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Perceived usefulness, ease of use and adequacy of use of mobile technologies by Nigerian university lecturers

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ABSTRACT

This paper investigated the university lecturers' perceived usefulness, ease of use and adequacy of use mobile technologies for research collaboration in South-west, Nigeria. Lecturers in the public universities in the South-west, Nigeria were purposively sampled. The study was descriptive type using survey method. 4 research questions were raised and answered. The research instrument was validated and reliability coefficient of 0.85, 0.92, 0.94 and 0.83 for perceived usefulness, ease of use, adequacy of use and frequency of use of mobile technologies for research collaboration was attained respectively using Cronbach Alpha. A total of 742 respondents were drawn from 13 federal and state universities in South-west, Nigeria. Data were collected using structured questionnaire. Mean and percentages were used to answer research questions 1-4. The findings revealed that university lecturers had positive perception toward the usefulness, ease of use and adequacy of use of mobile technologies. The study concluded that lecturers perceived mobile technologies to be essential and easy to use in facilitating research collaboration. It was recommended that the university lecturers should be encouraged to use mobile technologies effectively for research collaboration.

Keywords*: Lecturers, Perception, Adequacy, University*

INTRODUCTION

The roles played by information and communication technologies (ICTs) in this era of global technological advancement makes them become indispensable in academic settings for accessing and dissemination of information. The use of Information and Communication Technologies and the internet facilities provide opportunities for research and networking among scholars in facilitating innovative, creative and cognitive thinking, higher productivity and efficiency (Adeosun, 2010), in form of collaboration through which local, national and global dimension of researches can be studied and communicated with colleagues and experts. ICT are computer and internet connections adopted by individuals to meet information processing needs of an organization or individual (Mikre, 2011), delivers core services of teaching and research in academic environment thereby transforming access and dissemination information (Ololube, Kpolovie & Makewa, 2015).

Having a vast comprehension on how to use ICT judiciously and the roles played by it is as essential requirement for any person or organization seeking a competitive advantage over others (Kpolovie & Awusaku, 2016) to create, access, store and disseminates information. Thus, judicious handling of information by lecturers permeates teaching, learning, research and publishing (Oviawe & Oshio, 2011). The mobile technologies and use of the Internet for research collaboration and problem-solving is an evolving solution to the problem of information dissemination via research output in most of the universities globally. The use of Laptops, Mobile phones, Tablets PCs, Portable Digital Assistants (PDA), Notebooks, Ipads, and the like; afford

access to electronic resources at anytime and anywhere making the needed information available within seconds (Adegun & AKomolafe, 2013) for teaching, learning and research.

The use of mobile technologies for pedagogical experiences is growing in visibility which opens the users' minds to the possibility of a radically new paradigm and encourages the abandon constraints of habitual ways of thinking, learning, communicating, designing and reacting (Traxler, 2007b; El-Hussein & Cronje, 2010). Mobile technologies present educators with an enormous of new pedagogical possibilities (Farrow, 2011); and offer new opportunities for learners' educational activities across different locations and times (Uden, 2007). Traxler (2007a) defined mobile technologies as wireless, digital devices and as the natural progression of e-learning that enable learners participate in acquisition and dispersal of knowledge. Mobile technologies are potent devices that are not bound to a location for accessing information at anywhere and anytime (Attewell, 2011). Ajzen and Fishbein (1980) posited that Technology Acceptance Model (TAM) was considered as an extension of theory of reasoned action (TRA). TAM originally proposed by Davis (1986) has proven to be a theoretical model that facilitate in explaining and predicting user behavior of information technology (Legris, Ingham, & Collerette, 2003). Davis (1989) and Davis, Bagozzi, and Warshaw (1989) adapted TRA in order to help in explaining users' acceptance or rejection of information technology.

TAM deals with issues of technology adoption and usage based on their understanding of the usefulness and the ease of use of technology. Some studies demonstrated that perceived usefulness was positively related to behavioural intention to use a system (Davis, 1989; Taylor & Todd, 1995; Gefen & Straub, 1997; Venkatesh & Davis, 2000). Perceived usefulness and perceived ease of use are the two cognitive beliefs that postulate theory on system usage by individual behavioural intention to use a system. Davis, Bagozzi and Warsaw (1989) averred that the use of technology system is influenced directly or indirectly by the user's behavioral intentions, attitude, perceived usefulness of the system, and perceived ease of the system. Figure 1 depicts the original TAM (Davis, 1989).

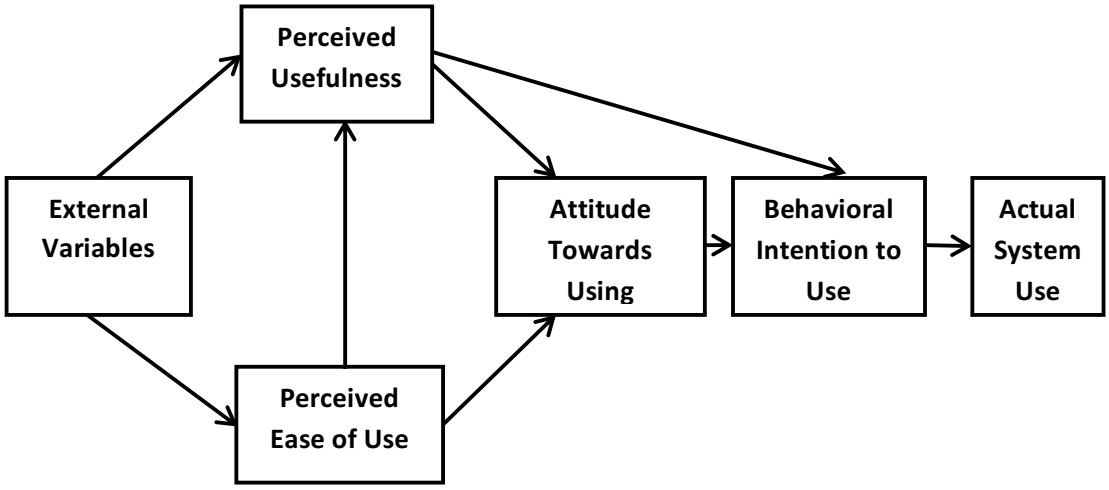

Figure 1: *Technology Acceptance Model (TAM)*

Source: Technology Acceptance Model (Adapted from Davis, Bagozzi, & Warsaw, 1989).

Statement of the Problem

The issues on research publications have been a major concern to university lecturers. Quite a number of researchers have asserted that the global university's ranking depends on the research outputs (Yusuf & Onasanya, 2004; Chiemeke, Longe, Longe & Shaib, 2009; and Okafor & Dike, 2010). Similarly, quality research outputs cannot be achieved without the use of information and communication technologies (Rajasingham, 2010; Nwokike & Chiemeka, 2011). Similarly, Agber and Agwu (2013) showed that differences existed in the lecturers' perceived usefulness, frequency of use and access of online resources. Olatokun (2008) and Studies conducted by Ugwu (2012) and Agber and Agwu (2013 revealed that access to ICTs had great impact on the productivity of the academic staff. Though, Sangowusi (2003) posited that the use of ICTs has insignificant impact on the productivity of professors as they seemed to be overwhelmed by the teaching and administrative chores. The aforementioned studies were not guided with the use of standard technology acceptance model like TAM.

Many researchers like Agarwal and Prasad (1998) added the construct of compatibility as new moderating variables to Technology Acceptance Model. Dishaw and Strong (1999) integrated Technology Acceptance Model with Task-technology Fit; Agarwal and Karahanna (2000) added cognitive absorption, playfulness and self-efficacy; Moon and Kin (2001) extended the TAM to explain the users' acceptance of World-Wide-Web context and Chen and Chen (2009) modified Technology Acceptance Model in order to understand the automotive telematics users' usage intention. However, these findings were not on the domain of using mobile technologies for research collaboration. TAM was employed based on Park, Son and Kim (2012) assertion that researches have to choose appropriate construct based on the objective of the study to influence the acceptance of a system. Based on this assertion, another construct was added to the original TAM by Davis, Bagozzi and Warshaw (1989) termed perceived adequacy of use. This afforded the researcher to capture the occurrence in the study. Attitude to use and behavioural intention to use were excluded from the original Technology Acceptance Model, because the study intends to focus on the actual use of mobile technologies for research collaboration. Perceived adequacy of use was the added construct to examine the use mobile technologies to complete tasks skillfully and effectively with barest minimum of error (Gardner & Amoroso, 2004).

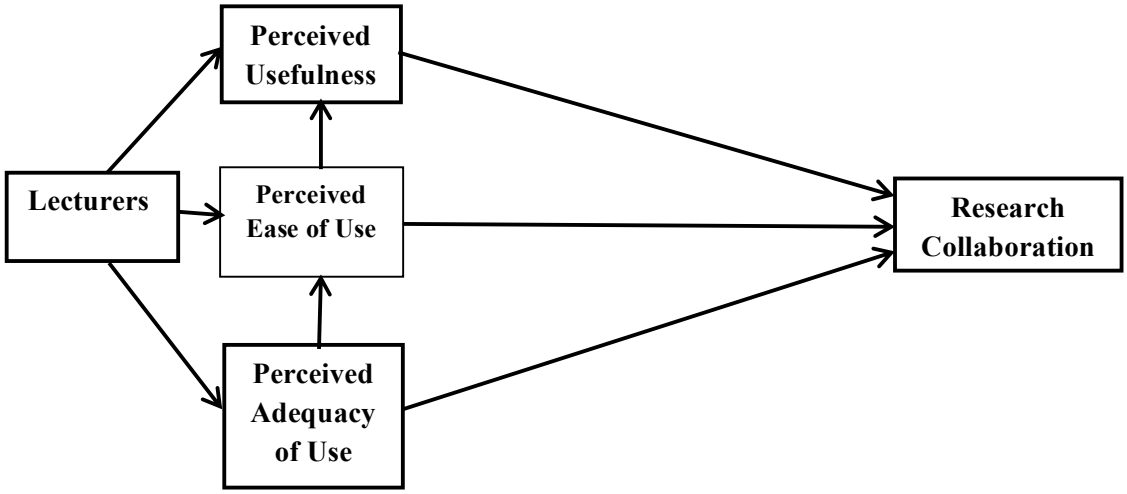

Figure 2: *Modified Technology Acceptance Model*

Source: Modified Technology Acceptance Model by Samuel (2016).

Purpose of the Study

The purpose of this study was to find out the university lecturers' perceived usefulness, ease of use and adequacy of use of mobile technologies for research collaboration in the South-western states of Nigeria.

Research Questions

The following research questions were generated for the study:

1. How do university lecturers perceive the usefulness of mobile technologies for research collaboration?

2. How do universities lecturers perceive ease of use of mobile technologies for research collaboration?

3. How do university lecturers perceive the adequacy of use of mobile technologies for research collaboration?

4. What is the frequency of lecturers' perceived usefulness, ease of use and adequacy of use of mobile technologies for research collaboration?

METHODOLOGY

Sample and Sampling Technique

Subjects: lecturers in the federal and state universities in South-west, Nigeria participated in this study. The federal and state universities in South-west geopolitical zone in Nigeria were situated in the 6 states, viz: Ogun, Oyo, Osun, Ondo, Ekiti, and Lagos. This study was a descriptive research type using cross-sectional survey method. Seven hundred and forty-two (742) lecturers were randomly sampled from 13 purposively sampled universities in the South-west, Nigeria.

Instrumentation: Structured questionnaire items were used to collect data on university lecturers' perceived usefulness, ease of use and adequacy of use of mobile technologies for research collaboration in the South-west, Nigeria. A total of 742(73.25%) out of 1013 copies of questionnaires were returned by the respondents that participated in the study.

The data generated on research questions 1, 2, 3 and 4 were collected, collated and analyzed using descriptive statistics (frequency counts, means and percentages). Items on university lecturers' perceived usefulness, ease of use and adequacy of use of mobile technologies were structure to elicit the respondents' responses based on Likert rating scale of Strongly Agreed (SA), Agreed (A), Disagreed (D) and Strongly Disagreed (SA).

The data collected on Strongly Agreed (SA) and Agreed (A) was collapsed as Agreed while Disagreed (D) and Strongly Disagreed (SA) were collapsed as Disagreed. Senior lecturers in the Department of Educational Technology and Computer Science at the University of Ilorin, Nigeria validated instrument the used for this study. Cronbach Alpha statistical instrument was used to established the reliability of the instrument section by section and the reliability coefficients of r=0.87, r=0.91, r=0.92 were attained at 0.05 level of significance.

Research question 1: How do university lecturers perceive the usefulness of mobile technologies for research collaboration?

Table 1: *University Lecturers' Perceived Usefulness of Mobile Technologies*

S/N	Items on Perceived Usefulness of Mobile Technologies	X
1	Accessing educative sites are facilitated while using mobile technologies for research collaboration.	3.55
2	Downloading of electronic resources is done frequently via mobile technologies.	3.39
3	Uploading of electronic resources is done frequently via mobile technologies.	3.26
4	Social networking sites are more often used to facilitate research collaboration.	3.11
5	Research collaborations are facilitated via audio calls to share ideas with professional colleagues.	2.75
6	Research collaborations are preferred via audio calls to share ideas with colleagues.	2.95
7	Interactions on research collaboration are done via video calls.	2.75
8	More often, collaboration is enhanced via text messaging (SMS) to relate with professional colleagues.	2.90
9	Mobile technologies are frequently used to forward data to professional colleagues and collaborators.	3.33
10	Mobile technologies facilitate receiving of data from professional colleagues and collaborators.	3.45
11	Usage of electronic manuscripts via mobile technologies is preferred to hard copies of researches.	3.42
12	Mobile technologies provide a good platform for research collaboration.	3.44
13	Research interaction with collaborators on field work is effective via mobile technologies.	3.32
	Sum of mean score for perceived usefulness	41.75

Note: the grand mean score of lecturers' perceived usefulness of mobile technologies for research collaboration was 3.21

As shown in Table 1, item 1, 10, 11 and 12 affirmed that the use of mobile technologies facilitated accessing of educative sites (3.55), frequently use of electronic manuscripts (3.42) is preferred to hard copies and provide a good platform for research collaboration (3.44). However, lecturers' responses in items 5, 6 and 7shows that mobile technologies are not well facilitated for research collaboration via audio (2.75) and video (2.75) calls due to some perceived challenges they encountered while using the platform. Also, the lecturers' response in item 8 showed that the use of text messages (SMS) (2.90) was not frequently used for collaborating research. Thus the grand mean score for lecturers' strong perception of usefulness of mobile technologies was 3.21 out of 4.00. It is therefore inferred that the university lecturers found mobile technologies to be expedient tools for research collaboration.

Research question 2: How do universities lecturers perceive ease of use of mobile technologies for research collaboration?

From Table 2, items 2, 5, 6, revealed lecturers' perceived ease of use of mobile technologies frequently online (3.42) with ease to access educational materials, enhances lecturers' scholarly (3.47) research collaborations, it is easy and interesting in carrying out scholarly tasks with less stress. Conversely, items 3 and14 shows that some lecturers seem not to enjoy the use of mobile

technologies when not connected to the internet (2.83) and the service of experienced persons would frequently be needed to maximize the use and the embedded potentials in the mobile devices (2.31). The high grand mean scores (3.26) revealed that lecturers perceived the ease of use of mobile technologies for research collaboration. It is therefore inferred that the sampled university lecturers perceived mobile technologies not to be difficult to use in facilitating research collaborations.

Table 2: *University Lecturers' Perceived Ease of Use of Mobile Technologies*

S/N	Items on Perceived Ease of Use of Mobile	X
1	Sharing of information via Bluetooth of the mobile technologies is simple and flexible.	3.29
2	Mobile technologies are used on line with ease to access educational materials.	3.42
3	Mobile technologies are used offline to facilitate research collaborations.	2.83
4	The use of mobile technologies simplifies research collaborations via audio conferencing platform.	3.10
5	The use of mobile technologies greatly enhances my scholarly research collaborations.	3.47
6	Carrying out tasks on the mobile technologies is easy and interesting.	3.48
7	Carrying out research with mobile technologies is reasonably affordable to subscribe to any internet provider.	3.31
8	Mobile technologies are easy to manipulate during research collaboration.	3.30
9	Use of mobile technologies enhances research collaborations with less stress.	3.44
10	Communication with research collaborators is easy using social networking sites.	3.42
11	Mobile technologies enhance easy access to editors' websites.	3.38
12	The use of mobile technologies gives immediate scholarly support whenever needed.	3.36
13	The use of mobile technologies is more convenient to access information anywhere and anytime.	3.46
14	Experienced person is needed whenever mobile technologies are used.	2.31
15	Mobile technologies are dynamic in usage to perform research operations.	3.31
	Sum of mean scores for perceived ease of use	48.88

Note: the grand mean score for lecturers' perceived ease of use of mobile technologies for research collaboration was 3.26

Research question 3: How do university lecturers perceive the adequacy of use of mobile technologies for research collaboration?

From Table 3, Items1, 5, 6, 10 and 11among others revealed high mean scores that the portability (3.63) of the devices facilitates frequent connection with the professional colleagues (3.38), helps to access (3.44) and forward (3.45) journal articles anytime and anywhere without distortion. Items1 and 2 also revealed that the use of mobile technologies enhances effective research collaboration (3.42) and has tremendously improved lecturers' research productivity (3.45). It is therefore inferred that the university lecturers perceived the effectiveness of use of mobile technologies with the barest minimum of error for research collaborations. The grand mean score of 3.45 in Table 3 shows high affirmation of adequacy of use of mobile technologies for research collaboration. Similarly, Table 3 shows the mean scores (41.37%) of lecturers' perception that mobile technologies are effective in use with the barest minimum of error for research collaboration.

Table 3: *University Lecturers' Perceived Adequacy of Use of Mobile Technologies*

S/N	Items on Perceived Adequacy of Use of Mobile Technologies	X
1	The use of mobile technologies enhances effective research collaboration.	3.42
2	The use of mobile technologies has tremendously improved my research productivity.	3.45
3	The use of mobile technologies' applications has been very helpful to easily analyze research data accurately.	3.41
4	Connecting professional colleagues with the use of mobile technologies have been frequent.	3.38
5	Mobile technologies support adequate delivery of information to professional collaborators.	3.47
6	Portability of mobile technologies enhances the effectiveness of their usage.	3.63
7	Mobile technologies afford easy analysis of research data.	3.40
8	Frequent use of mobile technologies brings about new opportunities in research collaboration	3.46
9	Use of mobile technologies offers opportunities for easy access to publishing editors.	3.39
10	Journal articles are easily sent without distortion of the contents via mobile technologies.	3.45
11	Journal articles are easily received without distortion of the contents via mobile technologies.	3.44
12	Communication between the corresponding author of a journal and the editor(s) are effectively facilitated via mobile technologies.	3.46
	Sum of mean scores for perceived adequacy	41.37

Note: the grand mean score for lecturers' perceived adequacy of use of mobile technologies for research collaboration was 3.45

Research Question 4: What is the frequency of the lecturers' perceived usefulness, ease of use and adequacy of use of mobile technologies for research collaboration?

Table 4 shows the frequency and mean scores for perceived usefulness (PU) 310(41.75%), perceived ease of use (PEOU) 363(48.88%) and perceived adequacy of use (PAU) 308(41.57%) of mobile technologies by university lecturers. The mean scores were considered as the benchmark to categorize the lecturers' acceptance or rejection of use of mobile technologies in terms of percentages. Lecturers occupying the category of the benchmark and above the benchmark scores (mean scores and above) are those that strongly affirmed the use of mobile technologies; while lecturers occupying the category below the benchmark (below the mean scores) are those that did not affirmed using mobile technologies in facilitating research collaboration.

Table 1 further showed that the sum for mean scores and above the mean scores on lecturers' perceived usefulness 411(55.40%), perceived ease of use 431(58.09%) and perceived adequacy of use 538(72.50%) of mobile technologies for research collaboration; while frequencies of 331 (44.60%), 311(41.91%) and 204(75.50%) lecturers disagreed with usefulness, ease of use and adequacy of use of mobile technologies respectively. The grand mean scores 460(62.03%) of the lecturers' perception exemplified good use of mobile technologies for research collaboration. Therefore, it implies that university lecturers averagely perceived the usefulness and ease of use

and had high perception on adequacy of use of mobile technologies in facilitating research for collaboration.

Table 4: *University Lecturers' Frequency of Use of Mobile Technologies*

Lecturers Perceptions	Mean scores (%)	Freq. for below mean scores	Below mean scores (%)	Freq. for mean scores and above	Sum for mean scores and above (%)	Sum for all the freq.
PU	41.75	331	44.60	411	55.40	742
PEOU	48.88	311	41.90	431	58.19	742
PAU	41.37	204	27.50	538	72.50	742
Grand Mean	44.00	282	38.00	460	62.03	742

DISCUSSION

The findings from this study agreed with Adegun and AKomolafe (2013) that the usefulness of Laptops, Mobile phones, Tablets PCs, Portable Digital Assistants (PDA), Notebooks, Ipads, and the like afford easy access to electronic resources at anytime and anywhere making the needed information available within seconds for teaching, learning and research. The findings on perceived usefulness and adequacy of use of mobile technologies agreed with Rajasingham (2010) and Nwokike and Chiemeka (2011) that quality research outputs cannot be achieved without the use of information and communication technologies and the internet facilities. The study agreed with Sangowusi (2003), Ugwu (2012) and Agber and Agwu (2013) that access to mobile technologies and internet facilities had great impact on the productivity of the academic staff based on their perceived ease of use and adequacy of mobile devices for collaboration. In summary, this study showed that lecturers' frequency counts on perceived usefulness 411(55.40%), perceived ease of use 431(58.09%) were average; while lecturers have high perception on the adequacy of use 538(72.50%) of mobile technologies in facilitating research for collaboration.

CONCLUSION

The ubiquitous nature of mobile technologies facilitates easy access to information and the dissemination of finding via research outputs in form of publication in a referred journal. The use of standard model like TAM by Davis, Bagozzi, and Warshaw (1989) and its modification by Samuel (2016) afforded the capturing of lecturers' perceived usefulness, ease of use, adequacy of use and frequency of use of mobile technology for research collaboration. Perceived adequacy of use of mobile technologies was an added construct that revealed the use of mobile technologies in facilitating completion of tasks skillfully and effectively with barest minimum of error (Gardner & Amoroso, 2004).

Thus, the findings on lecturers' perceived usefulness, ease of use and adequacy of use of mobile technologies revealed that mobile technologies are indispensable tools in facilitating academic research for publication in this era that newer technologies are rapidly evolving. The lecturers' frequency counts on perceived usefulness 411(55.40%), perceived ease of use 431(58.09%) and perceived adequacy of use 538(72.50%) of mobile technologies revealed that lecturers averagely

perceived the usefulness and ease of use and have high perception on adequacy of use of mobile technologies in facilitating research for collaboration.

RECOMMENDATIONS

The study recommends that:

1. Seminars and workshops should be organized for all lecturers on how to effectively use mobile technologies in facilitating effective research and collaboration.

2. Lecturers should be motivated to frequently use mobile technologies thereby exposing them to easier method of fiddling through various platforms that would encourage research and collaboration

3. Seminars and workshops should be organized for all lecturers on how to use mobile technologies in completing research related tasks skillfully and effectively with barest minimum of error.

4. University administrators should endeavour to provide adequate institutional support on the access to digital mobile technologies, electronic resources and the internet facilities to all university lecturers.

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