© *Media Watch* 8 (2) 208-221, 2017
ISSN 0976-0911 e-ISSN 2249-8818
DOI: 10.15655/mw/2017/v8i2/49010

University Students' Intention of Smartphone Adoption for Academic Activities: Testing an Extended TAM Model

ISMAIL SHEIKH YUSUF AHMED[1], MUKTHAR EL-KASIM[2] & LAMBE KAYODE MUSTAPHA[3]
[1]Qatar University, Qatar
[2]Hassan Usman Katsina Polytechnic, Katsina, Nigeria
[3]University of Ilorin, Nigeria

New technology has been credited with the ability to extend human senses. However, adaptation and use of technology has been reported to be intricately mediated by usefulness and ease of use of technology among other contingencies. While Technology Acceptance Model (TAM) has provided the theoretical basis for adaptation and use of technology in a plethora of contexts, little, if any, study has examined the use of ubiquitous smart technological apparatus for academic purpose among the greatest adopters of the technology, university students. The current study examines students' intention of smartphone adoption from the TAM perspective. Data has been collected from students in two public universities in Malaysia and Nigeria. IBM-SPSS version 20.0 and Structural Equation Modeling (SEM) approach with AMOS were used to analyze and test the hypothesized theoretical model. The results suggested that attitude, social influence and perceived usefulness were positively correlated with the respondents' intention towards using smartphones for educational purposes. Moreover, students' attitudes towards adoption of smartphones were directly predicted by perceived usefulness and directly self-efficacy, which in turn, had direct impact on students' perceptions of easiness and usefulness. Findings made a considerable contribution to the heuristic value of TAM and facilitated the maximization of smart technologies for educational purposes.

Keywords: Smartphone, attitude, university students, TAM model, intention

Since their appearance on the contemporary media landscape, smart technologies have facilitated 'smart' engagements among the people in virtually every clime. From smart marketing, to smart banking, smart studying and smart holidaying, the utility of smart technologies, particularly smartphones, are becoming unrivalled, in their abilities to facilitate multi-dimensional information and communication functions. Predominantly embraced by the youths who, because of their 'digitalised' lifestyles, have been dubbed digital citizens, smartphone offers functions that meet ritualized and instrumental needs of the users (Joo & Sang, 2013; Kang, Lee, & Lee, 2014). Being miniaturized, compact, portable, dependable, and, above all, user-friendly, smartphones have become an indispensable communication and information apparatuses that are part and parcel of people's daily luggage (Kim, Kim & Watcher, 2013; Lee, Chang, Lin & Cheng, 2014; Park, Kim, Shon & Shim, 2013).

Correspondence to: Ismail Sheikh Yusuf Ahmed, Department of Mass Communication, Qatar University, Qatar University - Women's College of Sciences Building, P.O. Box 2713, Doha-Qatar.
E-mail: iahmed@qu.edu.qa

The multi-functional nature of smartphones, leading to its usage for interpersonal communication, mass mediated communication and information management functions has been changing the ways by which global citizens are managing their daily activities. Park et al. (2013), for example, surmise that smartphones change people's mode of communication, information search, fun and pleasurable engagement and management of everyday lives. Capturing the essence of smartphones in today's life, Marc Andreessen, the founder of Netscape, submits, "the smartphone revolution is under-hyped, more people have access to phones than access to running water. We have never had anything like this before since the beginning of the planet.'' (Lee et al., 2014). Because of its pervasiveness, therefore, scholars have devoted enormous attention to the phenomenon of smartphone from a variety of prisms.

Chiefly among the most explored areas of smartphone as a technological-cum-communicative apparatus is the contexts of adoption and use of the novel technology. Predominantly, studies have examined the microscopic (individual) and macroscopic (societal) factors influencing smartphone use within Technological Acceptance Model framework (Kang et al., 2014; Mekic & Özlen, 2014; Park et al., 2013; Shin, Shin, Choo, & Beom, 2011). Most of these studies document how intrinsic motivations and extrinsic perceptions of smartphone contribute significantly to the use of the device for habitual and instrumental purpose of the devices, particularly among the youths.

Being technologically-savvy and innovation embracers, the youths have been identified as critical patrons of smartphone. While Netsize Guide (2008) and ITU (2009) affirmed that almost 4 billion people representing 61 per cent of world population subscribe to mobile telephony (cited in Verkasalo, López-Nicolás, Molina-Castillo, & Bouwman, 2010), the youths have been found to be the major segment of smartphone users (Lee, 2014). The context of youths' adoption and usage of smartphone has, therefore, received attention of researchers. Salehan and Negahban (2013), for instance, document multi-purpose usage of smartphone among the youth. These scholars hold that the youth explores the smartphone's communicative robustness to meet such needs as communication, information search, and studying, fun-seeking and social networking behaviours.

Despite the pedagogical utility of smartphone, however, limited studies have examined application of smartphone for educational sectors (Shin et al., 2011). Giving the potential of smartphone to aid pedagogical activities such as professor-student interaction, research collaboration, on-the-go information search and such technologically-assisted learnings (mobile learning, ubiquitous learning and electronic learning), universities across the world are integrating smartphone devices as inevitable learning tools for higher education students (Lee, 2014; Shin et al., 2011; Yu, 2012). In view of findings supporting the role of self-efficacy (Huffman, Whetten, & Huffman, 2013; Park & Chen, 2007; Shin et al., 2011) and subjective norms (social influence) (Lee, 2014; Lee et al., 2014; Park et al., 2013) on adoption and use of technology and increasing centrality of smartphone to learning among higher education students (Lee, 2014; Shin et al., 2011), this study examines the utilities of smartphones for pedagogical utility from extended TAM framework.

Literature Review

Technology Acceptance Model (TAM)

The TAM perspective has become a prominent theoretical framework employed by scholars and researchers examining acceptance of certain information system by a potential user in the recent times. This framework posited that user's intention to use an information system could be accounted for by three determinants namely: attitude (ATT), perceived ease of use (PEU), and perceived usefulness (PU), towards using a particular Information

Systems (IS, Davis, 1986). TAM has also posited that the users' attitude towards a certain information system is a key predictor of his/her willingness to reject or accept the system. Consequently, user's attitude is, in turn, determined by two major beliefs: PEU and PU.

The PU variable is conceptual defined as the extent to which a user believed that using a certain information system would enhance his job performance, while PEU is seen as the extent to which a user believed that using a certain information system would ease his both mental and physical sufferings (Davis, 1989). PU is considered as the primary determinant of user's attitude towards intention, while PEU served as secondary determinant. The ATT is seen as "affective or valenced response towards performing some behaviour and not towards some generalized attitude object" (Fishbein & Ajzen, 1975).

The association between PU and intention to use is derived from the notion that peoples' intention toward use was as a result of their willingness to make their work more effective and efficient, beyond the negative or positive feelings that may associate with their own use (attitude). The purpose is that people will eventually use new technology if they perceived that its utilization would help in achieving their targeted goals. (Muñoz, 2008).

Numerous studies established the utility of TAM in explaining technology acceptance among different groups and settings, particularly within educational environment. For example, Shroff, Daneen, and Eugenia (2011) employed the TAM framework in relations to students' intention to use an e-portfolio system. The findings of their study revealed that students' perceptions on the ease of use had significantly impacted on their attitude towards using an e-portfolio. Hence, their study found PEU to be the strongest impact on PU. The Szajna's (1994) study found that the PU and PEU items indicated a practically acceptable predictive validity. The PEU items were reported to be reliable and valid for "(i) intentions to use, (ii) self-report usage, (iii) self-predicted usage, (iv) attitudes toward use, and (v) choice".

Moreover, Park (2009) studied the TAM in explaining the behavioural intention of university students to use e-learning. Data were collected from 628 university students and analyzed with LISREL programme to explain the students' adoption of e-learning process. Five e-learning predictors were examined in the study: subjective norms (SN), system accessibility (SA), self-efficacy (SE), PU and PEU. The study found self-efficacy to have greater influence on the students' intention to accept e-learning among the entire variables under examination. Hence, the study concludes that Technology Acceptance Model was a good theoretical lens of examining students' acceptance of e-learning.

The extension accommodation of TAM has made the theory more robust in the current new technology environment. Many studies adopted and extended TAM with different concepts and variables with a view to investigate or explain user acceptance from different fields and professions such as Education (Kripanot 2006; Park, 2009; Shroff et al., 2011), organizational studies (Al-Haderi, 2013; Zagar, Jaridnia & Shahhosseini, 2011), Banking and marketing (Dahlberg, Mallat, Ondrus, & Zmijewska, 2008; Ma'ruf, Muhamad & Ramayah, 2005; Ramayah & Ignatius, 2010) and Internet studies (Porter & Donthu, 2007; Suki, 2011). Social media literature also indicated numerous studies that investigated social media milieu utilized TAM as theoretical framework (Nasri, 2011; Nasri & Charfeddine, 2012; Shen, Laffey, Lin, & Huang, 2006; Suksa-ngiam & Haiyasoonthorn, 2011).

Subjective Norms

Subjective norms are often referred to as social influence (SI) in literature. The construct emanates from Theory of Reasoned Action (TRA), which explained antecedents to human behaviour. The TRA states that the best determinant of volitional behaviour is one's

behavioural intention. Behavioural intentions are believed to be the effect of both an individual influence and social pressure. The individual influence on intention is a person's attitude towards performing the behaviour. The normative influence on intention is one's subjective norm (Fishbein & Ajzen, 1975). Subjective norms were seen as "the perceived expectations of specific referent individual or groups, and by the person's motivation to comply with those expectations" (Fishbein & Ajzen, 1975, p. 302).

The TRA explained that person's intention to make certain behaviour is measured by their attitude towards that behaviour and the social pressure on them to perform that behaviour i.e 'subjective norms'. The influence of both attitude and subjective norms towards performing certain behaviour may differ according the person involved and behavioural context. A person determines his attitude towards a behaviour based on the behavioural outcomes and assessment of the consequences of the outcomes. The SN variable is defined as how 'other' people around the performer of behaviour are expecting them to behave and the performer's motivation to compliance to expectations these 'others' (Ajzen & Fishbein, 1980).

Many studies established the applicability of subjective norms in explaining why an individual perform certain behavior (Ajzen, 1991; Ajzen & Fishbein, 1980; Trafimow, Sheeran, Conner, & Finlay, 2002). Moreover, numerous researches that investigate peoples' online behaviour applied social influence construct as one of the major determinant of performing certain behaviour. The findings of such studies proved social influence to be a predictor to one's behaviour (Alam & Sayuti, 2012; Baker & White, 2010; George, 2004; Luarn & Lin, 2005; Stone, Jawaher, & Kisamore, 2010)

Self-Efficacy

Self-efficacy (SE) was viewed as the judgment of how effective can someone implement certain actions that are required to deal with a particular situation (Bandura, 1982). Davis's Technology Acceptance Model equates SE with PEU. The central thesis of SE as theorized by Bandura was a person's confidence and belief of executing assigned role successfully thereby achieving a target goal.

From the Technology Acceptance Model perspective, the study of Venkatesh (2000) has proven that self-efficacy was one of the antecedents to perceived ease of use construct. Moreover, many studies established that SE was a predictor of PEU (Atif & Richards, 2012; Lule, Omwansa, & Waema, 2012; Park, 2009).

Building on the above literature, this study proposes a model, which assesses smartphones adoption among university students for academic activities.

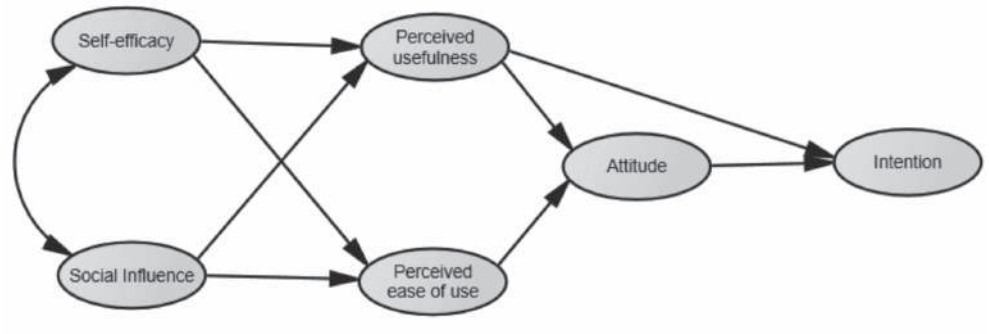

Figure 1. Hypothesized conceptual model for smartphone educational usage

Hypotheses

H_1: PU would have positive impact on students' attitudes towards using smartphones for educational purposes.
H_2: PEU would have positive impact on students' attitudes towards using smartphones for educational purposes.
H_3: PEU would have positive impact on PU.
H_4: PU would have positive impact on students' intention to adopt smartphone for educational purposes.
H_5: SN would have positive impact on PEU.
H_6: SN would have positive impact on PU.
H_7: SE would have positive impact on PEU.
H_8: SE would have positive impact on PU.
H_9: ATT towards smartphone use would have positive impact on students' intention to adopt smartphone for educational purposes.
H_{10}: PEU would be indirectly correlated with attitude through PU.
H_{11}: PEU would indirectly correlated with intention through PU.
H_{12}: PU would indirectly correlated intention through attitude.
H_{13}: PEU would indirectly correlated with intention through attitude

Methodology

Research Design and Sampling

This study used quantitative research design with questionnaire as data collection method. The data were collected using self-administered questionnaire from undergraduate students in two public universities in Malaysia and Nigeria. This study employed purposive sampling where the undergraduate students represented the population of the study. A total of 481 students had responded to the current study.

Instruments

This study used survey with structured questionnaire. It consisted of two main sections. The first section captures the background of the students such as gender, age, level of study, study year, smartphone ownership, and brands of the smartphones they use. The second section provides the students' responses regarding the main constructs of the study such as PEU, PU, SE, SN, ATT and intention of smartphone use for educational purposes.

The measures of the above constructs were adapted from previous studies on the smartphone use and technology acceptance literatures (Ajzen, 1991; Davis, Bagozzi, & Warshaw, 1989; Joo &Sang, 2013; Lee, 2014; Park & Chen, 2007). Each of the constructs were measured with five items. A five-point scale was used to rate the items of the study constructs.

Participants

Demographic characteristics are shown in Table 1. The descriptive statistics suggested a slightly more females (52%) than males (48%). There are also slightly more students from Malaysia (53) compared to Nigerian students (47%). As for year of study, close to one-third (30%) of the students were in their third year, followed by those who are in the second year

(27%). About a quarter of the students (25%) were studying at their first year. Few of the students (17.1%) were at the fourth level of study. With regard to age categories, slightly less than half of the respondents (46%) were aged at 23-27 years, and almost one-third of them were between 18-22 years (32%). Less than quarters (20%) were above 28 years. This reflects the age of the undergraduate who are normally less than 30 years.

Regarding the smartphone usage, all the respondents of this study were using at least one smartphone. Most popular brands for the study respondents include Samsung (33.5%), Lenovo (18%) and Nokia (15%). In terms of length of brand usage, Most of the students (66%) of the students were using the smartphones between 1-4 years. Few of them were using less than 6 months (14.3%) and more than 5 years (20%).

Techniques of Data Analysis

The collected data were entered into the SPSS program (version 20.0). A screening and data cleaning was conducted prior analyzing and interpreting the results. Frequencies, means, standard deviations were reported for the descriptive statistics capturing the demographic characteristics of the respondents. A reliability test was conducted using the alpha scores for determining internal consistency among items.

In order to test the hypothesized smartphone educational usage model, a SEM approach with AMOS program (Arbuckle, 2010) was conducted, using Maximum Likelihood Estimation (MLE). A two-step approach was employed, performing Confirmatory Factor Analysis (CFA) in the first step in order to determine the measurement model's psychometric properties as well conducting full-fledged model to test the hypothesized model.

Following the suggestions from the recent literatures (Hair, Black, Babin, & Anderson, 2010), several fit indices were used in this study namely normed chi Square (X^2), Tucker-Lewis Index (TLI), Root Mean Square Error Approximation (RMSEA) and Comparative Fit Index (CFI). A fitting and acceptable model is obtained when CFI and TLI are higher than .90 (Hair et al., 2010; Kline, 2011); normed chi square is less than 5 (Bagozzi & Yi, 1988) and RMSEA is less than .08 (Hu & Bentler, 1999).

Findings

Measurement Model

Confirmatory Factor Analysis (CFA) using Maximum Likelihood estimation (MLE) was conducted for the all constructs in this study. There were six constructs as presented in Figure 1 to test the suggested model for smartphone educational usage. The measurement model was assessed based on several fit statistics such as CFI, TLI, RMSEA, and normed chi square. Figure 2 shows the results of the measurement model.

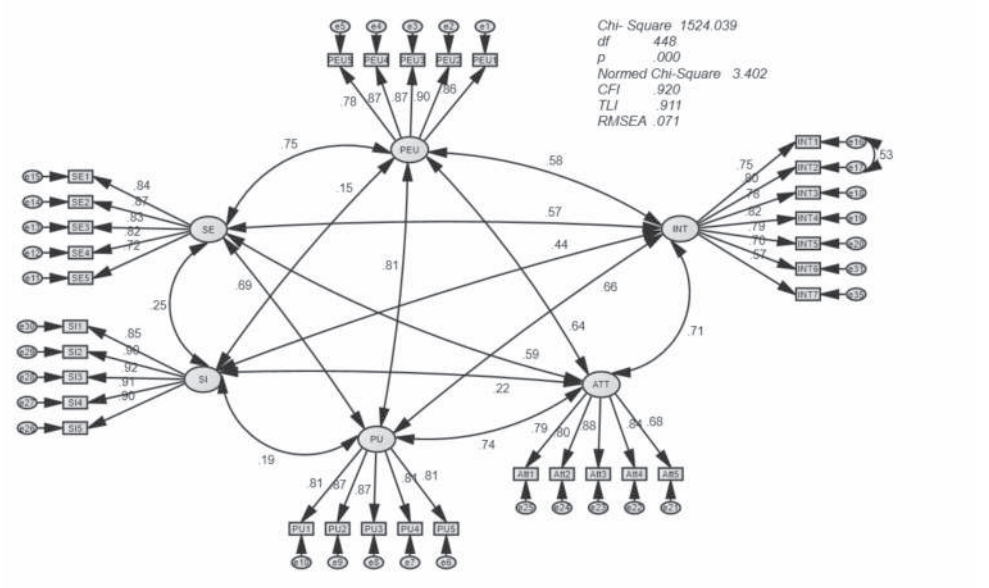

Figure 2. Measurement model for smartphone educational usage

As shown in Figure 2 above, all fit statistics surpassed the recommended thresholds, suggesting that the hypothesized model for smartphone educational purpose is well fitting to the empirical data. As chi-square is sensitive to sample size (Kline, 2010), it is not used as a fitting index in this study. Normed chi-square, instead, was used and it was less than recommended value of 5.0. In addition, the values of CFI and TLI were above 0.90 whereas RMSEA was also less than its recommended cut-points of 0.08.

After assessing the overall fit of the measurement model, construct reliability and validity were evaluated using composite reliability (CR), average variance extracted (AVE), maximum variance shared (MVS), and square root of average variance extracted.

With regard to construct reliability, two popular indicators were used: Cronbach's alpha coefficient (alpha) and composite reliability (CR). A construct is internally consistent when the Cronbach's alpha and CR scores are above .70. Therefore, all the scores for the CR, as shown in Table 2 in the appendix, rang from 0.898 to 0.955. As for the alpha coefficient scores were also higher than 0.88.

Two types of validity were addressed in this study, namely convergent validity and discriminant validity. Convergent validity was assed using average variance extracted and factor loadings. Following the suggestions of Hair et al. (2010) and Bagozzi and Yi (1988), the factor loadings should be significant and higher than 0.50 (acceptable) or 0.70 (preferable), while AVE should be greater than 0.50. As shown in Figure 2, all the factor loadings were higher than the recommended threshold and were also significant at 0.001 level. Moreover, the values of AVE for all constructs in Table 2 were all greater than the cut-score of 0.50. Therefore, convergent validity was adequately established. As for discriminant validity, three criteria were reported in the current study.

As suggested by Hair and colleagues (Hair et al., 2010), MSV and ASV should both be less than the AVE for each construct in order to show good discriminant validity. As well, root square of AVE should be greater than correlation between a given concept with all other concepts (Fornell & Larcker, 1981). As such, AVE values shown in Table 3 were greater

than the values of MSV and ASV while the bold diagonal, which represents square root of AVE, was greater than the relationship between any two variables. Therefore, a good discriminant validity was established, which means that the constructs are sufficiently different from each other.

Full-Fledged Model

The full-fledged smartphone educational usage model was tested using the same criteria for the fit indices discussed above. The initial hypothesized model did not sufficiently fit to the empirical data and was revised accordingly. Figure 3 shows the results of the full model.

The revised hypothesized model shown in Figure 3, produced a good fitting indices to the empirical data, with normed chi square=3.535; CFI=0.915; TLI=0.907, RMSEA=0.073. After obtaining an acceptable model fitting, the results of the path coefficients were interpreted. The results suggested that PU (β=0.63, t=10.27, p=0.000) had statistically significant impact on students' attitude towards smartphone usage for educational purposes. Thus, H_1 was fully supported. PEU (β=0.14, t=1.93, p=0.054) did not exert any significant impact on attitude, and therefore, H_2 was not supported. However, this construct (β=0.67, t=11.00, p=0.000) had significant impact on PU (H_3 was supported), which in turn, had significantly determined students' intention to use smartphones for educational purposes (β=0.26, t=4.54, p=0.000). This means that H_4 is fully supported.

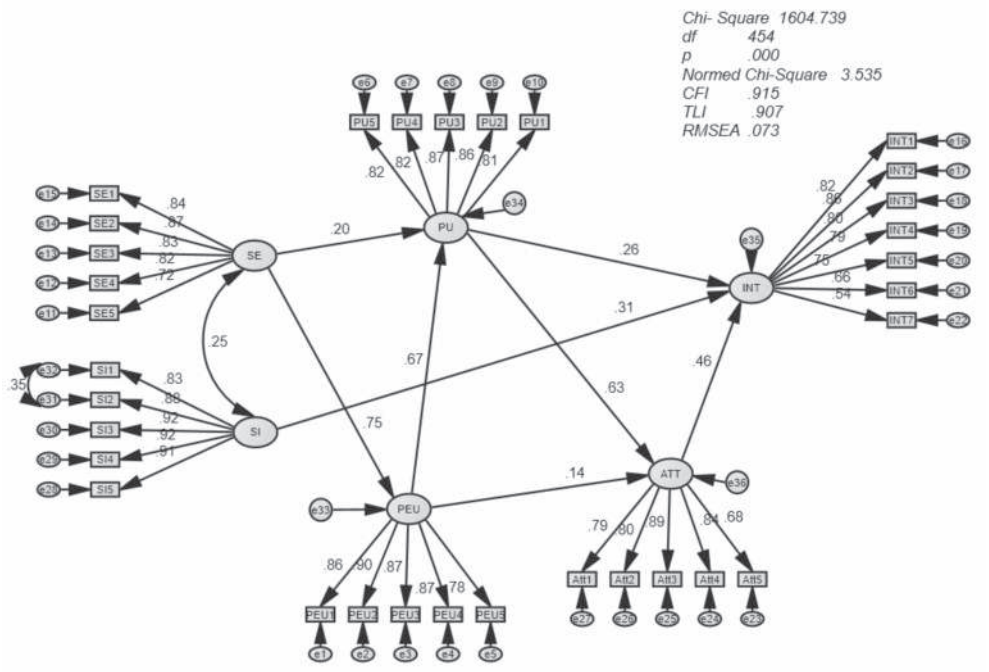

Figure 3: Hypothesized smartphone educational adoption model

There were no statistically significant impact of social influence on both PEU (β=-0.05, t=-1.46, p=0.145) and PU (β=0.05, t=1.64, p=0.101), which translates that the H_5 and H_6 were not supported by the data. This indicates that students' friends did not influence their decisions to adopt or reject smartphone for educational purposes. In contrast, the results suggested a statistically significant impact of self-efficacy on both PEU (β=0.75, t=13.63, p=0.000) and PU (β=0.20, t=3.72, p=0.000), which indicates a full support to H_7 and H_8 respectively. Regarding the H_9, the results offered full support to the hypothesis (β=0. 46, t=7.44).

To test the remaining hypotheses, a mediating test was conducted using bootstrapping procedure with 1,000 re-sampling (Cheung & Lau, 2008)to test the indirect effects of PEU, PU and attitude. The results suggested that the standardized indirect effects from PEU to attitude through PU is .418 with 95 per cent confidence interval between 0.295 and 0.569, which significant at 0.05.This indicates that PEU had significant indirect impact on attitude through PU. Thus, H_{10} was fully supported. In addition, the indirect effects from PEU on intention through PU (β=0.425, p=0.002) was significant with 95 per cent confidence intervals between 0.332 and 0.522. Hence, H_{11} was fully supported by the data. Moreover, the results also supported the mediating effect of PU on intention through attitude (β=0.288, p=0.001, with 95 per cent confidence interval between 0.184 and 0.417). This exerts a full support to H_{12}. Contrary to this, the mediating effect of PEU on intention through attitude was not supported since the direct effect was not significant. Therefore, H_{13} was not supported.

Discussion and Conclusion

This study investigates the use of smartphone for pedagogical purpose among students of higher learning institutions using the original and extended versions of TAM framework. Incorporating self-efficacy and social influence as additional constructs, the study explores the microscopic and macroscopic influencers affecting attitude and intention to adopt smartphone for learning purpose. Resulting from findings of previous studies which have documented individual contribution of the added constructs (self-efficacy and social influence), this study intends to investigate the synergistic effects that is possible from the interaction of the constructs, thus validating and extending the original TAM framework.

While previous TAM studies on smartphone phenomenon have predominantly focused on how the theoretical constructs of the model explained significant variance in attitude and intention to adopt the technology, the current study leaps beyond acceptance and use of smartphone for ritualized (habitual) and instrumental (cognitive) purposes from a generic perspective to specificities of pedagogical use of smartphone. Findings from this study reveal inconsequential role of social influence on respondents' PEU and PU of smartphone to learning among the respondents. This put a pause to the notion that students are susceptible to normative peer influence (Lee, 2014).

With regards to the contributions of self-efficacy, the study validates earlier measurement of the construct on the one hand (Joo & Sang, 2013; Lee, 2014; Park & Chen, 2007) as well as significant contribution of the construct to PEU, PU, ATT and INT to use smartphone as a pedagogical tool. Self-innovativeness of the students is thus an important conditionality for their attitude towards and intention to use smartphone for learning purpose. The findings concur with earliest results that suggest that self-efficacy precipitate self-acceptance of innovative ideas and products (Huffman et al., 2013; Lee, 2014; Shin et al., 2011).

Although this study records important contribution on the utility of smartphone for 'smart' education in today's setting where tempro-spatial differentiation has been pummeled,

it suffers some deficiency that future studies should address. Being an exploratory adventure, the study used just a single public university as a locale, which inherently limits the external validity of the study. The use of self-administered questionnaires could also bias the findings giving the possibility of the influence of social desirability. Also, the size of the sample is also smaller and the purposive technique used is limit generalization that a random sampling technique could have offered.

Though not exhaustive addressing above limitation would provide ground for better theorization on how changing technology contribute to pedagogical revolution, which is timely giving the desirability of various forms of technologically-assisted learning platforms (e-learning, m-learning and u-learning). Therefore, future studies should elaborate factors contributing to adoption and use of smartphone for learning among different tiers of educational systems. By sampling more respondents, adopting longitudinal design and examining a number of moderators and mediators, a robust state of affairs on smartphone-learning interface will surely emerge. On the whole, this modest effort has shown that smartphone is not only accepted in the developing countries but serve both ritualistic and instrumental purposes as it has been established in developed climes.

Appendix

Table 1. Demographics of the respondents

Demographics	Frequency	Percentage
Gender:		
Male	231	48
Female	250	52
Total	481	100.00
Level of study:		
First year	122	25.4
Second year	131	27.2
Third year	145	30.1
Fourth year	83	17.3
Total	481	100.00
Age categories:		
18-22	158	32.8
23-27	223	46.4
28-32	58	12.1
Above 33	42	8.7
Total	481	100.0
Nationality		
Nigeria	226	47
Malaysia	255	53
Total	481	100.0
Do you use smartphone?		
Yes	481	100.00
No	0	0.00
Total	481	100.0
Which brand?		
Samsung	161	33.5
Lenovo	86	17.9
Nokia	72	15.0
Blackberry	43	8.9
Sony	36	7.5
Apple	34	7.1
Others	49	10.3
Total	481	100.0
How many years you have been using Smartphone?		
Less than 6 months	69	14.3
1-2 years	149	31.0
3-4 years	167	34.7
5-6 years	51	10.6
More than 6 years	45	9.4
Total	481	100.0

Table 2. Convergent validity and reliability

	Constructs	Factor loadings	AVE	CR	Alpha
Perceived usefulness			0.698	0.920	.919
PU1	Using Smartphone enables me to accomplish tasks more quickly	.81			
PU2	Using Smartphone enhances my effectiveness on my study.	.87			
PU3	Using Smartphone makes it easier to do my study.	.87			
PU4	Using the Smartphone in my job would increase my study performance	.81			
PU5	I would find the Smartphone useful in my study.	.81			
Perceived ease of use			0.734	0.932	.930
PEU1	Learning to operate the Smartphone is easy for me	.86			
PEU2	It would be easy for me to become skillful at using my Smartphone	.90			
PEU3	My interaction with the Smartphone is clear and understandable	.87			
PEU4	I would find the Smartphone to be flexible to interact with	.87			
PEU5	I would find it easy to get the Smartphone to do what I want it to do	.78			
Attitude			0.643	0.899	.893
ATT1	Using Smartphone for educational purpose is a good idea.	.79			
ATT2	Using Smartphone while studying is convenient.	.80			
ATT3	Using Smartphone is beneficial to my study.	.88			
ATT4	Using Smartphone is of great concern to me.	.84			
ATT5	Using Smartphone is wise use of money.	.68			
Self-efficacy			0.674	0.911	.909
SE1	I feel confident in understanding terms/words relating to Smartphone hardware	.84			
SE2	I feel confident in understanding terms/words relating Smartphone software or applications	.87			
SE3	I feel confident describing functions of Smartphone hardware	.83			
SE4	I feel confident describing how to use Smartphone software or applications	.82			
SE5	I feel confident using Smartphone without any help from someone else	.72			
Social influence			0.805	0.954	.954
SI1	It is important that my friends like the mobile phone I buy.	.85			
SI2	I like to know what mobile phone makes good impressions on my friends.	.90			
SI3	I achieve a sense of belonging by purchasing the same mobile phone that my friends purchase.	.92			
SI4	If I want to be like someone, I try to buy the same mobile phone he/she uses.	.91			
SI5	I identify with my friends by purchasing the same mobile phone they purchase.	.90			
Intention			0.561	0.898	.896
INT1	I intend to improve my academic performance by next year through effective use of Smartphone as a study tool.	.75			
INT2	I plan to use Smartphone to effectively manage my study time.	.80			
INT3	Whenever possible, I intend to use Smartphone in my study	.78			
INT4	It is likely that I would recommend for my friends to use	.82			

Table 3: Discriminant validity

	AVE	MSV	ASV	SE	SI	PEU	ATT	INT	PU
SE	0.674	0.567	0.356	0.821					
SI	0.805	0.194	0.073	0.254	0.897				
PEU	0.734	0.661	0.399	0.753	0.147	0.857			
ATT	0.643	0.542	0.371	0.589	0.221	0.642	0.802		
INT	0.561	0.507	0.358	0.571	0.441	0.577	0.712	0.749	
PU	0.698	0.661	0.429	0.690	0.192	0.813	0.736	0.656	0.835

SE: self-efficacy, SI: social influence, PEU: perceived ease of use, ATT: attitude, INT: intention, PU: perceived usefulness, MSV=maximum shared variance, ASV=average shared variance, AVE=average variance extracted, CR=composite reliability, bold diagonal= square root of AVE.

References

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*(2), 179–211.

Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior.* Englewood Cliffs, NJ: Prentice-Hal.

Al-Haderi, S. M. (2013). The effect of self-efficacy in the acceptance of information technology in the public sector. *International Journal of Business and Social Sciences*, *4*(9), 188–198.

Alam, S. S., & Sayuti, N. M. (2012). Applying the Theory of Planned Behavior (TPB) in halal food purchasing. *International Journal of Commerce and Management*, *21*(1), 8–20.

Arbuckle, J. L. (2010). *IBM SPSS AMOS 19: User's Guide*. Chicago: Amos Development Corporation.

Atif, A., & Richards, D. (2012). A Technology acceptance model for unit guide information systems. In *PACIS 2012 PROCEEDINGS*. Retrieved from http://aisel.aisnet.org/pacis2012/97

Bagozzi, R. P., & Yi, Y. (1988). On the evaluation of structural equation models. *Journal of the Academy of Marketing Science*, *16*(1), 074–094.

Baker, R. K., & White, K. M. (2010). Predicting adolescents' use of social networking sites from an extended theory of planned behaviour perspective. *Computers in Human Behavior*, *26*(6), 1591–1597.

Bandura, A. (1982). Self-efficacy mechanisms in human agency. *American Psychologist*, *37*(2), 122–147.

Cheung, G. W., & Lau, R. S. (2008). Testing Mediation and Suppression Effects of Latent Variables: Bootstrapping With Structural Equation Models. *Organizational Research Methods*, *11*(2), 296–325.

Dahlberg, T., Mallat, N., Ondrus, J., & Zmijewska, A. (2008). Past, present and future of mobile payments research: A literature review. *Electronic Commerce Research and Applications*, *7*(2), 165–181.

Davis, F. (1986). *A technology acceptance model for empirically testing new end-user information systems: Theory and Results*. Doctoral dissertation: Massachusetts Institute of Technology.

Davis, F. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, *13*(3), 319–339.

Davis, F., Bagozzi, R., & Warshaw, P. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science*, *35*(8), 982–1003.

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention and behavior: An introduction to theory and research*. Reading, MA: Addison-Wesley.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, *18*(1), 39–50.

George, J. F. (2004). The theory of planned behavior and Internet purchasing. *Internet Research*, *14*(3), 198–212. http://doi.org/10.1108/10662240410542634

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate Data Analysis* (7th ed). Upper Saddle River, New Jersey: Pearson Prentice Hall.

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, *6*(1), 1–55.

Huffman, A. H., Whetten, J., & Huffman, W. H. (2013). Using technology in higher education: The influenceof gender roles on technology self-efficacy. *Computers in Human Behavior*, *29*(4), 1779–1786.

Joo, J., & Sang, Y. (2013). Exploring Koreans' smartphone usage: An integrated model of the technology acceptance model and uses and gratifications theory. *Computers in Human Behavior*, *29*(6), 2512–2518.

Kang, Y., Lee, M., & Lee, S. (2014). Service-Oriented Factors Affecting the Adoption of Smartphones. *Journal of Technology Management & Innovation*, *9*(2), 98–117.

Kim, Y. H., Kim, D. J., & Watcher, K. (2013). A study of mobile user engagement (MoEN): Engagement motivations, perceived value, satisfaction, and continued engagement intention. *Decision Support Systems*, *56*(4), 361–370.

Kline, R. B. (2011). *Principles and practice of structural equation modeling* (3rd ed.). New York: The Guilford Press.

Lee, S. Y. (2014). Examining the factors that influence early adopters' smartphone adoption: The case of college students. *Telematics and Informatics*, *31*(2), 308–318.

Lee, Y., Chang, C., Lin, Y., & Cheng, Z. (2014). The dark side of smartphone usage: Psychological traits, compulsive behavior and technostress. *Computers in Human Behavior*, *31*(1), 373–383.

Luarn, P., & Lin, H.-H. (2005). Toward an understanding of the behavioral intention to use mobile banking. *Computers in Human Behavior*, *21*(6), 873–891.

Lule, I., Omwansa, T. K., & Waema, T. W. (2012). Application of technology acceptance model (TAM) in M-banking adoption in Kenya. *International Journal of Computing and ICT Research*, *6*(1), 31–43.

Ma'ruf, J., Muhamad, O., & Ramayah, T. (2005). Intention to purchase via the internet: A comparison of two theoretical models. *Asian Academy of Management Journal*, *10*(1), 79–95.

Mekiæ, E., & Özlen, M. K. (2014). Acceptance of smartphones by users in BiH through extended technology acceptance model. *European Researcher*, *67*(1–2), 136–149.

Nasri, W. (2011). Factors Influencing the Adoption of Internet Banking in Tunisia. *International Journal of Business and Management*, *6*(8), 143–160. http://doi.org/10.5539/ijbm.v6n8p143

Nasri, W., & Charfeddine, L. (2012). An exploration of Facebook. com adoption in Tunisia using Technology Acceptance Model and Theory of Reasoned Action. *Interdisciplinary Journal of Contemporary Reserch in Business*, *4*(5), 948–969.

Park, N., Kim, Y., Shon, H. Y., & Shim, H. (2013). Factors influencing smartphone use and dependency in South Korea. *Computers in Human Behavior*, *29*(4), 1763–1770.

Park, S. Y. (2009). An Analysis of the Technology Acceptance Model in Understanding University Students' Behavioral Intention to Use e-Learning. *Educational Technology & Society*, *12*(3), 150–162.

Park, Y., & Chen, J. (2007). Acceptance and adoption of the innovative use of smartphone. *Industrial Management & Data Systems*, *107*(9), 1349–1365.

Porter, C. E., & Donthu, N. (2007). Using the technology acceptance model to explain how attitudes determine Internet usage: The role of perceived access barriers and demographics. *Journal of Business Research*, *59*(9), 999–1007.

Ramayah, T., & Ignatius, J. (2010). Intention to shop online: The mediating role of perceived ease of use. *Middle-East Journal of Scientific Research*, *5*(3), 152–156.

Salehan, M., & Negahban, A. (2013). Social networking on smartphones: When mobile phones become addictive. *Computers in Human Behavior*, *29*(6), 2632–2639.

Shen, D., Laffey, J., Lin, Y., & Huang, X. (2006). Social influence for perceived usefulness and ease-of-use of course delivery systems. *Journal of Interactive Online Learning*, *5*(3), 270–282.

Shin, D., Shin, Y., Choo, H., & Beom, K. (2011). Smartphones as smart pedagogical tools: Implications for smartphones as u-learning devices. *Computers in Human Behavior*, *27*(6), 2207–2214.

Shroff, R. H., Daneen, C. C., & Eugenia, M. W. (2011). Analysis of the technology acceptance model in examining students' behavioural intention to use an e-portfolio system. *Australasian Journal Of Educational Technology*, *27*(4), 600–618.

Stone, T. H., Jawaher, I. M., & Kisamore, L. J. (2010). Predicting academic misconduct intentions and behavior using the theory of planned behavior and personality. *Basic and Applied Social Psychology*, *32*(1), 35–45.

Suki, N. M., & Suki, N. M. (2011). Users' behavior towards ubiquitous M-Learning. *Turkish Online Journal of Distance Education*, *12*(3), 118–129.

Suksa-ngiam, W., & Haiyasoonthorn, W. (2011). Measurement of The adoption of Facebook.Com. In *International Conference on Business and Economics Research* (pp. 113–118). Singapore: IACSIT Press.

Szajna, B. (1994). Software evaluation and choice: predictive evaluation of the Technology Acceptance Instrument. *MIS Quarterly*, *18*(3), 319–324.

Trafimow, D., Sheeran, P., Conner, M., & Finlay, K. (2002). Evidence that perceived behavioural control is a multidimensional construct: Perceived control and perceived difficulty. *British Journal of Social Psychology*, *41*(1), 101–121.

Venkatesh, V. (2000). Determinants of perceived ease of use: Integrating control, intrinsic motivation, and emotion into the technology acceptance model. *Information Systems Research*, *11*(4), 342–365.

Verkasalo, H., López-Nicolás, C., Molina-Castillo, F. J., & Bouwman, H. (2010). Analysis of users and non-users of smartphone applications. *Telematics and Informatics*, *27*(3), 242–255.

Yu, F. (2012). Mobile/Smart Phone Use in Higher Education. In M. Rao (Ed.), *Southwest Decision Science Institute Conference* (pp. 831–839). Houston, Texas, USA: Decision Sciences Institute.

Ismail Sheikh Yusuf Ahmed is currently affiliated with the Mass Communication Department of Qatar University. His research interest include political communication, media effects, news consumption/credibility, and new media technologies adoption and consequences.

Mukhtar El-kasim is a senior lecturer in the Department of Mass Communication at Hassan Usman Katsina Polytechnic Katsina State, Nigeria. He has research interest in public relations, new media and communication theories.

Lambe Kayode Mustapha is associated with Department of Mass Communication, University of Ilorin, Nigeria. He is a senior lecturer and postgraduate coordinator at the department. His research focuses in corporate communication, political communication, new media studies and media effects research.