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Effect of ICT Use on Library Service Delivery: A Comparative Approach from Two Universities

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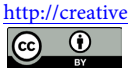

Abstract

The study is aimed at investigating the effect of Information and Communication Technology (ICT) use on library service delivery in two universities namely, University of Ghana library (Ghana) and Jiangsu university library (China). The paper adopted quantitative method and used a structured questionnaire to gather the research data. A sample size of 62 staff from Jiangsu University Library and 80 staff from the University of Ghana Library were selected. In all, a sample size of 142 respondents was used. Mathematical statistics methods, such as mean scores, standard deviations, independent samples t-test and structural equation modelling were used in making meaning of the data gathered. Results revealed that Reference, Digital, and Circulation services but Social media, were effective in service delivery in both universities. It was also revealed that lack of trained library personnel, poor internet connection and erratic power supply were the major challenges faced by UG library in the use of ICT. Lastly, result on effect of ICT use on library services revealed that the level of ICT use in library operations significantly influenced the level of library services delivered by both Jiangsu University (JU) library and University of Ghana (UG) library. The study recommends that academic libraries capitalize on the prospects of social media, to promote their services to their patrons (the academic community). Recommendation is also made for libraries to focus on the use of social media as a viable avenue to promote library services.

Subject Areas

Digital Libraries, Library Information, Library Services, Library Management

Keywords

ICT Use, Library Services, Digital Information, Librarians, University Library

1. Introduction

The term library has evolved from being a physical structure sited in a particular geographic area into a virtual or an electronic environment that is easily accessible globally. Formally, library collections were contained in a physical structure and consisted of physical materials or information resources like books, encyclopedias, periodicals, films and video tapes. Now, library collection comprises both the physical materials and all digital or electronic information resources and services provided that the library provides [1] [2]. Libraries have become one of the institutions mostly used to manage, disseminate and preserve knowledge. They try to meet the demands and needs of the current and future civilizations. In other words, satisfying the educational needs, cultural needs and the general information needs of their users [3] [4].

The technological change and its resultant transition from printing to digital publications have affected how information is managed, processed and used. Once upon a time, library collection was made up of only printed materials, since educational materials were only published in print. Technological revolution has introduced a new way by which information resources are being presented as well as a new infrastructure for information dissemination [5]. This has enabled library staff to manage, process and disseminate information across the globe. As a result, users can now have access to libraries' multimedia information remotely from anywhere in the world [6]. For instance, library patrons can now make reservations for their favourite library items online by using Online Public Access Catalogue (OPAC) [7] [8].

Information and Communication Technology (ICT) is a broad and distinct concept. It is defined by Blurton [9], as the use of all forms of technology related tools and resources to perform activities such as communicating, creation, dissemination, storage and managing information. Information and Communication technology (ICT) is widely recognized as a critical tool for improving and promoting efficiency in a variety of development areas [10] [11]. Libraries have worked to create and apply many types of technological innovations to enhance how services are delivered to users since the inception of ICT. Since the early 1970s, librarians have installed and deployed devices and software to improve their operations [12]. They've accomplished this through collaboration and cooperation with individuals and technological agencies, incorporating library and patron demands into the design and management of these technologies [13]. Despite the significant impact this technological change has made on libraries and librarians in developed countries, in particular, it has also presented a big challenge to librarians in developing countries. In his study to investigate students' loss of interest in using certain library services, Ali postulated that one of the causes of such development is a lack of trained library staff [14].

The aim of libraries is to provide services that satisfy their users' needs and wants, and the incorporation of ICT into library services has provided libraries with a great opportunity to do so [15]. As seen in research by [16] and [17], the

expansion of ICT in libraries has demanded investigations on its use and effect on services. Existing research mostly focuses on ICT and its effect on Library Services, particularly in the areas of ongoing developments that have transformed how libraries access, retrieve, store, control and disseminate information to users [18]. Related research only examined the different characteristics of digital libraries, their purposes, advantages, and certain key features [19]. In academic libraries, little research has been done on ICT and its effect on library services.

Furthermore, extant studies are limited to evaluating the effectiveness of library services and their challenges from the perspective of users. For instance, [20] focused on the extent to which users utilize ICT based library services and facilities and the challenges they are confronted with when using ICT products and services in the libraries investigated. Initial literature analyses reveal that, little research has been done on the topic in Ghana and China. Library administrators in Ghana and other parts of the world, particularly in academic libraries, struggle to assess the efficiency and effectiveness of their ICT implementations, as well as the degree to which their libraries meet users' expectations and requests. Hence, the motivation for this study is to fill these gaps.

2. Research Objectives

- To assess the level of effectiveness in service delivery among the two University libraries.
- To assess the challenges in the use of ICT on library services delivery in the two University libraries.
- To assess the effects of ICT use on library services delivery in the two University libraries.

3. Literature Review

3.1. Information and Communication Technology (ICT) Concept

"Information and Communication Technology (ICT) is both a huge industry, and the source of dramatic changes in business practices in all sectors [21]. The term ICT covers a number of related fields of study and scope, from semiconductor design and production, hardware manufacture (mainframes, servers, PCs, and mobile devices), and software, data storage, backup and retrieval, networking, and the internet [22] [23]."

[24] shared her opinion on how ICT has changed job functions in organizations. She explained this in three ways. First and foremost, there has been automation of clerical jobs and routine tasks which are often involved in assembly-line. In addition, non-routine task done by skilled personnel has been changed. Finally, productivity has increased due to support ICT gives to technical and managerial jobs.

3.2. Importance of ICT Use in University Libraries

Libraries play a significant role within universities by supporting their objectives

of teaching, learning, research and other services to their communities [25]. The degree to which universities are able to work to achieve their objectives, shows how much support the university libraries have been providing, by way of making important information resources available to their users [26].

For the past two decades, university libraries have seen an evolution process as a result of the application of IT. This transition was identified in the area of resource acquisition and usage as well as users [27].

Libraries are now using ICT to offer services like circulation, cataloguing and classification, referencing, money transition, acquisition, documentary delivery, user orientation, inter library loan, chat assistance and e-mail, bibliographic, web 2.0 interactive sharing, photocopies, electronic contents and book and serial.

Apart from the numerous benefits remote libraries derive from such opportunities, university libraries are also enabled to provide speedy and vital information to library users by these opportunities [28] [29] [30]. The internet is considered to be one of the greatest things that have happened in the past century [31]. According to Fitzgerald and Savage [32], the World Wide Web has had lots of influence on libraries, especially in terms of logistics of service delivery. [23] posit that, academic libraries are now able to provide access to broad information around the globe without geographical boundary though the availability of internet and e-mail facilities.

3.3. Effects of ICT Use in Academic Libraries

One of the factors that might affect the use of ICT in the organization is the impact it makes. Concerning Information Technology and its usage in organizations, [33] as cited in [34], indicated that, ICT was able to revolutionize some parts of the working conditions of employees in an organization, such as the enterprise and mutual relationships which could ultimately affect employees and the gratification they get from their job significantly. The adoption and use of ICT are essential not only to university libraries, but also to the development of a nation as a whole. However, there is a significant divide with regard to the effects of ICT use, between developing countries, specifically, African countries and developed countries, specifically, China's ICT [35] [36].

In respect to academic libraries, the radical change from the traditional and manual process of accomplishing tasks in the library working environment to a rapid usage of ICT has had a significant effect both on the wellbeing of beneficiaries of library services and librarians [37] [38] [39]. Baro [40] indicates that provision of academic library services has now been revolutionized with the adoption and use of ICT. He intimates that, "ICT is heavily utilized in the storage, processing and dissemination of information.

Thompson and Pwadura [41] also, in enumerating the benefits of use of ICT at the Navrongo campus library, University for Development Studies, posit that, "the Navrongo Campus Library is now enjoying the Primary Level of Automation (PLA), where a patron can search to determine the status of a library book

before he or she comes to the library to borrow. One can also make reservations through this service.

Defaulters and patrons in possession of overdue library materials can now be easily traced and given sanctions according to library rules [41]. Similar views are expressed by [42], who suggests that, "Information and Communication Technologies (ICTs) enhances service provision to library clientele.

3.4. ICT Use and Associated Challenges

According to [43], one of the factors that negatively affect the adoption and use of ICTs is poor economic condition. [44] and [45] recount how expensive is it to put up an ICT infrastructure. They explained that lots of things go into the setting up of an ICT infrastructure. Things such as the building of network infrastructure, purchasing of computers and accessories and hiring or employing of highly skilled staff to manage the system. To acquire all of these are capital intensive they added.

Lots of universities in Africa are supported and funded by the governments and do not create profits on their own. This assertion has been shown in number of studies and the end result has always been that ICT turns to suffer because the governments channel their scarce resources of funding to other prioritised areas rather than ICT [43] [46] [47]. One needs resources like affordable and reliable internet supply, good computing facilities, steady electricity supply, among others, in order to enjoy ICT usage. However, studies conducted by [44] and [48] revealed that adoption and use of ICTs by countries who lack the resources that give access to ICT, continue to remain fairly low. Developing countries like Nigeria and Malawi continue to battle with this same problem [23].

4. Conceptual Framework and Study Hypotheses

Based on the objectives of the study, the researcher developed a conceptual framework to serve as the engine that will help establish influence that one phenomenon has on others. The role of the framework also, is to buttress the significance of the literature sourced, to answer a question that other researchers have not explained yet and to understand the gap in the field of study that needs to be filled by the researcher. The conceptual framework of this study shows the relationship between the variables used. Thus, the Dependent variables (Reference service, Digital content, Circulation service and Social media service) and Independent Variable (ICT Use). **Figure 1** shows the conceptual framework for the study.

Based on the sampled population the researcher developed hypotheses to predict possible outcome or results of the research. In this study, the researcher tries to confirm that ICT will make significant differences in the library service delivery. The following hypotheses were put forward:

The use of ICT in the sampled university libraries has positively affected access to reference materials. [49] asserts that use of ICT in libraries has enhanced the

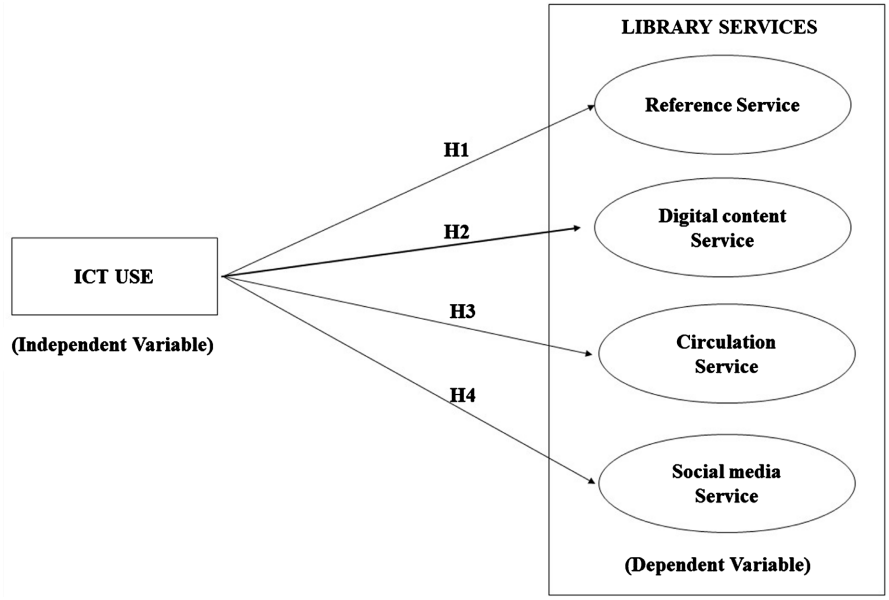

Figure 1. Conceptual framework diagram.

rendering of references services like "ask a librarian" and remote access to reference librarians. Hence, hypothesis 1 (H1) frames as follows:

*H*1: *ICT Use has a significant positive effect on Reference services of university libraries.*

ICT use in the sampled university libraries has allowed digitization of library collection for easy access. [50] maintains that innovative use of ICT has an effect on digital contents. In short, ICT use has affected digital content service positively. Hence, hypothesis 2 (H2) frames as follows:

*H*2: *ICT Use has a significant positive effect on Digital content Service of university libraries*.

ICT use in the sampled university libraries has made library function such as Circulation less laborious and efficient. [7] opines that present circulation service of libraries is being influenced heavily by ICT. In a nutshell, ICT use has affected Circulation services positively. Hence, hypothesis 3 (H3) frames as follows:

*H*3: *ICT Use has a significant positive effect on Circulation Services of university libraries.*

The use of ICT in the sampled university libraries has improved easy flow of information from the libraries to users than before. [51] postulates that the use of ICT has brought a lot of relevance to social media. It is therefore assumed that ICT use has affected social media services positively. Hence, hypothesis 4 (H4) frames as follows:

*H*4: *ICT Use has significant positive effect on social media services of university library. The overall hypotheses are summarized below.*

H1: ICT Use has a significant positive effect on reference services of university libraries.

H2: ICT Use has a significant positive effect on circulation services of univer-

sity libraries.

H3: ICT Use has a significant positive effect on digital content services of university libraries.

H4: ICT Use has a significant positive effect on social media services of university libraries.

5. Methodology

The study adopted quantitative method and used structured questionnaire to gather the research data. The research design was also cross-sectional, as data was gathered at a particular point in time, from a cross-section of a population, to make inferences and generalization to the entire population of the study. The researcher used eight weeks in all, to collect the data for the study. Questionnaires were administered to respondents in two forms. Respondents in UG library were given hardcopy or printed questionnaire while data from respondents in JU library was collected through online survey. This study used questionnaire as the data collection tool, as questionnaires are more constant, stable and have uniform measures with no variations and also reduce research bias [52]. The questionnaire had five sections. Section A addressed respondents' demographics. Section B addressed level of effectiveness of library service delivery, measured on a Likert scale of 1-Not effective at all, 2-Not effective, 3-Somehow effective, 4-Effective, and 5-Highly effective. Section C addressed the effects of ICT Use on library services, measured on a Likert scale of 1-Strongly disagree, 2-Disagree, 3-Somehow agree, 4-Agree, and 5-Strongly agree. Finally, Section D addressed the challenges of ICT Use, also measured on a measured on a Likert scale of 1-Strongly disagree, 2-Disagree, 3-Somehow agree, 4-Agree, and 5-Strongly agree. Likert scale is preferred by most researchers because it is simple and easy to interpret. The researcher also chose Likert scale because it is easy for computation and requires minimum thinking (easy to complete) [53].

200 staff were initially selected for both libraries. Purposive and convenient sampling were used in selecting the respondents from both libraries. 62 staff respondents were obtained from Jiangsu University Library and 80 staff respondents from the University of Ghana Library. In all, 142 respondents fell under the two sampling techniques. To ensure consistency, the primary data was first edited to correct any errors before being coded and analyzed. The quantitative data was analyzed with the Statistical Package for Social Science (SPSS v.23) and Amos (v.23) to generate and interpret the variables. Mathematical statistics methods, such as mean scores, standard deviations, independent samples t-test and structural equation modelling were used in making meaning of the data gathered.

Since the mean provides a central value but no information about where it came from, it was important to find in order to allow us to measure the data sets dispersion, which would in turn give us differences between the two groups (population) [54]. The standard deviation was used to provide the data variance

and the square root of the values obtained [54]. An independent sample t-test was done as it allowed the researchers to tell whether there is a statistically significant difference in the mean scores for the two groups or not [55]. SEM facilitated in modeling the relationships between the observed indicators and latent constructs. Based on theory for measurement model, SEM was used because of its capacity to combine empirical observations with relations among unobserved constructs into a single integrated system [56].

6. Test Reliability and Validity

Reliability and validity issues are critical concerns in research. This study therefore undertook some measures to ensure the final results presented were based on reliable and valid data, as well as sound methodology. As part of SEM, it is expected that the Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) are presented to ensure the soundness of the path estimates. Discriminant validity was also checked.

6.1. Exploratory Factor Analysis (EFA)

Table 1 presents the EFA results, which were run in SPSS (v.23). The questionnaire had 8 observed items measuring ICT Effect. The dependent variable, Library Service, had four dimensions. These were circulation services, reference services, digital content services, and social media services. Circulation service had 6 observed variables, reference service had 9 observed items, digital content service had 5 observed variables, and social media services 7 observed variables.

The total variance extracted (TVE) was expected to be at least 50%, and from Table 1, we realized the TVE for this study was 76.54%, which was very high. The Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy, and a minimum of 0.6 was expected. This study however scored 0.814. The Bartlett's Test of Sphericity was expected to be statistically significant, to indicate there existed adequate correlations among the variables to warrant EFA. Results for this was statistically significant (x2 = 644.22; Sig. = 0.000), indicating EFA was appropriately conducted. The correlation Determinant was expected to be not equal to zero (0), as an indication of positive definiteness. The Determinant for this EFA was 0.0005 (greater than 0), indicating there was positive definiteness in the data used for the estimation.

6.2. Confirmatory Factor Analysis (CFA)

After the EFA met the respective thresholds, the data was further tested using CFA, as presented in Table 2. Just like the EFA, the standardized factor loadings for each measurement variables were expected to be at least 0.5. This was achieved for all the measurement items, indicating the measurement items significantly defined the proposed latent variables. The Cronbach's Alpha (CA) for all the variables were larger than the minimum expected value of 0.7, indicating there was high internal consistency among the measurement variables.

Table 1. Exploratory factor analysis (EFA).

	Component					Total Variance Explained
	1	2	3	4	5	
ICT-U1	0.922					76.54%
ICT-U2	0.871					
ICT-U3	0.877					
ICT-U4	0.898					
ICT-U5	0.949					
ICT-U6	0.964					
ICT-U7	0.945					
RS1		0.915				
RS2		0.877				
RS3		0.845				
RS4		0.909				
RS5		0.929				
RS6		0.887				
RS7		0.901				
CL1			0.817			
CL2			0.796			
CL3			0.838			
CL4			0.904			
CL5			0.891			
CL6			0.848			
DC1				0.951		
DC2				0.807		
DC3				0.721		
DC4				0.837		
DC5				0.857		
SM1					0.763	
SM2					0.776	
SM3					0.673	
Kaiser-Meyer-Olkin Measure of Sampling Adequacy						0.814
Bartlett's Test of Sphericity			Approx. Chi-Square			644.22
			Df			88
			Sig.			0.000
a. Determinant						0.0005

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. Source: Field Data (2020).

Table 2. Confirmatory factor analysis (CFA).

Fit Indices CMIN = 45.150; DF = 23; CMIN/DF = 1.963; p-value = 0.255; GFI = 0.905; NFI = .913; TLI = .955; CFI = .957; RMSEA = 0.034; SRMR = 0.051	**Std. Factor Loading**
ICT Use (*ICT-U*): *CA* = 0.898; *CR* = 0.973; *AVE* = 0.838	
ICT-U1	0.911
ICT-U2	0.899
ICT-U3	0.825
ICT-U4	0.861
ICT-U5	0.977
ICT-U6	0.986
ICT-U7	0.937
Reference Services (*RS*): *CA* = 0.958; *CR* = 0.961; *AVE* = 0.783	
RS1	0.928
RS2	0.983
RS3	0.870
RS4	0.999
RS5	0.838
RS6	0.726
RS7	0.817
Circulation (*CL*): *CA* = 0.949; *CR* = 0938; *AVE* = 0.722	
CL1	0.566
CL2	0.733
CL3	0.840
CL4	0.930
CL5	1.003
CL6	0.946
Digital Contents (*DC*): *CA* = 0.896; *CR* = 0.916; *AVE* = 0.689	
DC1	0.992
DC2	0.758
DC3	0.800
DC4	0.846
DC5	0.730
Social Media (*SM*): *CA* = 0.924; *CR* = 0.949; *AVE* = 0.866	
SM1	0.760
SM2	0.802
SM3	1.173

Source: Field Data (2020).

As per model fit indices, CMIN/DF is expected to be less than 3, GFI should be at least 0.8, TLI and CFI are all expected to be greater than 0.9, whiles RMSEA and SRMR are also expected to be less than 0.08 [57]. From **Table 2**, it is realized that the results met these thresholds, and so we concluded that our data appropriately fit the construct model.

7. Analysis and Discussion

7.1. The Level of Effectiveness in Service Delivery among the Two University Libraries

The first objective of this paper sought to assess the level of effectiveness in the delivery of library services among the two Universities. Four library services were identified from literature, which were Reference services, Circulation, Digital contents and Social media. To assess if there existed any significant differences in the library services provided by JU and UG, independent samples t-test was conducted. Results revealed that both universities were effective in service delivery through Reference, Digital and Circulation services. Both universities were seen to have performed poorly through social media service. According to [58], the effective service delivery of a library is assessed by measuring the satisfaction that users derive from the service. That is, if the service meets the demands placed on it. In relation to the findings of this study, he remarked that library patrons are much concerned with the quality of the reference service they receive, and that providing a high-quality reference service should be a priority for all library services.

In assessing the perception of library service quality, [59] identified that the respondents perceived provision of circulation services, reference services as of good quality or effective, meritorious and encouraging. This supports the choice of our constructs in the assessment of the effectiveness of library service delivery.

[60] stated that libraries in academic institutions employ social media tools not only for communication purposes, but that they have also adapted their research methodologies to this context. Regrettably, only a few African university libraries have social networking sites, and only a few have been able to link their sites to their library's website [61]. This result also corroborates with the assertion of [62], that there are limitations involved in the use of social media (WhatsApp) for library service delivery. He outlined technological competence required to use the web client system to deliver services and time investment in the management of social media, as some of these bottlenecks. **Tables 3-6** present the t-test scores for the four services.

7.2. Challenges in the Use of ICT on Library Services Delivery in the Two University Libraries

To determine if there existed any significant differences in the challenges among both libraries, an independent samples t-test was conducted. Eighteen (18) ICT challenges were identified from literature and performed the test on. Result

Table 3. Independent samples T-test: reference service.

Measurement Items	University	*N*	Mean	Std. Deviation	Mean Difference	t	Sig. (2-tailed)
Reference Services (*RS*)	JU	62	4.25	1.214	−0.100	−0.544	0.587
	UG	80	4.35	1.107			
Emails (RS1)	JU	62	4.33	1.339	−0.125	−0.619	0.537
	UG	80	4.45	1.211			
Indexing & abstracting services (RS2)	JU	62	4.44	1.029	−0.100	−0.646	0.519
	UG	80	4.54	.927			
Bibliographic service (RS3)	JU	62	4.04	1.373	−0.150	−0.716	0.475
	UG	80	4.19	1.274			
Selective Dissemination of Information (RS4)	JU	62	4.31	1.318	−0.125	−0.625	0.533
	UG	80	4.44	1.210			
New arrivals alerts (RS5)	JU	62	4.25	1.364	−0.050	−0.239	0.811
	UG	80	4.30	1.277			
Current Awareness Services (RS6)	JU	62	4.14	1.447	−0.050	−0.224	0.823
	UG	80	4.19	1.370			
Electronic document delivery (RS7)	JU	62	4.25	1.419	−0.100	−0.461	0.645
	UG	80	4.35	1.323			

Source: Field Data (2020)

Table 4. Independent samples T-test: circulation service.

Measurement Items	University	*N*	Mean	Std. Deviation	Mean Difference	t	Sig. (2-tailed)
Circulation (*CL*)	JU	62	3.41	1.422	0.085	0.368	0.713
	UG	80	3.33	1.510			
Library membership (CL1)	JU	62	3.69	1.047	−0.213	−0.680	0.497
	UG	80	3.90	1.900			
Book reservation (CL2)	JU	62	3.64	1.478	0.063	0.261	0.794
	UG	80	3.58	1.549			
Overdue fines (CL3)	JU	62	4.23	1.591	0.200	0.783	0.435
	UG	80	4.03	1.638			
Reminders (CL4)	JU	62	2.90	1.620	0.125	0.477	0.634
	UG	80	2.78	1.691			
Interlibrary book loans (CL5)	JU	62	2.06	1.649	0.200	0.768	0.443
	UG	80	1.86	1.644			
Online chat (CL6)	JU	62	2.98	1.526	0.138	0.566	0.572
	UG	80	2.84	1.546			

Source: Field Data (2020).

Table 5. Independent samples T-test: digital contents.

Measurement Items	University	*N*	Mean	Std. Deviation	Mean Difference	t	Sig. (2-tailed)
Digital contents (*DC*)	JU	62	3.94	0.995	0.128	0.574	0.862
	UG	80	3.77	0.999			
Books and reference material (DC1)	JU	62	4.20	1.195	0.013	0.067	0.946
	UG	80	4.19	1.148			
Manuscripts & archival material (DC2)	JU	62	4.83	1.167	00.94	10.987	0.039
	UG	80	3.89	1.114			
Institutional databases/digital library (DC3)	JU	62	3.50	1.441	−0.125	−0.540	0.590
	UG	80	3.63	1.487			
Subscribed databases (DC4)	JU	62	3.84	1.471	0.050	0.218	0.828
	UG	80	3.79	1.429			
Open access material information (DC5)	JU	62	3.34	0.476	−0.013	−0.165	0.869
	UG	80	3.35	0.480			

Source: Field Data (2020).

Table 6. Independent samples T-test: social media.

Measurement Items	University	*N*	Mean	Std. Deviation	Mean Difference	t	Sig. (2-tailed)
Social media (*SM*)	JU	62	2.20	0.87084	0.013	0.088	0.930
	UG	80	2.19	0.92145			
Library Facebook account (SM1)	JU	62	1.95	0.940	0.012	0.088	0.930
	UG	80	1.94	0.847			
Twitter alerts for users (SM2)	JU	62	2.43	1.271	0.037	0.185	0.854
	UG	80	2.39	1.297			
LinkedIn (SM3)	JU	62	2.23	1.102	−0.012	−0.074	0.941
	UG	80	2.24	1.046			

Source: Field Data (2020).

revealed that both universities had only one (1) challenge in common, which was copyright and intellectual property rights management. It was also revealed that both universities were not facing four (4) out of the eighteen challenges which were examined. These included, no suitable working environment, lack of interest by library users, lack of co-operation within libraries and lack of awareness of ICT potentials by users. However, UG was found to be battling with twelve (12) out of eighteen of the challenges surveyed. These were, lack of trained library personnel on ICT; erratic power supply (which is a major challenge in Ghana, popularly known as "dumsor"); poor attitude of staff towards library automation and their unwillingness to change old ways of doing things; poor attitude of university management on ICT; lack of access to appropriate ICT equipment;

fear of change and a lack of personal change management skills; lack of ICT equipment support; obsolescence of software and hardware; cost of maintenance; cost of staff training; poor internet connection and poor connectivity; and the lack of back up services i.e. electricity/generator. The results corroborate with the assertion of [63] that, the major problem that the twenty-first century libraries are faced with is not insufficient funding, but the abysmal performance of library staff and other information professionals in underdeveloped nations due to a lack of ICT skills. One of the major restrictions that has given rise to the development of poor internet in Africa, according to [64], is lack of setup funds to build internet facilities. [65] postulate to further support this, that there is no effective telecommunications and power supply infrastructure in Africa to act as starting blocks for the development of internet services.

JU library showed less ICT challenges because they have improved ICT infrastructure which even reflected in the effectiveness of their service delivery. The reason for this significant progress and achievement is because China has put in place various policies to ensure and promote ICT utilization, especially in their educational sector. The education ministry in China for example, has effectively carried out several projects to facilitate and promote ICT use in schools. Some of these projects are School to School Network Project (Xiaoxiao tong) [66], New Curriculum Standards [67] and the Teachers Professional Development for ICT in Education [68]. Another important developmental resolution made by China in their educational reform is promotion of educational modernization with the use of ICT. **Table 7** presents the t-test scores for ICT use challenges.

7.3. Effects of ICT Use on Library Services Delivery in the Two University Libraries

The last objective of this study focused on the main thrust of the study, that is, assessing the effect of ICT use on library services delivery among the two Universities. To meet this objective, a Structural Equation Modelling (SEM) was adopted, using Amos (v.23). The dependent variables thus represented the four dimensions of library service (Reference services, Circulation, Digital contents, and Social media), whiles the independent variable was ICT Use. Data from the two institutional libraries were merged and used for the SEM, because 1) the t-test presented (**Table 3** to **Table 4**) indicate that there existed no significant differences in the data from two institutions, data was homogenous, and 2) larger sample size is more ideal for running SEM, so running the SEM for each University may be inappropriate (63 samples for JU and 80 for UG). **Figure 2** and **Table 8** represent the path summary for the SEM. The estimation was conducted after the EFA and CFA.

The results revealed that the level of ICT use in library operations significantly influenced the level of library services delivered by both JU library and UG library. The result is supported by the findings of [69], who stated that ICT has had enormous impact on the operations and services of the University libraries in Nigeria. This is in line with [70] assertion that, the digital shift spurred by ICT

Table 7. Independent samples T-test: Challenges of ICT use.

Measurement Variables	University	*N*	Mean	Std. Deviation	Mean Difference	t	Sig. (2-tailed)
Inadequate financial support from university authorities (C1)	JU	62	3.00	1.173	−1.38	−2.635	0.006
	UG	80	4.38	1.102			
Lack of trained library personnel on ICT (C2)	JU	62	2.15	1.157	−1.95	−2.881	0.001
	UG	80	4.10	1.277			
Erratic power supply (C3)	JU	62	1.10	1.169	−3.03	−4.124	0.000
	UG	80	4.13	1.090			
Lack of awareness of ICT potentials by users (C4)	JU	62	2.16	1.104	−0.69	1.207	0.232
	UG	80	2.85	1.369			
Poor attitude of staff towards library automation (C5)	JU	62	2.84	1.190	−1.04	−4.770	0.000
	UG	80	3.88	0.853			
Poor attitude of university management on ICT (C6)	JU	62	2.31	1.249	−1.27	−2.175	0.023
	UG	80	3.58	0.903			
Lack of access to appropriate ICT equipment (C7)	JU	62	2.23	0.895	−1.10	−1.985	0.041
	UG	80	3.33	1.023			
Fear of change and a lack of personal change management skills (C8)	JU	62	2.24	1.141	−1.19	−2.914	0.000
	UG	80	3.43	0.874			
Lack of ICT equipment support (C9)	JU	62	2.00	1.071	−1.95	−2.235	0.020
	UG	80	3.95	1.037			
Obsolescence of software and hardware (C10)	JU	62	2.06	0.918	−1.09	−1.994	0.050
	UG	80	3.15	1.001			
Cost of maintenance (C11)	JU	62	2.71	1.107	−.840	−3.789	0.000
	UG	80	3.55	1.085			
Cost of staff training (C12)	JU	62	2.76	1.112	−.292	−1.314	0.192
	UG	80	3.05	1.085			
No suitable working environment (C13)	JU	62	1.69	1.065	−.310	−1.332	0.187
	UG	80	2.00	1.177			
Poor internet connection (C14)	JU	62	1.19	1.226	−2.99	4.310	0.000
	UG	80	4.18	1.181			
Lack of back up services i.e. electricity/generator (C15)	JU	62	2.90	1.211	−0.78	−3.552	0.001
	UG	80	3.68	0.971			
Lack of interest by library users (C16)	JU	62	2.56	1.236	−0.270	−1.122	0.264
	UG	80	2.83	0.984			
Lack of co-operation within libraries (C17)	JU	62	2.37	1.059	0.071	0.324	0.746
	UG	80	2.30	1.091			
Copyright and intellectual property rights management (C18)	JU	62	3.45	1.169	0.077	0.366	0.715
	UG	80	3.38	0.774			

Source: Field Data (2020).

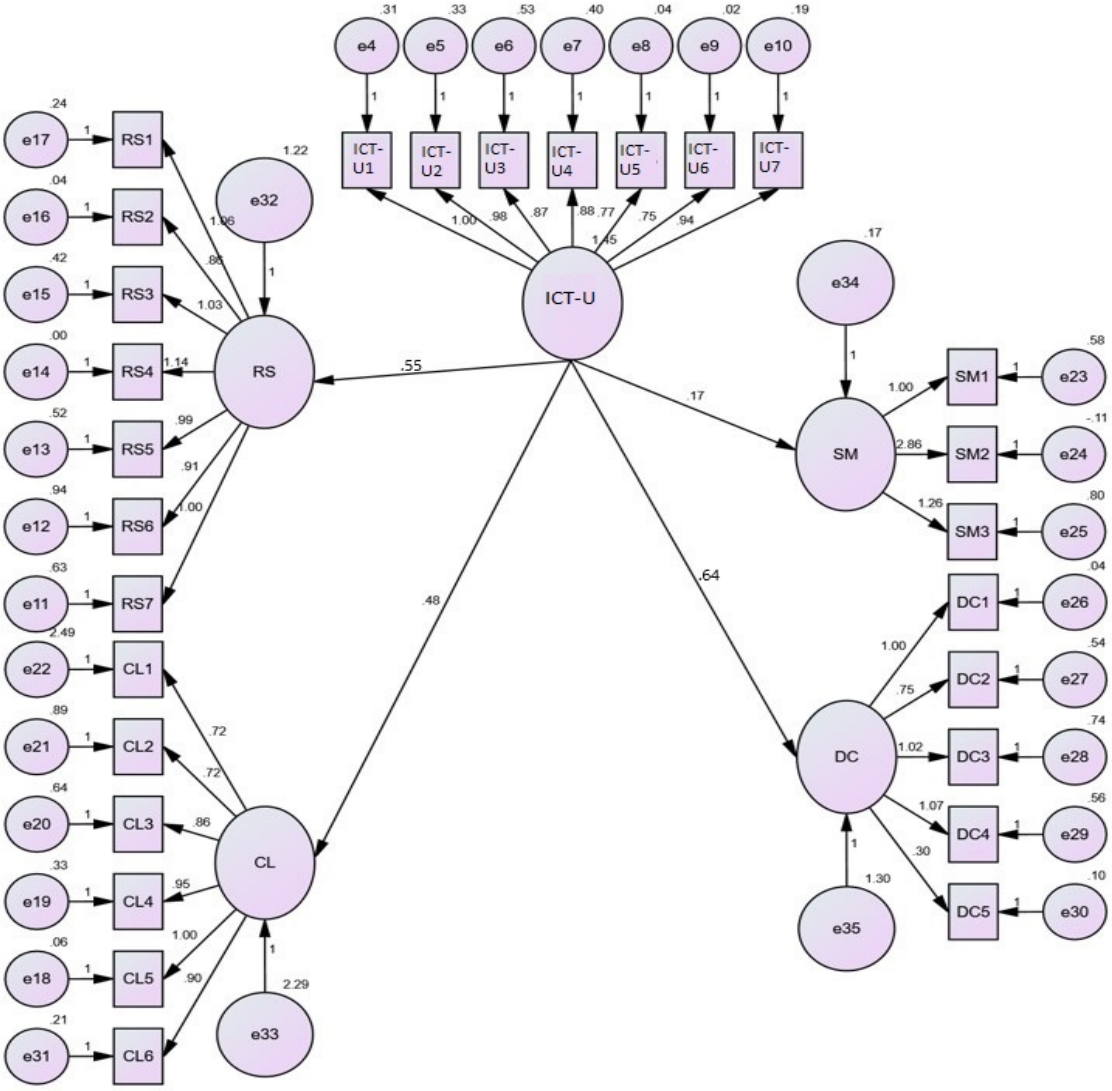

Figure 2. SEM path summary.

Table 8. SEM path summary.

			Estimate	S.E.	C.R.	P
RS	<---	ICT-U	0.554	0.073	7.589	***
SM	<---	ICT-U	0.168	0.042	3.992	***
CL	<---	ICT-U	0.476	0.103	4.632	***
DC	<---	ICT-U	0.642	0.171	3.754	***

*** ~ p-value significant at 0.01 (1%)

innovation has significantly changed academic libraries' service delivery. He adds that ICT has had an impact on every aspect of academic libraries' services and has revolutionized the library and information services globally. Supporting these views, [71] opines that Information and communication technology (ICT) possess the key to modernizing information services, as it does not only intro-

duce new ways of processing information, but also changes the structure of information and how it is communicated. [72] also reported how the use of Information and communication technology has had a profound effect on library work in Chinese libraries. According to [72], the use of ICT has greatly changed the way information is processed, stored and delivered in Chinese libraries. With the individual dimensions of library services, results showed that ICT digital content service had the greatest impact of 0.642 coefficient representing 64.2%. this was followed by reference service with 55.4%, circulation services with 47.6% and finally social media services with the least impact of 16.8%.

8. Conclusion

The study was set out to ascertain the effects of ICT use on library service delivery. The study was founded on sound literature, based on which the research instrument was developed. Sound methodology was also adopted in the analysis and presentation of results. After the analysis, it was concluded that Reference, Digital, Circulation services but Social media, were effective in service delivery in both universities. It was also revealed that lack of trained library personnel, poor internet connection and erratic power supply were some of the most challenges faced by UG library in the use of ICT. Lastly, result on effect of ICT use on library services revealed that the level of ICT use in library operations significantly influenced the level of library services delivered by both JU library and UG library.

9. Research Implication

The research findings present theoretical implications for ICT use literature by way of extending the scope of the research on performance in library service delivery. Furthermore, the findings will enable managers to identify how to effectively and efficiently manage their libraries by investing in new technologies. Also, these research findings will allow expansion of ICT use in libraries and other organizations from developing countries with the objective of identifying organizational performance.

10. Recommendations

Firstly, in this era of multiple and vibrant social medias, institutions have been using such mediums to target clients. For profit making firms, social media presents less option to market their products to customers. Although libraries are non-profit ventures, they could also capitalize on the prospects of social media, to promote their services to target audience (the academic community).

Secondly, it is also recommended that libraries focus on social media as a viable avenue to promote library services since social media is mostly patronized by the youth, who form a greater portion of the clientele of the libraries.

Libraries of today have outgrown the stage of being passive and archival institutions to become effective institutions of service. Evidence from other studies

has shown that one of the ways which have helped in this achievement is through effective reference service. It is therefore recommended that libraries could create enabling environments where users feel comfortable making inquiries. Again, timely responses should be attached to user enquiries.

It is also recommended that, university libraries, especially those in developing countries, seeking to improve their library performance should invest in ICT. Thus, it could greatly boost the performance of their libraries.

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Conflicts of Interest

The authors declare no conflicts of interest.

References

[1] Islam, S. and Islam, N. (2006) Information and Communication Technology (ICT) in Libraries: A New Dimension in Librarianship. *Asian Journal of Information Technology*, **5**, 809-817.

[2] Rahman, A., Uddin, H. and Akhter, R. (2004) Information and Communication Technologies, Libraries and the Role of Library Professionals in the 21st Century: With Special Reference to Bangladesh. In: *International Conference on Asian Digital Libraries*, Springer, Berlin, 608-617. https://doi.org/10.1007/978-3-540-30544-6_69

[3] Walsh, A. (2010) QR Codes-Using Mobile Phones to Deliver Library Instruction and Help at the Point of Need. *Journal of Information Literacy*, **4**, 55-65. https://doi.org/10.11645/4.1.1458

[4] George, C., *et al.* (2006) Scholarly Use of Information: Graduate Students' Information Seeking Behaviour. *Information Research*, **11**, Article No. 272.

[5] Schmidt, J. (2007) Promoting Library Services in a Google World. *Library Management*, **28**, 337-346. https://doi.org/10.1108/01435120710774477

[6] Cholin, V.S. (2005) Study of the Application of Information Technology for Effective Access to Resources in Indian University Libraries. *The International Information Library Review*, **37**, 189-197. https://doi.org/10.1080/10572317.2005.10762680

[7] Adebayo, O.A., Ahmed, Y.O. and Adeniran, R.T. (2018) The Role of ICT in Provision of Library Services: A Panacea for Sustainable Development in Nigeria. *Library Philosophy and Practice*, Paper 1951. https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=5305&context=libphilprac

[8] Ogar, C.E. and Dushu, T.Y. (2018) Transforming Library and Information Services Delivery Using Innovation Technologies. *Library Philosophy & Practice*, Paper 2036.

[9] Blurton, C. (1999) New Directions of ICT-Use in Education.

[10] Oliveira, T. and Martins, M.F. (2011) Literature Review of Information Technology Adoption Models at Firm Level. *Electronic Journal of Information Systems Evaluation*, **14**, 110-121.

[11] Della Volpe, V. (2015) ICT and Inclusion in Higher Education: A Comparative Ap-

proach. *Open Journal of Social Sciences*, **3**, 39-47. https://doi.org/10.4236/jss.2015.39007

[12] Blackburn, H. (2011) Millennials and the Adoption of New Technologies in Libraries through the Diffusion of Innovations Process. *Library Hi Tech*, **29**, 663-677. https://doi.org/10.1108/07378831111189769

[13] Bahri, S. and Ibrahim, A. (2013) RFID in Libraries: A Case Study on Implementation. *Library Hi Tech* News, **30**, 21-26. https://doi.org/10.1108/LHTN-03-2013-0012

[14] Ali, N. (2005) The Use of Electronic Resources at IIT Delhi Library: A Study of Search Behaviours. *The Electronic Library*, **23**, 691-700. https://doi.org/10.1108/02640470510635773

[15] Asogwa, B.E., *et al.* (2014) Use of ServQUAL in the Evaluation of Service Quality of Academic Libraries in Developing Countries. *Library Philosophy and Practice*, Paper 1146. https://digitalcommons.unl.edu/libphilprac/1146/

[16] Adanu, T.S. (2006) Planning and Implementation of the University of Ghana Library Automation Project. *African Journal of Library, Archives & Information Science*, **16**, 101-108.

[17] Amekuedee, J.O. (2005) An Evaluation of Library Automation in Some Ghanaian University Libraries. *The Electronic Library*, **23**, 442-452. https://doi.org/10.1108/02640470510611508

[18] Khan, J. (2016) Impact of Information Communication Technology on Library and Its Services. *International Journal of Research-GRANTHAALAYAH*, **4**, 97-100. https://doi.org/10.29121/granthaalayah.v4.i9.2016.2540

[19] More, R. (2012) Impact of Information and Communication Technology on Library Services. 447-449.

[20] Singh, A. (2015) ICT and Its Impact on Library and Information Services: A Case Study of Kendriya Vidyalaya Libraries. *International Journal of Science and Research*, **4**, 756-770.

[21] Paletta, F.C. and Dias Vieira Junior, N. (2008) Information Technology and Communication and Best Practices in It Lifecycle Management. *Journal of Technology Management Innovation*, **3**, 80-94. https://doi.org/10.4067/S0718-27242008000200007

[22] Wood, E., *et al.* (2012) Examining the Impact of Off-Task Multi-Tasking with Technology on Real-Time Classroom Learning. *Computers and Education*, **58**, 365-374. https://doi.org/10.1016/j.compedu.2011.08.029

[23] Ani, O.E., Esin, J.E. and Edem, N. (2005) Adoption of Information and Communication Technology (ICT) in Academic Libraries: A Strategy for Library Networking in Nigeria. *The Electronic Library*, **23**, 701-708. https://doi.org/10.1108/02640470510635782

[24] Friedberg, L. (2003) The Impact of Technological Change on Older Workers: Evidence from Data on Computer Use. *ILR Review*, **56**, 511-529. https://doi.org/10.1177/001979390305600309

[25] Adigun, G.O., Kotso, J.A. and Kolajo, F.S. (2013) Changing Roles of Academic and Research Libraries in Scholarly Information Communication Landscape: Case Study of Ahmadu Bello University, Zaria, Nigeria. *Greener Journal of Social Sciences*, **3**, 156-165. https://doi.org/10.15580/GJSS.2013.3.021213446

[26] Raitt, D. and Okiy, R. (2005) Strengthening Information Provision in Nigerian University Libraries through Information Communication Technologies. *The Electronic Library*, **23**, 311-318. https://doi.org/10.1108/02640470510603714

[27] Ramzan, M. (2004) Does Level of Knowledge Impact Librarians' Attitude toward Information Technology (IT) Applications? In: 2*nd International Caliber on Road Map to New Generation of Libraries Using Emerging Technologies*, INFLIBNET Centre, Ahmedabad. https://ir.inflibnet.ac.in:8443/ir/bitstream/1944/311/1/04cali_5.pdf

[28] Ramzan, M. and Singh, D. (2009) Status of Information Technology Applications in Pakistani Libraries. *The Electronic Library*, **27**, 573-587. https://doi.org/10.1108/02640470910979543

[29] Gulati, A. (2004) Use of Information and Communication Technology in Libraries and Information Centres: An Indian Scenario. *The Electronic Library*, **22**, 335-350. https://doi.org/10.1108/02640470410552974

[30] Adeleke, A.A. and Olorunsola, R. (2010) ICT and Library Operations: More on the Online Cataloguing and Classification Tools and Techniques in Nigerian Libraries. *The Electronic Library*, **28**, 453-462. https://doi.org/10.1108/02640471011052025

[31] Onyekwelu, D.C. (1999) Information Technology Revolution: Challenges and Opportunities for Library Services in Nigeria. *Nigerian Libraries*, **33**, 1-10.

[32] Fitzgerald, B. and Savage, F. (2004) Public Libraries in Victoria, Australia: An Overview of Current ICT Developments, Challenges, and Issues. *OCLC Systems & Services*: *International Digital Library Perspectives*, **20**, 24-30. https://doi.org/10.1108/10650750410527304

[33] Saidel, J.R. and Cour, S. (2003) Information Technology and the Voluntary Sector Workplace. *Nonprofit Voluntary Sector Quarterly*, **32**, 5-24. https://doi.org/10.1177/0899764002250004

[34] Hackler, D. and Saxton, G.D. (2007) The Strategic Use of Information Technology by Nonprofit Organizations: Increasing Capacity and Untapped Potential. *Public Administration Review*, **67**, 474-487. https://doi.org/10.1111/j.1540-6210.2007.00730.x

[35] Elbert, M., Fuegi, D. and Lipeikaite, U. (2012) Public Libraries in Africa-Agents for Development and Innovation? Current Perceptions of Local Stakeholders. *IFLA Journal*, **38**, 148-165. https://doi.org/10.1177/0340035212444512

[36] Ridwan, S.M. (2015) Application of Information and Communication Technology in Management of Information Resources and Services in Kaduna State Tertiary Institutions' Libraries Kaduna-Nigeria. In: 2*nd Mediterranean Interdisciplinary Forum on Social Sciences and Humanities*, *MIFS* 2014, European Scientific Institute, ESI (Publishing), Almeria.

[37] Adekanye, E.A. (2011) Computerization of the Fatiu Ademola Akesode Library, Lagos State University. *Information Development*, **26**, 237-244.

[38] Jeevan, V. and Nair, S.S. (2004) Information Technology Adoption in Libraries of Kerala: A Survey of Selected Libraries in Thiruvananthapuram. *Annals of Library and Information Studies*, **51**, 137-144.

[39] Krubu, D. and Osawaru, K. (2010) The Impact of Information and Communication Technology (ICT) In Nigerian University Libraries. *Library Philosophy and Practice*, Paper 515. https://digitalcommons.unl.edu/libphilprac/515/

[40] Baro, E.E. (2011) A Critical Examination of Information and Communication Technology Policies: Effects on Library Services in Nigeria. *Library Philosophy and Practice*, Paper 464. https://digitalcommons.unl.edu/libphilprac/464/

[41] Thompson, E.S. and Pwadura, J. (2014) Library Automation at the University for Development Studies: Challenges and Prospects. *New Review of Academic Librarianship*, **20**, 66-77. https://doi.org/10.1080/13614533.2013.842929

[42] Haliso, Y. (2011) Factors Affecting Information and Communication Technologies (ICTs) Use by Academic Librarians in Southwestern Nigeria. *Library Philosophy and Practice*, Paper 571. https://www.proquest.com/openview/11c7fcc691706320a6c758aca147e503/1?pq-origsite=gscholar&cbl=54903

[43] Chaputula, A.H. (2012) State, Adoption and Use of ICTs by Students and Academic Staff at Mzuzu University, Malawi. *Program*: *Electronic Library and Information Systems*, **46**, 364-382. https://doi.org/10.1108/00330331211276477

[44] Enakrire, R.T. and Onyenania, O.G. (2007) Causes Inhibiting the Growth or Development of Information Transfer in Africa: A Contextual Treatment. *Library Hi Tech News*, **24**, 20-28. https://doi.org/10.1108/07419050710778491

[45] Martey, A. (2004) ICT in Distance Education in Ghana. *Library Hi Tech News*, **21**, 16-18. https://doi.org/10.1108/07419050410546356

[46] Chaputula, A. and Boadi, B.Y. (2010) Funding for Collection Development Activities at Chancellor College Library, University of Malawi. *Collection Building*, **29**, 142-147. https://doi.org/10.1108/01604951011088871

[47] Ifidon, S. (1990) Collection Development in African University Libraries-Challenges and Frustrations. African Studies Program, Indiana University, Bloomington.

[48] Myhill, C.E. (2002) ICT for Access to Information Services for Disabled People: An Overview of Projects and Services at Gateshead Libraries Service. *Program*: *Electronic Library and Information Services*, **36**, 176-181. https://doi.org/10.1108/00330330210440467

[49] Waghmare, D.D. and Salve, S.R. (2014) Innovative Practices in Academic Libraries in ICT Environment. *International Journal of Educational Research and Technology* (*IJERT*), **5**, 16-21.

[50] Zach, F.J., Nicolau, J.L. and Sharma, A. (2020) Disruptive Innovation, Innovation Adoption and Incumbent Market Value: The Case of Airbnb. *Annals of Tourism Research*, **80**, Article ID: 102818. https://doi.org/10.1016/j.annals.2019.102818

[51] Solomon, L. (2013) Using Social Media in Libraries: Best Practices. Scarecrow Press, Lanham.

[52] Saunders, M., Lewis, P. and Thornhill, A. (2009) Research Methods for Business Students. 5th Edition, Prentice Hall, London.

[53] Van Laerhoven, H., van der Zaag-Loonen, H.J. and Derkx, B.H.F. (2004) A Comparison of Likert Scale and Visual Analogue Scales as Response Options in Children's Questionnaires. *Acta Paediatrica*, **93**, 830-835. https://doi.org/10.1111/j.1651-2227.2004.tb03026.x

[54] Livingston, E.H. (2004) The Mean and Standard Deviation: What Does It All Mean? *Journal of Surgical Research*, **119**, 117-123. https://doi.org/10.1016/j.jss.2004.02.008

[55] Gerald, B. (2018) A Brief Review of Independent, Dependent and One Sample T-Test. *International Journal of Applied Mathematics Theoretical Physics*, **4**, 50-54. https://doi.org/10.11648/j.ijamtp.20180402.13

[56] Knoke, D. (2005) Structural Equation Models. In: *Encyclopedia of Social Measurement*, University of Minnesota, Minneapolis, 689-695. https://doi.org/10.1016/B0-12-369398-5/00392-3

[57] Hair, J.F., *et al.* (2010) Multivariate Data Analysis: A Global Perspective. Pearson Education, Inc., Upper Saddle River.

[58] Bamigboye, O. (2007) Evaluation of Library Services Delivery in Olabisi Onabanjo University, Ago-Iwoye, Nigeria. *Library Management*, **28**, 152-162. https://doi.org/10.1108/01435120710727992

[59] Udem, O.K. Ikenwe, J.I. and Ugwuamoke, E.C. (2020) Undergraduates' Perception of Library Service Quality and Value in the 21st-Century in Southeast Nigeria: A Case Study. *Library Philosophy and Practice*, Paper 4501. https://digitalcommons.unl.edu/libphilprac/4501/

[60] Bell, L. and Peters, T. (2013) Introduction: The Mobile Revolution and Libraries, Librarians, and Library Users. In: Peters, T. and Bell, L., Eds., *The Handheld Library*: *Mobile Technology and the Librarian*, Libraries Unlimited, Santa Barbara, 9-22.

[61] Ayiah, E.-M. and Kumah, C.-H. (2011) Social Networking: A Tool to Use for Effective Service Delivery to Clients by African Libraries. *World Library and Information Congress*: *77th IFLA General Conference and Assembly*, San Juan, 13-18 August 2011, 1-14.

[62] Ansari, M.S. and Tripathi, A. (2017) Use of WhatsApp for Effective Delivery of Library and Information Services. *DESIDOC Journal of Library & Information Technology*, **37**, 360. https://doi.org/10.14429/djlit.37.11090

[63] Edem, N. (2008) The Digital Age: Changes and Challenges to Librarians in Nigerian University Libraries. *Delta Library Journal*, **2**, 47-57.

[64] Olalude, F.O. (2007) Utilisation of Internet Sources for Research by Information Professionals in Sub-Saharan Africa. *African Journal of Library*, *Archives Information Science*, **17**, 53-58.

[65] Chigbu, E. and Dim, C. (2012) Connectivity and Accessibility in Nigerian University Libraries: A Survey of Access, Usage, and Problems in the University of Nigeria, Nsukka. *Library Philosophy and Practice*, Paper 767. https://digitalcommons.unl.edu/libphilprac/767/

[66] Liu, Y. He, H. and Zhao, D.S. (2007) Where Is the Way? Comparative Study for ICT in China and Other Countries. *China Modern Education Equipment*, **2**, 6-7.

[67] Zhu, Z.T. (2004) Guiding Textbook Editing about ICT in Education with New Ideas. *Information Technology Education in Primary and Secondary Schools*, **6**, 10-12.

[68] Wu, Z.L. (2008) ICT in Education: The Challenges and Development for Teacher's Professional Development. *Journal of Chinese Adult Education*, **10**, 83-84.

[69] Ubogu, J.O. (2019) Impact of Information Technology in Nigerian University Libraries. *Open Access Library Journal*, **6**, e5340. https://doi.org/10.4236/oalib.1105340

[70] Patra, B. (2008) The Role of Information and Communication Technology on Management and Services of Academic Libraries. *Techno India Group Research Journal*, **1**, 12-37.

[71] Ahmad, T. and Sheikh, A. (2021) Impact of Information and Communication Technologies (ICT) on Student's Learning: A Case from University of the Punjab, Pakistan. *Digital Library Perspectives*, **38**, 205-221. https://doi.org/10.1108/DLP-03-2021-0027

[72] Zhang, L. and Hao, J. (2012) Librarians 2.0: IT Literacy of Librarians in China. *IFLA World Library and Information Congress*: 78*th IFLA General Conference and Assembly*, Helsinki, 11-17 August 2012. https://www.ifla.org/past-wlic/2012/150-zhang-en.pdf