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Technology adoption by personnel in university libraries in South-West, Nigeria

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Abstract
The use of technology has attracted the attention of library personnel because it enhances and promotes dynamic library service delivery. Studies have shown that library personnel are reluctant to adopt technology for day to day operations. Low level of technology adoption may be attributed to characteristics associated with the individual, organization or the specific innovation. Therefore, the study investigated technology adoption by personnel in university libraries in South-West, Nigeria This study adopted the survey research design. The population of the study consisted of 234 library officers and librarians. Total enumeration was used. A self-structured and validated questionnaire was used for data collection. Cronbach's alpha reliability coefficients for the constructs ranged from 0.60 to 0.94. A response rate of 88.9% was achieved. Data were analysed using descriptive and inferential statistics. Findings showed a joint influence of individual, organizational and innovation characteristics on technology adoption (Adj.R^2 = 0.14, F(1, 208)= 12.239, $p < 0.05$). The study concluded that organizational and innovation characteristics contributed to technology adoption by personneltherefore, it was recommended that library administrators should promote the adoption of technology for library services, dedicate more funds for acquiring technology infrastructure such as internet and computing devices, automate all library functions and develop local capacity to manage technology.

Keywords: Technology adoption, individual characteristics, innovation characteristics, organizational characteristics, technology, library personnel, university libraries, South-West, Nigeria

Introduction
University libraries provide resources and services to meet the information needs of users in the academic environment. University libraries are important component in all universities; they serve a complementary purpose of supporting the institution's curriculum, and expediting the process of scholarly research of lecturers and students (Umoh, 2017). University libraries also serve as repositories of organized collections of educative information resources (print and non-print) manned by library personnel who are an integral part of tertiary institutions.

In pursuant of enhancing the provision of information resources and in line with the digital revolution characterized and dominated by Robotics, Artificial Intelligence (AI), machine learning, virtual reality, (VR), Augmented Reality (AR) etc, personnel of academic universities are gradually adopting various technologies to provide improved service delivery such as notification service, mobile website, catalogues, database service, E-resources service, user-instruction services, reference service, and library virtual tour service (Amaechi et al, 2018). These services are capable of expediting the process of information dissemination to library users and also provide them with adequate competencies for operating in the fast-evolving technological sphere.

Soyemi and Awoyemi (2021) regarded technology as an essential part of

daily life and postulated that by the year 2025, a lot of jobs would have been taken over by Technology, because the rapid transformation experienced in the world in the last fifty years is six times more than that experienced in the thousands of years of world existence. Technology use in university libraries is especially important for developing high-quality library services that result in current knowledge and skills that align with the technological demands of the current library users. Research has shown that using technology can increase access to learning resources for library users and offer better communication among library personnel and users because the adoption of technologies varies significantly from organization to organization and person to person, identifying factors related to technology adoption is critical to the academic library. Understanding these factors may aid in increasing levels of technology adoption in academic library, assist in determining appropriate professional development interventions, and can contribute to the limited body of knowledge related to technology adoption in academic library.

Technology adoption theories and models

There are several frameworks for guiding innovation diffusion and/or adoption studies. It is argued that most of them are derivatives of Rogers' Diffusion of Innovation Theory (DOI) (Bakkabulindi, 2014). These theories and models have been developed to identify factors that influence an individuals' use of information technology. These theories include, Technology-Organization-Environment (TOE), Theory of Reasoned Action (TRA) (Ajzen and Fishbein, 1980), Theory of Planned Behaviour (TPB) (Ajzen, 1991), theory of Diffusion of Innovation (DOI) (Rogers, 1995, 1983), Technology Acceptance Model (TAM) (Davis, 1989), and Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh *et al.*, 2003). However, with regards to this study, Rogers' (2003) Diffusion of Innovation Theory (DOI) was employed, because it proves to be an original theory which provides a fundamental basis for guiding studies on the adoption of innovations. According to Rogers (2003), DOI relates innovation diffusion and/or adoption to three categories of predictors, namely the characteristics of the individual potential adopter, the characteristics of the organization where the potential adopter is, and how the adopter perceives the innovation.

Literature review

Since the integration of information communication technologies (ICTs) in the academic library, they have transformed the academic library into a hub of knowledge and provided basic conditions for effective learning. Hence, technologies further provide a massive number of new improvements for the academic library (Oyelude, 2018). Tekale and Dalve (2019) posit that, with their feature of mobility and ubiquity, technologies are capable of providing personalized means of information acquisition for librarians and library users, with features that aid e-learning, m-learning, and virtual learning environment (VLE). Thus, librarians are required to acquire knowledge relevant to adopting mobile technology in their various operations in the academic library. Jentzsch (2012) opined that technologies usage could be regarded as one of the key revolutions in academic institutions globally. Other authors believed that technologies are useful tools for socio-economic development, Carmody (2010) believed that technology could also serve as a tool for service delivery in an academic library. He argued that technologies are embedded in existing academic relations of support, resource extraction, and information dissemination

and it could also be a tool to reconfigure and reconstitute the identified user's need in the library.

Sife, Klondo, and Lyimo-Macha (2010) also pointed out that, although technology seem to have the potential for improving library services, the precise mode and the extent to which technology contribute to library development remain largely unexplored. Carmody (2012) believed that the claim about the transformational developmental impacts of technology adoption in university libraries is yet to be fully explored. Most studies on technology adoption focused on the question of potential users' initial decision to adopt or not to adopt, (Kim & Crowston, 2011 and Roger, 2003). Prior studies on technology adoption enunciated the differences in user perceptions between the initial adoption and the continued usage (Hong, Thong, & Tam, 2006 and Tella & Adaraloye, 2014).

Bakkabulindi (2014) in a work titled "A call for Return to Rogers' Innovation Diffusion Theory" identified three categories of predictors that relate to the adoption of innovation, namely the characteristics of the individual potential adopter, the characteristics of the organization where the potential adopter is and how the adopter perceives the innovation. These categories of predictors are regarded as individual, organizational, and innovation characteristics. Rogers (2003) defined individual characteristics in terms of the level of training and demographic variables such as age, gender, and income level of an individual with regards to the adoption of an innovation. Jaidee and Beaumont (2003) stated that individual characteristics significantly influence the choices, preferences, and views of individuals on the adoption of technology. Thus, individual characteristics are the variables that define the adoption of innovation by individuals in a particular setting (Bakkabulindi, 2011). These variables are the level of training of relevance to the innovation the person has received; how old the person is; the gender and the income level of the person. The older a person becomes, the less that person will be attracted to adopt innovations. In terms of gender, males are usually more apt to use innovations than females. The wealthier a person becomes, the more able that person will be to acquire and hence to adopt innovations (Bakkabulindi, 2011). With regards to Roger's Diffusion of Innovation (DOI), another category of correlation that significantly influences the adoption of innovation is organizational characteristics.

Ali and Arshad (2016) define organizational characteristics as the support and attributes of a particular organization concerning the adoption of an innovation. Riley and Hunt (2015) stated that several kinds of the literature suggest that organizational characteristics have a major part to play in the adoption of an innovation. The adoption of technologies by the library as an 'organization' significantly influences how librarians will perceive technologies. According to Rogers (2003), organizational readiness for change, organizational culture towards innovation, organizational size, and organizational change management style are the main factors of organizational characteristics that are likely to influence the adoption of innovations.

According to Bakkabulindi (2014), change management can be subdivided into two approaches, namely planned change and emergency change approaches. Planned change is a deliberate pre-meditated move to alter the organizational status. It is change initiated and implemented by change leaders to solve problems, adopt innovations, or influence future changes. Emergency change on the other hand is not a sequential process. It is chaotic and often involves shifting

goals, discontinuation of activities, and making unexpected combinations of changes. Based on the fact that change is usually participatory, administrators are required to be readily informed about the necessary changes that are required in the organization and are further encouraged to adopt a positive attitude and have personal involvement in every process of change.

Although individual characteristics and organizational characteristics significantly influence technologies adoption, literature has shown that innovation characteristics are also a key variable that influence the process of mobile technology adoption (Bakkabulindi 2014). Innovation characteristics can be traced to the diffusion of innovation theory which states that the process of communicating innovations to members of an organization or community over time depends on, relative advantage, compatibility, user-friendliness, and observability (Rogers, 2003). According to Kelleher and Sweetser (2012), the relative advantage could be further defined as the degree to which an innovation is perceived as being better than the idea it supersedes, and it is often expressed in terms of economic profitability and societal prestige. Hence, relative advantage deals with the librarians' subjective probability that adopting technologies will enhance his or her operation in the library. Another factor of innovation characteristic is compatibility.

Compatibility refers to the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters. An innovation that is incompatible with librarians' values, norms, or mode of operation will not be adopted as rapidly as an innovation that is compatible. Rogers (2003) asserts that compatibility is positively related to an innovation's rate of use, which implies that an innovation that is more compatible fits more closely with the users' situation and then increases the rate of use. Compatibility enables individuals to give meaning to innovation in order to adapt and get acquainted with it. Additionally, user-friendliness serves as another factor of innovation characteristics.

User-friendliness is referred to as the degree to which an innovation is perceived as relatively easy to understand and use. Innovation is perceived to be user-friendly when its functionality can be mastered effortlessly by librarians. Mugo, Njagi, Chemwei, and Motanya (2017), explained perceived user-friendliness of technologies in terms of interface characteristics and screen design. Interface characteristics are regarded as the medium between the system and the user. Interface characteristics such as menus, icons, and control toolbars aid in the enhancement of the usability of any system (Chiyangwa & Moriwge, 2016). Based on this, it is expected that the interface characteristics enhance the usability of mobile technology and significantly influence its adoption by librarians. Observability also serves as a factor of innovation characteristics.

Observability refers to the degree to which the results of an innovation are visible to others. Perceived observability can be referred to as the perceived communicability of an innovation (Rogers, 2003). Rogers, Singhal, and Quinlan (2009) observe that whereas some ideas are easily evaluated, communicated, or described to other people, while other innovations are difficult to evaluate, communicate or describe to others.

Figure 1 provides a framework, a scheme of concepts (variables or constructs) on which the study is built. The framework has one dependent variable, namely the adoption of an innovation, being related to three groups of independent variables, namely the individual characteristics, the organizational characteristics and the perceived characteristics of an innovation.

The dependent variable was operationally defined, that is, broken into two concepts, namely knowledge and use of the innovation. Rogers (2003) observes that newness in an innovation need not just involve new knowledge. Someone may have known about an innovation for some time but not yet developed a favourable or unfavourable attitude toward it, nor have adopted or rejected it. Newness of an innovation may be expressed in knowledge, persuasion or a decision to adopt or use it. However, since one of the independent variables, perceived innovation characteristics, is very near to attitude, in the model (Figure 1) it is proposed that only knowledge and use be the appropriate measures of diffusion and/ or adoption of an innovation. Similarly the first independent variable is operationalised into two concepts or individual adopter characteristics, namely the interaction with change agents of relevance to the innovation, skills with respect to the innovation, and demographic variables operationalised as age, gender and income level. Under the third independent variable, there are four concepts or perceived characteristics of the innovation, namely its perceived relative advantage, compatibility, user friendliness and observability. Under the second independent variable, there are four concepts or organisational characteristics, namely the organizational readiness for change, culture with respect to the innovation, size of the organisation, and organisational's change management style with respect to the innovation.

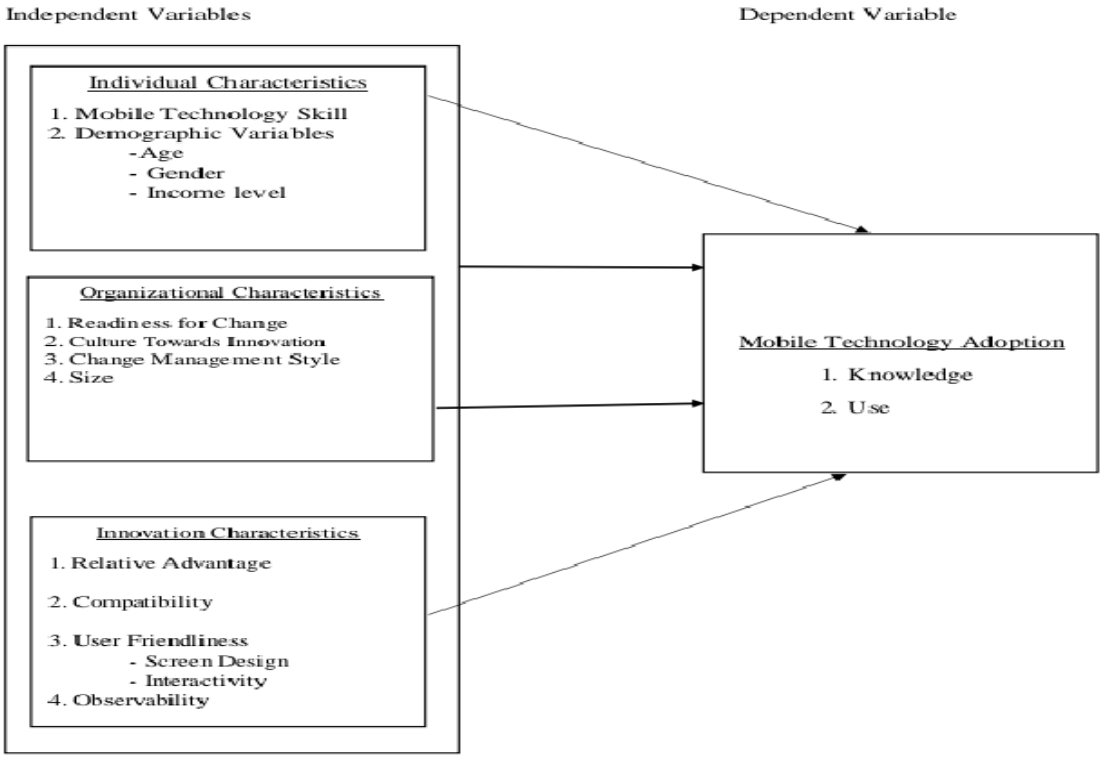

Figure 1: Conceptual model of technology adoption by personnel in university libraries in South-West, Nigeria (Self designed)

Rogers (2003) identified five adopter categories that serve as the classifications of the members of a social system on the basis of innovativeness, the degree to which an individual or other unit of adoption is relatively earlier in adopting new ideas than other members of a system. The continuum of innovativeness, according to Rogers (2003) can be partitioned into five adopter categories which are: Innovators (venturesome); early adopters (respect); early majority (deliberate); late majority (skeptical); and laggards (traditional).

Innovators (Venturesome) are usually obsessed with innovations. Their interest in new ideas leads them out of a local circle of peer networks and into more cosmopolite social relationships.

Early adopters (Respect) are a more integrated part of the local social system than are innovators. Whereas innovators are cosmopolites, early adopters are localities. This adopter category, more than any other, has the highest degree of opinion leadership in most systems. Potential adopters look to early adopters for advice and information about an innovation. The early adopter is considered by many to be "the individual to check with" before adopting a new idea (Rogers, Singhal, and Quinlan, 2009).

The early majority (Deliberate) adopt new ideas just before the average member of a system. The early majority interacts frequently with their peers but seldom hold positions of opinion leadership in a system. The early majority's unique location between the very early and the relatively late to adopt makes them an important link in the diffusion process. They provide interconnectedness in the system's interpersonal networks. The early majority is one of the most numerous adopter categories, making up one-third of all members of a system.

The late majority (Skeptical) adopt new ideas just after the average member of a system. Like the early majority, the late majority make up one-third of the members of a system. Adoption may be both an economic necessity for the late majority and the result of increasing peer pressures. Innovations are approached with a skeptical and cautious air, and the late majority does not adopt until most others in their system have done so.

Laggards (Traditional) are the last in a social system to adopt an innovation. They possess almost no opinion leadership. Laggards are the most local of all adopter categories in their outlook. Many are near isolates in the social networks of their system. The point of reference for the laggard is the past. Decisions are often made in terms of what has been done previously, and these individuals interact primarily with others who also have relatively traditional values. Laggards tend to be suspicious of innovations and of change agents. Their innovation-decision process is relatively lengthy, with adoption and use lagging far behind awareness-knowledge of a new idea.

According to Basri, Alandejani, and Almadani (2018), the adoption of technologies brings about a number of substantial opportunities for librarians, in terms of reducing their workload, facilitating access to information contents, and efficiently meeting the various information needs of users. These opportunities enable librarians to function effectively in the library, thus enabling them to align themselves with the evolution of other librarians in the 21st century. Adoption of technologies increases access to information contents and other scholarly resources through wireless communications and organization facilitating developments of new services in the library. Bejalwar (2018) posit that technology adoption has the potential to enhance libraries' service provision through the communication of knowledge and information to users at different geographical locations. The adoption of technologies also has the ability to provide capacity building collections for the library by providing access to limitless information, data, resources, and documents on the web. The adoption of mobile

technologies will further enable the academic library to become a hub of knowledge for its parent institution and the immediate community Anbu and Kataria (2017).

Statement of the problem

There is increasing discussion on the use and importance of technology for service provision in academic libraries. Technology's role is to enhance the delivery of services, which in turn has the potential to transform service provision to library users. Despite the significant leap in the use of technology in every facet of lives and the push by institutions to incorporate technology, library personnel are reluctant to adopt technology for day-to-day operations (Oyelude, 2018). Yamaguchi (2018) attributed reluctance of technology adoption to inadequate support from organization, Similarly, Bakkabulindi (2014) taking the route of diffusion of information theory, related individual characteristics and innovation characteristics of such technology, as reasons for reluctance in innovation adoption. Transforming traditional methods of operation is necessary to meet the library users' needs. Adopting technologies will require both library personnel to learn how to use technologies and organizational recognition that library personnel value mobile technology in their operations. While there is extensive research on faculty reluctance to technology in teaching and learning, there is limited literature relating individual, organization and innovation characteristics to technology adoption by library personnel. It is against this background that this study investigates the combined effect of individual, organizational and innovations characteristics as predictors of technology adoption by personnel in university libraries in South-West, Nigeria.

Objective of the study

The main objective of this study is to determine the combined influence of individual, organizational and innovation characteristics on technology adoption in university libraries in South-West, Nigeria. The specific objectives are to:

1. identify the types of technology adopted in university libraries in South-West, Nigeria;
2. examine the extent to which library personnel adopt technology in universities in South-West, Nigeria;
3. determine the technology adoption categories in university libraries in South-West, Nigeria;
4. identify factors that inhibit adoption of technology by personnel in university libraries in South-West, Nigeria; and
5. examine the combined influence of individual, organizational and, innovation characteristics on mobile technology adoption by personnel in university libraries in South-West Nigeria.

Research questions

Based on the specific objectives, this study answered the following research questions:

1. What are the technologies adopted by personnel in university libraries in South-West, Nigeria?
2. To what extent are mobile technologies adopted among personnel in university libraries in South-West, Nigeria?
3. What are the categories of technology adoption of library personnel? This
4. What are the factors that inhibit the adoption of mobile technologies by personnel in university libraries in South-West, Nigeria?

Hypothesis

The following null hypothesis was tested at 0.05 level of significance for the Study:

> **Ho_1**: Individual, organizational and, innovation characteristics jointly, has no significant influence on mobile technology adoption by personnel in university libraries in South-West, Nigeria?.

Scope of the study

This study focused on combine effect of individual, organizational, and innovation characteristics as predictors of technology adoption by personnel in university libraries in South-West, Nigeria. Individual characteristics in this study cover: skills and demographic variables such as age, gender, and income level. Organizational characteristics on the other hand include organizational readiness for change, organizational culture towards innovation, organizational size, and organizational change management style. Also, innovation characteristics cover relative advantage, compatibility, user-friendliness, and observability. The sub-constructs to be considered under technology adoption are knowledge and use of technology. The study was undertaken in South-West, Nigeria, comprising six states. The study population comprised 130 librarians and 104 library officers in 12 government-owned universities from 6 states in South-West, Nigeria, in which 4 out of these universities are owned by the federal government while the other 8 are owned by the state government. The study sample size is therefore, 234**.**

Methods

The study employed a survey research design which involves a one-time interaction with librarians and library officers in the study area. The study population comprised all 234 librarians and library officers in twelve (12) government owned universities from six states in South-West, Nigeria. Four out of the universities are owned by the federal government while the other six are owned by state government. The study population adopted total enumeration of all 234 librarians and library officers as participants in the study. A structured and validated questionnaire was used for data capturing while data analysis were done using descriptive and inferential statistics.

Results and discussion

Research question one: What are the types of technologies adopted by personnel in university libraries in South-West, Nigeria? This research question sought to identify the most adopted type of technology by library personnel in university libraries in South-West, Nigeria.

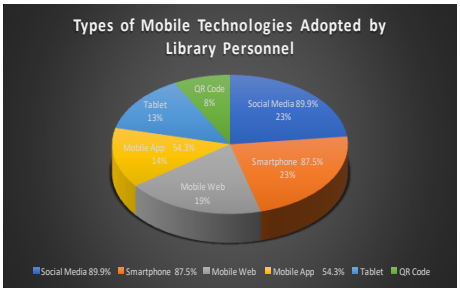

Figure 2- Types of Technologies adopted by library personnel

Figure 2 reveals that a significant number of personnel in university libraries in South-West, Nigeria identified social media (89.9%) and smartphone (87.5) as the most adopted technology. Half of the respondents adopted mobile apps (54.3%) and tablets (51.9%). On the other hand, QR code technology, regardless of being core to library services was least adopted (30.3%) among personnel in university libraries in South-West, Nigeria.

Research question two: To what extent are mobile technologies adopted among personnel in university libraries in South-West, Nigeria?

Table 1: Extent of technology adoption

Items	To a Very Low Extent		To a Low Extent		To Some Extent		To a High Extent		To a Very High Extent		Mean $\bar{x}$
	N	%	N	%	N	%	N	%	N	&	
Social media											
Social media is adopted to create awareness for the library on various online platforms	8	3.8	8	3.8	45	21.6	79	38.0	68	32.7	3.92
Social media is adopted to inform library users about new additions to the collections of the library	10	4.8	13	6.3	45	21.6	63	30.3	77	37.0	3.88
Social media is adopted to respond to inquiries of library users	10	4.8	13	6.3	51	24.5	76	36.5	58	27.9	3.76
Group mean= 3.85											
Smartphone											
Smartphone is adopted to source for information on the internet	1	0.5	10	4.8	56	26.9	75	36.1	66	31.7	3.94
Smartphone is adopted to contact library users about notice alert and events in the library	4	1.9	15	7.2	63	30.3	71	34.1	55	26.4	3.76
Smartphone is adopted to share document and with users	7	3.4	20	9.6	58	27.9	71	34.1	52	25.0	3.68
Group mean= 3.79											
Mobile website											
Mobile website is adopted to enable the downloading of information materials by library users	12	5.8	26	12.5	47	22.6	82	39.4	41	19.7	3.55
Mobile website is adopted to upload and post event happening in the library	14	6.7	31	14.9	44	21.2	72	34.6	47	22.6	3.51
Mobile website is adopted to assist library users with services delivery	12	5.8	34	16.3	42	20.2	82	39.4	38	18.3	3.48

Group mean= 3.51											
Tablet											
Tablet is adopted for provision of access to E-resources	26	12.5	30	14.4	53	25.5	63	30.3	36	17.3	3.25
Tablet is adopted for giving new library users orientation program about the library environment	30	14.4	40	19.2	51	24.5	58	27.9	29	13.9	3.08
Tablet is adopted for streaming of video on the internet for users	32	15.4	39	18.8	55	26.4	56	26.9	26	12.5	3.02
Group mean= 3.12											
Mobile application (app)											
Mobile app is adopted to create an interactive and collaborative platform for library users	47	22.6	26	12.5	54	26.0	56	26.9	25	12.0	2.93
Mobile app is adopted to provide library users with quick access to E-resources services	50	24.0	27	13.0	45	21.6	63	30.3	23	11.1	2.91
Mobile app is adopted to enable library users with self-services such as, reference services, information retrieval services and orientation services	51	24.5	27	13.0	53	25.5	49	23.6	28	13.5	2.88
Group mean= 2.91											
Quick response code (QR Code) technology											
QR Code is adopted to encode relevant information about the library on the web	77	37.0	47	22.60	30	14.4	28	13.5	26	12.5	2.42
QR code is adopted to promote digital collections in the library	78	37.5	47	22.60	25	12.0	35	16.8	23	11.1	2.41
QR Code is adopted to notice library users about space reservations in the library environment	81	38.9	48	23.08	28	13.5	31	14.9	20	9.6	2.33
Group mean= 2.39											
N= 208, Grand mean= 3.26											

Note: Criterion mean response range; To a very low extent (1<$\bar{x}$ ≤1.9), To a low extent (1.5<$\bar{x}$ ≤2.9), To some extent (2.5<$\bar{x}$ ≤3.9), To a high extent (3.5<$\bar{x}$ ≤ 4.9), To a very high extent (4.9<$\bar{x}$ ≤5.0)

Table 1 reveals the extent of technologies adopted by library personnel in university libraries in South-West Nigeria. Six indicators were used to measure the respondents' extent of technologies adopted. Reporting on the overall result in Table 1, the grand mean of technologies adopted by library personnel in academic library in South-West Nigeria is 3.26 and its value is within the criterion mean response range of "To some extent" ($2.6<\bar{x} \leq 3.9$) therefore, it can be inferred that technology was "to some extent" adopted by personnelin university libraries in South-West, Nigeria.

Research question three: What are the categories of technology adoption of library personnel? This research question was aimed at identifying the categories of technology adoption by personnel in university libraries in South-West, Nigeria

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Table 2: Technology adoption categories

Categories of technology adoption by library personnel	Strongly Disagree		Disagree		Agree		Strongly Agree		Mean
	N	%	N	%	N	%	N	%	
early majority (Deliberate)									
I interact with library personnel from other libraries on development of technology	7	3.4%	27	13.0%	123	59.1%	51	24.5%	3.05
I read articles that are based on the evolution of technology development	3	1.4%	18	8.7%	126	60.6%	61	29.3%	3.18
I visit websites that provide insights into the sphere of technology	5	2.4%	14	6.7%	128	61.5%	61	29.3%	3.18
Group mean=3.14									
Early adopter (Respect)									
I interact with students and technology-oriented individuals about technology development	16	7.7%	40	19.2%	109	52.4%	43	20.7%	2.86
I write articles that are based on evolution and trends of technology	14	6.7%	62	29.8%	91	43.8%	41	19.7%	2.76
I am stimulated to give quick response to users via technology	11	5.3%	31	14.9%	127	61.1%	39	18.8%	2.93
Group mean=2.85									
Innovators (Venturesome)									
I can develop mobile application	68	32.7%	78	37.5%	50	24.0%	12	5.8%	2.03
I can be consulted when people have challenges with using technology	24	11.5%	64	30.8%	96	46.2%	24	11.5%	2.58
I endeavor to educate my colleagues on technology development	23	11.1%	77	37.0%	69	33.2%	39	18.8%	2.60
Group mean=2.40									
Late majority (Skeptical)									
I perceive that technology is less user-friendly due to limited screen size	62	29.8%	108	51.9%	27	13.0%	11	5.3%	1.94
Due to poor connectivity I perceive that technology will not be effective in my operation in the library	55	26.4%	111	53.4%	36	17.3%	6	2.9%	1.97
I perceive that the use of wired technology is more effective than the use of mobile technology	66	31.7%	97	46.6%	33	15.9%	12	5.8%	1.96

Data in Table 2 show the categories of technologies adoption of library personnel in academic library in South-West, Nigeria, with respect to the indicators used in this study. From the data presented on the table it was revealed that a significant percentage of library personnel in University libraries in South-West, Nigeria agreed to be Early Majority (Deliberate) (3.14) and Early Adopter (Respect) (2.85). While a low number of the respondents agreed to be Late Majority (Skeptical) (1.96) and Laggard (Traditional) (1.54).

The analysis of the results in table 2 revealed that many of the respondents can be classified as early majority (mean=3.14) which suggests that they are deliberate in the adoption of mobile technology for library service provision. This also implies that the library personnel read articles that are based on the evolution of mobile technology development, they visit websites that provide insights into the sphere of technology and they interact with library personnel from other libraries on development of technology adoption. Some of the library personnel can also be seen as innovators (mean=2.40) which suggests that they rarely develop mobile technology for library services provision.

Research question four: What are the factors that inhibit the adoption of mobile technologies by personnel in university libraries in South-West, Nigeria? This research question was centered on considering the factors that inhibit the adoption of technology adoption by personnel in university libraries in South-West, Nigeria.

Table 3: Factors that inhibit adoption of technology

	Strongly Disagree		Disagree		Agree		Strongly Agree	
Factors	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Insufficient training prevents the adoption of technology	4	1.9%	14	6.7 %	104	50.0%	86	41.3 %
Unavailable technological infrastructure prevents the adoption of technology	13	6.3%	10	4.8 %	102	49.0%	83	39.9 %
Poor network is a challenge to technology adoption	13	6.3%	4	1.9 %	113	54.3%	78	37.5 %
Epileptic power supply affects the adoption of technology	4	1.9%	11	5.3 %	120	57.7%	73	35.1 %
Poor accessibility prevents the adoption of technology	10	4.8%	10	4.8 %	116	55.8%	72	34.6 %
Inadequate knowledge proves to be a challenge in the adoption of technology	9	4.3%	14	6.7 %	113	54.3%	72	34.6 %
N= 208								

Regarding the factors that inhibit the adoption of technology by personnel in university libraries in South-West, Nigeria, it was revealed that both insufficient training (41.3%) and unavailable technological infrastructure (39.9%) significantly inhibited the adoption of technology by librarians. While poor accessibility (34.6%) and inadequate knowledge (34.6%) had low impact on the inhibition of technology adoption.

Hypothesis: Individual, organisational and innovation characteristics jointly have no significant influence on technology adoption by personnel in university libraries in South-West, Nigeria.

In order to determine the joint influence of individual, organizational and innovation characteristics on technology adoption by personnel in university libraries in South-West, Nigeria, multiple regressions was used. The data are presented in Table 4(a) and Table 4(b)

Table 4.a: Multiple regressions model summary showing the joint influence of individual, organizational and innovation characteristics on technology adoption by personnel in university libraries in South-West Nigeria.

Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.391[a]	0.153	0.14	14.19536

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	7398.75	3	2466.25	12.239	.000[b]
	Residual	41107.707	204	201.508		
	Total	48506.457	207			

a. Dependent variable: Technology adoption

b. Predictors: (Constant), Innovation characteristics, individual characteristics, organistional characteristics

Table 4.b: Multiple regression model summaries showing the joint influence of individual, organizational and innovation characteristics on technology adoption by personnel in university libraries in South-West Nigeria.

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	-2.643	12.513		-.211	.833
Individual Characteristics	-.149	.521	-.018	-.286	.776
Organistional Characteristics	.208	.187	.098	1.110	.268
Innovation Characteristics	.768	.215	.316	3.574	.000

a. Dependent Variable: Technology Adoption

Source: Field Survey 2020

From the result in Table 4.a and b, there was a joint significant positive influence of individual, organizational and innovation characteristics on technology adoption by university library personnel in South-West, Nigeria. Table 4.12a showed a coefficient determinant of R^2 =0.153 which implies that 15.3% of the variation in mobile technology adoption was jointly contributed by the predictors (individual, organizational and innovation characteristics), while the remaining 84.3% variation in technology adoption could only be explained by other variables not included in this study. The

results in table 4.a ($F(1. 208)= 12.239$, $p < 0.05$) showed that there was a joint significant positive influence of individual, organizational and innovation characteristics on technology adoption by library personnel in university libraries in South-West, Nigeria.

Table 4.b was used to explain the individual contribution of each of the predictors to technology adoption by librarians. Hence, individual characteristics (β= -.018, p-value (.778), B= -.149) was not a significant contributor. Similarly, organizational characteristics (β= 1.110), p-value (.2.68), B= .208) was not a significant contributor. However, innovation characteristics (β= 3.574), $p < 0.05$ B= .768) significantly contributed positively to the model, such that a relative improvement in innovation characteristics will result in a 0.768 corresponding improvement in technology adoption by librarians. It therefore implies that "innovation characteristics" was the main contributor to the joint influence of the predictor variables on technology adoption by personnel in university libraries in South-West, Nigeria.

Since there was a joint significant positive influence of individual, organizational and innovation characteristics on technology adoption by librarians. Therefore, the null hypothesis was rejected.

Conclusion

Although technology seems to have the potential for improving library services, the precise mode and the extent to which technology contribute to library development remain largely unexplored. Individual characteristics were defined in terms of the level of training and demographic variables such as age, gender and income level of an individual with regards to the adoption of an innovation. From the study, organizational characteristics are the support and attributes of a particular organization with regards to the adoption of an innovation. Organizational readiness for change, organizational culture towards innovation, organizational size and organizational change management style are the main factors of organizational characteristics that are likely to influence the adoption of innovations. Although, individual characteristics and organizational characteristics significantly influence technology adoption, findings of the study have shown that innovation characteristics are a key variable that influences the process of technology adoption.

In view of the findings of the study, the following recommendations are hereby made:

1. Strategies and policies such as institutionalizing technology usage in library services; therefore, library management should create awareness within the communities to embrace the adoption of technology adoption.
2. The study revealed that there was a joint significant positive influence of individual, organizational and innovation characteristics on technology adoption by personnel, therefore, library management should promote organizational characteristics on the attributes of technology from the perspective of its innovativeness.
3. Since technology adoption will lead to improved service quality and user's satisfaction, management of university libraries should invest in the provision of necessary infrastructure such as internet bandwidth, network facilities, and power supply to support technology adoption.
4. Insufficient training was a hindering factor to technology adoption; hence, training of library personnel on the

use of technology and other ICTs should be a regular activity in the library.

5. Since the technology adoption categories among the library staff were mainly "early majority" and "early adopter', the management of libraries should identify library personnel with the early majority and adopter with view to reinforcing interest in technology adoption.

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