internet (online) and hard-copy. Out of the 400 questionnaires distributed, 175 were completed and returned. It was found that perceived usefulness, perceived usability, relative advantage, and personal innovativeness were positively related with the intention to adopt mobile banking services.

In another study, Khraim *et al.* (2011) evaluated consumer adoption of mobile banking service among Jordanian consumers. Using Tan and Teo's (2000) and Rogers' (2003) framework, six factors were identified to be tested to evaluate their influence on mobile banking among 301 Jordanian consumers. The findings showed that all the six factors have significant influence on adoption of mobile banking. Perceived risk (complexity) was tested and had a positive correlation with adoption of mobile banking. The reason for this may be that users may have been exposed to previous online services, which means that they were more aware of the existence of the potential risk.

Mokhlis and Yaakop (2012) examined consumer choice criteria in mobile phone selection among 376 Malaysian university students using principal components analysis resulted in seven independent dimensions; namely, innovative features, image, price, personal recommendation, durability and portable aspect, media influence, and post-sale service were identified. The study revealed that the top three most important factors influencing consumers' choice of mobile phones were innovative features, recommendation and price. Carter and Belanger (2003) analyzed the influence of perceived characteristics of innovating by Moore and Benbasat (1991) on e-Government adoption. According to the authors, e-Government is the use of information technology to enable and promote the efficiency with which government services and information are made available to citizens, employees, organizations and government agencies. The findings obtained from 140 undergraduate students based on perceived characteristics of innovating constructs -.relative advantage, image, and compatibility had positive correlation with use of government websites; but ease of use was not significantly associated with use intentions (adoption) of e-Government services. One criticism of this study is that the sample used could not be generalized for all citizens. In addition, other constructs can be correlated with use of e-Government services such as awareness, personal innovativeness and risk.

3. Methodology
Research Design

A descriptive survey design was adopted for this study. The questionnaire used had three (3) sections. Section A contained questions developed to obtain demographic information from the respondents. Items in section B contained Perceived Characteristics of Innovating scale adapted from Moore and Benbasat (1991). Section C contained Behavioural Intention scale adapted from Jarvenpaa, Tractinsky, and Saarinen (1999) to measure consumer adoption. Each item was rated on a Likert scale of 1 to 5 ranging from strongly disagree to strongly agree.

Population, sample and sampling techniques

This study's main sample comprised 389 full-time undergraduate students drawn from a population of 13,798 using Yamane (1967) in Israel (2009) model for sample size. Stratified random sampling technique was adopted to distribute the questionnaires across the faculties of Ekiti State University, Ado-Ekiti.

Method of data collection

Data were collected within 4 weeks. The administration of the questionnaire was done despite student's year of study or the gender.

Validation of instruments

The questionnaire used to measure the variables in this study were the perceived characteristics of innovating scale, and behavioural intention scale and being adapted instruments, they were subjected to validity test with English language experts to assess the appropriateness of language; as well as marketing and consumer behaviour experts to check for content analysis. For example, in Table 2, perceived characteristics of innovating scale (Moore & Benbasat, 1991) was originally used to measure perception of adoption of personal work station (PWS) in the workplace, hence the researchers had to change 'PWS' to 'new mobile phone' and 'in my organization' was changed to 'in my campus'.

Reliability of instruments

Cronbach's alpha coefficient was computed for each variable to test for reliability. Table 1 shows the Cronbach's alpha for the constructs in the research framework. As th

Cronbach's alpha range from 0.690 to 0.790, the constructs were deemed to have adequate reliability for the study.

Table 1. Reliability co-efficient of adapted instruments.

Variable	Measurement	No. of item	Cronbach's alpha
Perceived characteristics of Innovation	Relative advantage	4	.749
	Compatibility	2	.739
	Ease of use	3	.715
	Trialability	1	.690
	Result demonstrability	4	.703
	Visibility	1	.690
	Image	3	.707
Adoption	Behavioural Intention scale	3	.790

4. Results and Discussion

Demographic distribution of respondents

From the 389 respondents sampled in this study, 380 returned the questionnaire (Table 3). The distribution of the respondents by sex across the faculties showed that male and female respondents were 207 and 173 respectively. Age distribution of the respondents showed that a sizeable number of respondents were in the age group of 21-23 years with 169 participants; 17 respondents were under 18 years; 104 of them were between 18-20 years; 79 respondents were between 24-26 years; and 11 respondents were 26 years and above. This implies that the respondents were relatively young and dependent on their parents or benefactors regarding the purchase of mobile phones for them. Year of study across the faculties revealed that 81 respondents were from 100 level; 100 of them were from 200 level; 79 respondents were from 300 level; 103 respondents were from 400 level and 17 respondents from 500 level were from the Faculties of Engineering and Agricultural Sciences. Most of the respondents live in settlements near the university, namely *Osekita* (91), Satellite (93), *Iworoko* (92), School gate (35); those that live in places far away from school, i.e. Ado town (57), and other places (12). The implication is that students are liable to be influenced by what others are doing; and awareness of mobile phone amongst their peers could also influence them.

Table 3. Demographic distribution of respondents.

Variable	Option	Frequency	Percent
Sex	Male	207	54.5
	Female	173	45.5
Age group	under 18	17	4.5
	18-20	104	27.4
	21-23	169	44.5
	24-26	79	20.8
	26 and above	11	2.8
Variable	**Option**	**Frequency**	**Percent**
Sex	Male	207	54.5
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Age group	under 18	17	4.5
	18-20	104	27.4
	21-23	169	44.5
	24-26	79	20.8
	26 and above	11	2.8
Faculty	Agricultural sciences	16	4.2
	Arts	60	15.8
	Education	95	25.0
	Engineering	16	4.2
	Law	4	1.0
	Management sciences	57	15.0
	Medicine and surgery	3	0.8
	Sciences	77	20.3
	The social sciences	52	13.7
Year of study	100	81	21.3
	200	100	26.3
	300	79	20.8
	400	103	27.1
	500	17	4.5
Residence	Osekita	91	23.9
	Satellite	93	24.5
	Town	57	15.0
	Iworoko	92	24.2
	school gate	35	9.2
	Others	12	3.2

Source: Field survey, 2014

Relationship between perceived characteristics and adoption of mobile phones

The correlation of two variables; that is, consumer perception of innovation and behavioural intention (adoption) were analyzed. Consumer perception of innovation had seven sub-constructs namely, relative advantage, compatibility, image, ease of use, result demonstrability, visibility and trialability. Data were analyzed using Pearson Product moment correlation.

Table 2. Measurement items of research instruments.

Measurement		Item
Perceived characteristics of innovating	Relative advantage	New mobile phone improves life for me generally
		New mobile phone makes life easier for me
		New mobile phone makes it easier for me to cope with my academics
		New mobile phone enhances my personal effectiveness
	Compatibility	Mobile phones are compatible with my lifestyle
		Using new mobile phones suit the way I like to live
	Ease of use	It is easy to use new mobile phones to do what I want to do
		Overall, I believe that these new mobile phones are easy for me
		Learning to operate these new mobile phones is easy for me
	Trialability	Before deciding to use a new mobile phone, I tried it first properly
	Result demonstrability	I would have no difficulty sharing about the benefits of using new mobile phones
		I believe I could tell others the pros and cons of using new mobile phones
		The benefits of using new mobile phones are clear to me
		I cannot explain why using new mobile phones may or may not be beneficial
	Visibility	In my campus other students see me with a new mobile phone
	Image	Students in my campus who use new mobile phones have more respect
		Students in my campus who use new mobile phones are of high profile
		Having these new mobile phones is a status symbol in my campus
Behavioural Intention scale	Adoption	I would purchase a new mobile phone
		I would use a new mobile phone in the near future
		If I need to buy a new mobile phone, it will be a new model

The results presented in Table 4 show that there is a significant positive relationship between relative advantage and behavioural intention (r = *0.859, p<0.05*). Obtaining a probability of 0.000 which is less than 0.05 significance level for a two-tailed test; the relationship between relative advantage and adoption of new mobile phones is significant. Therefore, we reject the null hypothesis and accept the alternative hypothesis.

Table 4. Correlation between Relative Advantage and Adoption of New Mobile Phones among Students of Ekiti State University.

		Behavioral Intention	Relative advantage
Behavioural Intention	Pearson Correlation	1	.859**
	Sig. (2-tailed)		.000
	N	380	380
Relative advantage	Pearson Correlation	.859**	1
	Sig. (2-tailed)	.000	
	N	380	760

**. Correlation is significant at the 0.05 level (2-tailed).

Table 5 shows that there is a significant positive relationship between compatibility and behavioural intention (*r = 0.745, p<0.05*). Obtaining a probability of 0.004 which is less than 0.05 significance level for a two-tailed test; the relationship between compatibility and adoption of new mobile phones is considered significant. Therefore, we reject the null hypothesis and accept the alternative hypothesis.

Table 5. Correlation between Compatibility and Adoption of New Mobile Phones among Students of Ekiti State University.

		Behavioral Intention	Compatibility
Behavioural Intention	Pearson Correlation	1	.745**
	Sig. (2-tailed)		.004
	N	380	380
Compatibility	Pearson Correlation	.105**	1
	Sig. (2-tailed)	.004	
	N	380	760

**. Correlation is significant at the 0.05 level (2-tailed).

Table 6 indicates that there is a significant positive relationship between ease of use and behavioural intention (*r = 0.718, p<0.05*). A probability of 0.000 which is less than 0.05 significance level for a two-tailed test was obtained regarding the relationship between Ease of use and adoption of new mobile phones. Therefore, we reject the null hypothesis and accept the alternative hypothesis.

Table 6. Correlation between Ease of Use and Adoption of New Mobile Phones among Students of Ekiti State University.

		Behavioral Intention	Ease of use
Behavioural Intention	Pearson Correlation	1	.718**
	Sig. (2-tailed)		.000
	N	380	380
Ease of use	Pearson Correlation	.718**	1
	Sig. (2-tailed)	.000	
	N	380	760

**. Correlation is significant at the 0.05 level (2-tailed).

As presented in Table 7, the results show that there is a significant positive relationship between trialability and behavioural intention (r = *0.594, p<0.05*). Therefore, obtaining a probability of 0.005 which is less than 0.05 significance level for a two-tailed test, the relationship between trialability and adoption of new mobile phones is significant. Consequently, we reject the null hypothesis and accept the alternative hypothesis.

Table 7. Correlation between Trialability and Adoption of New Mobile Phones among Students of Ekiti State University.

		Behavioural Intention	Trialability
Behavioural Intention	Pearson Correlation	1	.594**
	Sig. (2-tailed)		.005
	N	380	380
Triability	Pearson Correlation	.594**	1
	Sig. (2-tailed)	.005	
	N	380	760

**. Correlation is significant at the 0.05 level (2-tailed).

Presented in Table 8 are the results which show that there is a significant positive relationship between result demonstrability and behavioural intention (r = *0.834, p<0.05*). A probability of 0.000 obtained which is less than 0.05 significance level for a two-tailed test, indicates a significant relationship between result demonstrability and adoption of new mobile phones. Therefore, we reject the null hypothesis in favour of the alternative hypothesis.

Table 8. Correlation between result demonstrability and Adoption of New Mobile Phones among Students of Ekiti State University.

		Behavioural Intention	Result Demonstrability
Behavioural Intention	Pearson Correlation	1	.834**
	Sig. (2-tailed)		.000
	N	380	380
Result Demonsrability	Pearson Correlation	.834**	1
	Sig. (2-tailed)	.000	
	N	380	760

**. Correlation is significant at the 0.05 level (2-tailed).

Table 9 shows that there is a significant positive relationship between visibility and behavioural intention (*r = 0.673, p<0.05*). Obtaining a probability of 0.005, which is less than 0.05 significance level for a two-tailed test; the relationship between result demonstrability and adoption of new mobile phones is significant. Therefore, we reject the null hypothesis and accept the alternative hypothesis.

Table 9. Correlation between Visibility and Adoption of New Mobile Phones among Students of Ekiti State University.

		Behavioural Intention	Visibility
Behavioural Intention	Pearson Correlation	1	.673**
	Sig. (2-tailed)		.005
	N	380	380
Visibility	Pearson Correlation	.673**	1
	Sig. (2-tailed)	.005	
	N	380	760

**. Correlation is significant at the 0.05 level (2-tailed).
Source: Output of Data Analysis (2014)

Presented in Table 10 are the results which show that there is a significant positive relationship between image and behavioural intention (*r = 0.482, p<0.05*). Obtaining a probability of 0.006 which is less than 0.05 significance level for a two-tailed test, the relationship between image and adoption of new mobile phones is significant. Therefore, we reject the null hypothesis and accept the alternative hypothesis.

Table 10.Correlation between Image and Adoption of New Mobile Phones among Students of Ekiti State University.

		Behavioral Intention	Image
Behavioural Intention	Pearson Correlation	1	.482[**]
	Sig. (2-tailed)		.006
	N	380	380
Image	Pearson Correlation	.482[**]	1
	Sig. (2-tailed)	.006	
	N	380	760

[**]. Correlation is significant at the 0.05 level (2-tailed).

Table 11 presents a summary of the hypotheses testing. The table revealed that all the null hypotheses were rejected in view of the significant relationship between the independent variable and adoption of new mobile phones introduced into the market. The results from the test of hypotheses showed that constructs such as relative advantage, ease of use, and result demonstrability, had strong significant relationships with adoption in that $p < 0.05$ at 0.000; compatibility construct had significant relationship with adoption ($p < 0.05$ at 0.004); visibility and trialability constructs were significantly related with adoption ($p < 0.05$ at 0.005); while, image had the least significant relationship strength with 0.006 probability level. The result of image variable is quite noteworthy. The students were asked three questions "students in my campus who use new mobile phones have more respect"; "students in my campus who use new mobile phones are of high profile"; and "having these new mobile phone is a status symbol in my campus". The respondents did not feel that mobile phones gave any user any prestige or more respect. Trialability had weak correlations; this may not be unconnected to the fact that mobile phones do not come in smaller versions for test or trial before a consumer buys. Trial may be achieved with friends or peers, but not with the marketer.

Table 11.Summary of test of hypotheses.

Hypothesis	Independent variable	Dependent variable	p < 0.05	Decision
H_{o1}	Relative advantage	Adoption (Behavioural intention)	0.000	Reject H_o
H_{o2}	Compatibility	Adoption (Behavioural intention)	0.004	Reject H_o
H_{o3}	Ease of use	Adoption (Behavioural intention)	0.000	Reject H_o
H_{o4}	Trialability	Adoption (Behavioural intention)	0.005	Reject H_o
H_{o5}	Result demonstrability	Adoption (Behavioural intention)	0.000	Reject H_o
H_{o6}	Visibility	Adoption (Behavioural intention)	0.005	Reject H_o
H_{o7}	Image	Adoption (Behavioural intention)	0.006	Reject H_o

Source: Field survey by researcher, 2014

The result of the study is similar to that reported by Limthongchai and Speece (nd) which reported positive relationship between relative advantage, compatibility, security, trialability and observability with adoption of e-commerce was found; but which reported an inverse relationship between complexity and adoption of e-commerce. Rao and Troshani's (2007) study showed that user disposition, perceived usefulness, perceived ease of use and social influence all had significant influence on adoption of mobile

services in Australia. In a study on the acceptance of e-banking by customers in Nigeria, Odumeru (2012) reported positive relationship between perceived benefits, ease of use, risk and enjoyment (independent variables) with acceptance of e-banking. Khraim *et al.* (2011) in their study reported that the independent variables, self-efficacy, trailability, compatibility, complexity, risk, and relative advantage all had direct positive effect on consumer adoption of mobile banking in Jordan. Tan and Teo (2000) tested and found relative advantage, compatibility, banking needs, trialability, and risk significantly related to adoption of internet banking in Singapore; but complexity had an inverse relationship with adoption in that it was not significantly relevant. Mokhlis and Yaakop's (2012) study on consumer choice criteria in mobile phone selection among Malaysian university students revealed that among seven independent dimensions namely, innovative features, image, price, personal recommendation, durability and portable aspect, media influence, and post-sale service; the top three most important factors influencing consumers' choice of mobile phones were innovative features, recommendation and price.

5. Conclusion

This study examined the relationship between perceived characteristics of innovating and adoption of new mobile phones among students in Ekiti State University, Ado-Ekiti, Nigeria. The introduction of the GSM in Nigeria in 2001 brought about a revolution in the telecommunications industry. Over the years, the communication device known as mobile phone has also witnessed innovations in size, functions, complexity; weight, value, and image. Based on the results of the test of hypotheses, the study found a significant relationship between perception of mobile phones as innovative and adoption of new mobile phones among students in Ekiti State University. The seven constructs of the perceived characteristics of innovating (Rogers, 1983, 1995; Moore and Benbasat, 1991) namely relative advantage, ease of use, result demonstrability, compatibility, visibility, trialability, and image all had positive significant relationships with adoption. Rogers (1983, 1995) theory and model of adoption also identified characteristics of innovation that facilitate adoption. The characteristics with the strongest relationship with adoption were relative advantage, ease of use and result demonstrability *($p < 0.05$, $p = 0.000$);* whereas the characteristic with the vulnerable connection with adoption was image *($p < 0.05$, $p = 0.006$).* Interestingly, image as a factor had the vulnerable connection with adoption though it was also significant in its relationship with adoption. The respondents of this study attached little importance to the prestige of owning a new mobile phone.

6. Recommendations and Implications for research and practice

Consequent on the findings of this study, the researchers suggest the following recommendations that could promote the sales of mobile phones and related products:

(i) Both manufacturers and marketers should be discreet in recognizing the various individual characteristics of consumers with differing rate of previous experience, perceptions and learning inconveniencies as these are determining factors for adoption and use of mobile phone technology.

(ii) The awareness level of mobile phones in Nigeria is very high as the number of mobile phone users has grown exponentially since its introduction in Nigeria in 2001. But the awareness of the functionality of new and sophisticated

mobile phones needs to be raised by the dealers if they choose to attract more consumers. This is because individuals have the tendency to use their existing phones as they are used to the functions, rather than buy new ones.

(iii) The significant relationship between characteristics of innovation such as relative advantage, compatibility, ease of use, image, result demonstrability, visibility, and trialability and adoption of these new phones among students means that marketers of mobile phones should design phones that will match students' lifestyle. That is, mobile phones that can help students achieve their academic pursuit with ease such as having scientific calculators; functions that help them browse, and carry out assignments. Also, dealers should consider increasing the trial use of the mobile phones to increase the level of adoption.

7. Suggestions for further study

This study was limited to students in Ado-Ekiti, Nigeria. The study could be carried out in other cities of the country to verify the findings. Secondly, other variables that influence adoption could be studied such as culture, perceived risk, attitude, economic profitability, and satisfaction in addition to financial capacity of the consumers. For all these variables, demographic data of respondents could be regressed to verify its effects on the dependent variable.

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