



Application of Mobile Technologies for Service Delivery in Federal University Libraries in North Central Nigeria

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ABSTRACT

The rapid advancement of mobile technologies has transformed various sectors, including education and information management. University libraries, as pivotal hubs for knowledge dissemination and academic support, have the potential to significantly enhance their service delivery through the effective utilization of these technologies. However, there remains a gap in understanding the extent to which mobile technologies are currently employed in university libraries, particularly in regions with unique challenges and resource constraints. The study investigated the utilization of mobile technologies for enhancing service delivery in university libraries in North Central region of Nigeria. Three specific objectives and research questions guided the study and two null hypotheses were formulated and tested. The population of this study comprised 212 librarians in the Federal Universities in North Central Nigeria. The entire population of 212 librarians was used for the study. The instrument for data collection was a structured questionnaire validated by experts. Data collected were coded and analyzed using Mean and Standard Deviation to answer the research questions while Chi-Square Goodness of fit was used to test the hypotheses at .05 level of significance. Findings of the study revealed that the extent to which mobile technologies are applied for service delivery in university libraries in North Central Nigeria is low. It was also revealed that the application of mobile technologies for reference and circulation. The study concluded that the extent of mobile technology application for service delivery in university libraries in North Central Nigeria is generally low. Based on the findings, it was recommended that to effectively utilize mobile technologies, library staff should undergo regular training and professional development and libraries should actively develop and promote services that leverage mobile technologies.

Keywords: Mobile Technology, Service Delivery, Reference Service and Circulation Service.

Introduction

Since the inception of the 21st century, Library and Information Science scholars are believed to have, through publications acquainted library and information science practitioners of the need to be ICT compliant, having acknowledged ICTs' sustained advances and its incontestable influence on library practices and operations. The library and information science professionals are utilizing ICT to keep pace with the problem of information explosion (Anisur, Hanif and Ragina, 2014). In the library, ICT has been of tremendous assistance either in easing the arduous task of manual processing or in time saving in the retrieval of information and have made it possible for libraries to access a wealth of up-to-date resources worldwide, give quicker access to specialist in a number of disciplines and allow librarians to reach each other and users with messages and document. It has been discovered that knowledge of ICT usage improves capacity in every field of human endeavor including library and information science. A lot of excitement characterize the prospects of moving away from the manual methods of performing routine jobs by library staff to computerized step by step online approach to achieving better results. ICT facilities used in enhancing the delivery of library services are numerous. Some of these facilities are mobile technologies (Smart Phones, Cell Phones, iPods and MP3 players Tablet).

Mobile Technology

Mobile technology is a form of *technology* that is mostly used in cellular communication and other related aspects. Adegboyega, Anayo, Adesola and Adekunle (2020) defined mobile technology as handheld information technology devices or artifacts that encompass hardware (devices), software (interface and applications), and communication (network services). It uses a form of platform where by many transmitters have the ability to send data at the same time on a single channel. Mobile technology devices used in academic libraries includes, PDAs (Personal Digital Assistant), Smart Phones, Cell Phones, iPods and MP3 players Tablet. Mobile technology has made communication and information access in the library very convenient and timely to users from the comfort of their own homes and offices, and from wherever they are while on the move with their cellular phone units or PDAs (personal digital assistants) (Saxena & Yadav, 2013). According to the authors, Mobile Technology helps both inexperienced and experienced librarians to stay relevant in an increasingly mobile society for better service delivery. With mobile technologies, libraries can better serve their users by embracing the growing capabilities of mobile technology; they can promote and expand their existing services by offering mobile access to their websites and online

public access catalogs; by supplying on-the-go mobile reference services; and by providing mobile access to e-books, journals, video, audio books, and multimedia content. Through conversations on mobile technology, libraries may gain insights into what their patrons want and need and ultimately understand their users' better.

In a technological driven age, university libraries need to offer innovative services in order to provide quality service to users and adult learners. With the immense popularity and adoption of mobile technology, it is now being used in many sections of the library to enhance service delivery. Saxena and Yadav (2013) identify Multimedia Messaging Service (MMS) and Short Messaging Service (SMS) notification services; library virtual/audio tours; Quick Response (QR) codes on mobiles; text reference service, mobile document supply; library guide; database browsing; e-resource with mobile interfaces; formal education, distance learning and e-learning as some of the library services that can be provided to patrons via mobile technology. Other mobile based library services include; OPAC on mobile phones; sending and receiving e-mail messages; searching databases of scholarly information; due-date reminder and renewal services; preview and reservation service of new titles; voice and video calls; online in-house library bulletins; helpdesk services/Ask-a-librarian; e-books, databases and useful resources links; Frequently Asked Questions (FAQ); providing links to internet resources; online current awareness services; online list of new arrivals; etc. For this study, focus is on the application of mobile technology in reference and circulation or lending service.

Reference Service

Reference services are seen as personal assistance provided to library clients or users seeking information. Madu and Ezeani (2009) in Atanda and Uchendu (2017) see reference services as assistance given to library users in pursuit of information by a librarian in charge of reference section. With the application of mobile technologies, it has transformed the way libraries provide reference services to their users. The reference librarian either provides electronic reference services like interactive social networked technologies, email communication, video conferencing through which users can ask questions and receive feedback online. This has further opened up doors to the emerging of broader communication and much more user-friendly platforms through the use of social media tools. Chebe (2012) explain that reference and information service is an aspect of library services in which contact between the reader and library materials is established through staff assistance, matching the user with the library materials which could be print or electronic resources. With the immense popularity and adoption of mobile technology, it is now being used in many library services including reference services to provide an additional channel of service. It is worthy of note that these services could be facilitated and made possible remotely by the use of mobile technology platforms by the academic library personnel.

Circulation Service

The circulation or lending service is another area that mobile technologies are used in the library. The circulation services are services rendered in issuing out library materials on loan to users in order to achieve their information needs (Raji, Oyedum, Akor & Abu (2017). It involves the process of lending library books and other materials to users. The unit is responsible for providing the facilities to borrow, returning borrowed books, renewal and payment of fines. It is essentially a social service in which users of a library have the privilege of borrowing library materials either for reading or consultation. As in banking and financial sectors, libraries can formulate regulations for using mobiles for circulation of reading materials and maintenance of users' account. This wireless solution enables staff to assist patrons in the stacks, check out materials while off site, such as at community or campus events, and update inventory items while walking around the library. Mobile phones make interlibrary loan/document delivery services faster and cut-down the time to request/visit different libraries and complement the geographically remote users. The users can get notified instantly with notice alerts such as alerts on appraising about overdue books, outstanding fines, reminders to return library items, renew books and library circulars-journals subscribed.

In university libraries, the library staff delivers services such as reference and circulation among others. Service delivery of these information services that meet the needs and aspirations of citizens, decision-makers and life-long learners is a longstanding goal of the information profession. It is worthy of note that mobile technologies may be highly relevant to effective service delivery in university libraries. Researches have shown that the work of the library staff in automated library is lessened. This in turn enhances effective library service delivery by the library staff. Today, library services are undergoing transformation. The transformation from manual to automated systems seems to be changing the services provided by these libraries and the way they are performed. What is most evident about the application of mobile technologies is that it may improve library services and increases productivity, efficiency, and accuracy in performing a variety of library operations.

From the foregoing therefore, it is sufficed to state that in this 21st century, the drastic role of mobile technologies in university libraries operation cannot be overemphasized. Many library routines and operations that were initially performed manually are now being converted to computerized operations which mean that applications of mobile technologies can enhance better and faster services to the end users. The rapid technological development in few decades back particularly in the area of Information and Communication Technologies (ICTs), multimedia, digital technologies and emergence of Internet/World Wide Web (WWW) have given rise to the development of modern computerized and digital libraries. These developments have fundamentally changed the way we generate, acquire, classify, organize, preserve, retrieve and circulate information in university libraries in North Central Nigeria. The university libraries are applying mobile technologies to their operations and services to keep abreast with the trends in the information age and to meet users' information needs. The librarians in these libraries are the engines that are saddled with the herculean task of rendering these high quality and efficient information services. When innovations are adopted in the library, it is a good practice to evaluate their workability and effectiveness. However, from the researcher's preliminary investigations, it is worrisome to state that since the adoption of mobile technologies in these libraries, there

has not been empirical research to ascertain how they have fared in service delivery. It is against this backdrop that this study sought to investigate the application of mobile technologies for effective library service delivery in university libraries in North Central Nigeria.

Theoretical Framework

Library 2.0 Theory by Jack Maness (2006)

Library 2.0 Theory, introduced by Jack Maness in 2006, revolves around the concept of integrating web-based services and tools into library operations to create a more user-centered and interactive environment. This theory emphasizes the importance of collaboration, communication, and community in library services, leveraging technologies like social media, wikis, blogs, and other Web 2.0 tools to enhance user engagement and satisfaction. In the context of this study, Library 2.0 Theory is highly relevant as it underlines the potential benefits of incorporating mobile technologies in university libraries. By adopting mobile technologies, libraries can offer more interactive and responsive services, such as mobile reference and circulation services, aligning with the Library 2.0 principles of enhancing user experience and fostering a participatory culture among library users.

The SERVQUAL Theory by Parasuraman, Zeithaml, and Berry (1988)

The SERVQUAL Theory, developed by Parasuraman, Zeithaml, and Berry in 1988, is a service quality framework that measures the gap between customer expectations and their perceptions of the service received. It identifies five dimensions of service quality: tangibles, reliability, responsiveness, assurance, and empathy. This theory is applicable to this study as it provides a foundation for evaluating the effectiveness of mobile technologies in enhancing service delivery in university libraries. By applying SERVQUAL, researchers can assess how well mobile technology integration meets librarians' and users' expectations in reference and circulation services, identifying areas where service quality can be improved to better meet user needs and enhance overall satisfaction with library services.

Statement of the Problem

The researchers have over the years observed that despite the potential advantages of mobile technology application, there seems to be an underutilization of mobile technologies in various service domains, including reference services and circulation. Within reference services, there appears to be a lack of full exploitation of mobile platforms for providing timely assistance. Similarly, the potential of mobile applications to streamline circulation services seems not to be fully realized. The observed underutilization of mobile technologies in various library service domains may lead to a range of consequences. These include diminished efficiency and timeliness in reference services and inefficient circulation processes. Addressing these consequences requires proactive measures to enhance digital literacy, invest in technological infrastructure, and strategically implement mobile technologies, ensuring that libraries can adapt to the evolving information landscape, meet user expectations, and remain competitive and relevant in providing services to their communities. Hence, the problem of this study put in a question form, "How are mobile technologies applied for effective library service delivery in university libraries in North Central Nigeria?"

Objectives

Specifically, the study sought to achieve the following objectives:

1. Ascertain the extent to which mobile technologies are applied for service delivery in university libraries in North Central Nigeria
2. Determine how mobile technologies are applied in reference service delivery in university libraries in North Central Nigeria
3. Ascertain the application of mobile technologies in circulation service delivery in university libraries in North Central Nigeria

Research Questions

The following research questions guided the study:

1. To what extent are mobile technologies applied for service delivery in university libraries in North Central Nigeria?
2. How are mobile technologies applied in reference service delivery in university libraries in North Central Nigeria?
3. How are mobile technologies applied in circulation service delivery in university libraries in North Central Nigeria?

Statement of Hypotheses

The following null hypotheses were formulated and tested at 0.05 level of significance:

1. The application of mobile technologies for reference service delivery in university libraries in North Central Nigeria is not significantly high
2. The application of mobile technologies for circulation service delivery in university libraries in North Central Nigeria is not significantly high

Methodology

The study adopted a survey research design and was carried out in North Central Nigeria. The population of this study comprised 212 librarians in the Federal Universities in North Central Nigeria. The entire population of 212 librarians in the Federal Universities in North Central Nigeria was used for the study. The instrument for data collection was a structured questionnaire titled "Mobile Technologies and Library Service Delivery Questionnaire (MTLSDQ)". To ensure the validity of the instrument, it was subjected to face and content validation by three experts, two from Library and Information Science and one from Measurement and Evaluation, University of Calabar. The instrument was trial tested on a smaller sample of 30 non-participating librarians from Universities in South-East Nigeria and data collected was subjected to Cronbach Alpha method for determination of the reliability coefficient. This yielded reliability coefficients of .73, .71 and .80 for each of the three clusters making up the questionnaire. Data for the study was collected by the researcher with the aid of seven research assistants. Data collected were coded and analyzed using Mean and Standard Deviation to answer the research questions while Chi-Square Goodness of Fit was used to test the hypotheses at 0.05 level of significance. For the Chi-square test of hypotheses, the decision was based on P-values and Alpha values. When $P < .05$, the null hypothesis was rejected and considered "Significant Influence" and when $P > .05$, the null hypothesis was not rejected and considered "No Significant Influence".

Results

Research Question 1: Research question one: To what extent are mobile technologies applied for service delivery in university libraries in North Central Nigeria?

TABLE 1

Mean and Standard Deviation Analysis of Responses on the Extent to which Mobile Technologies are Applied for Service Delivery in University Libraries in North Central Nigeria

S/N	Mobile Technologies	Mean	SD	Decision
1	PDAs (Personal Digital Assistant)	2.22	.82	Low Extent
2	Smart Phones	2.73	.73	High Extent
3	Cell Phones	2.92	.80	High Extent
4	iPods and MP3 players	2.24	.87	Low Extent
5	Tablets	2.33	.88	Low Extent
6	Laptop	2.45	.73	Low Extent
7	E-book Reader	2.25	.79	Low Extent
	Cluster Mean	2.45	.80	Low Extent

technologies are applied for service delivery in university libraries in North Central Nigeria in mean and standard deviation. From the Table, it can be seen that only item 3 and 2 with mean values of 2.92 and 2.73 which are above the benchmark of 2.50 were rated 'high extent' by the respondents. Other items such as items 1, 4, 5, 6 and 7 with mean values of 2.22, 2.24, 2.33, 2.45 and 2.25 respectively were rated 'low extent' as their mean values were less than the benchmark of 2.50. The table also revealed a cluster mean of 2.45 and SD = .80. With this cluster mean (2.45) which is less than the benchmark of 2.50, it can be deduced from this finding that the extent to which mobile technologies are applied for service delivery in university libraries in North Central Nigeria is low.

Research Question 2: How are mobile technologies applied for reference service delivery in university libraries in North Central Nigeria?

TABLE 2

Mean and Standard Deviation Analysis of Responses on how Mobile Technologies Applied for Reference Service Delivery in University Libraries in North Central Nigeria

S/N	Mobile technologies such as laptops, smart phones and tablets etc are used in the reference service in my library in the following ways:	Mean	SD	Decision
1	Real-time interactive reference services where the users can talk to a real, live reference librarian at any time, from anywhere in the world	2.18	.80	Disagree
2	Providing reference services in the form of SMS	2.62	.80	Agree

3	Providing reference services in the form of MMS	2.32	.79	Disagree
4	Emailing reference interview of sorts by asking the users to elaborate or clarify if needed before proceeding to answer the question	2.36	.83	Disagree
5	Providing reference services through library websites	2.37	.82	Disagree
6	Identifying related web resources inside or outside in the reference unit	2.52	.83	Agree
7	Searching the right information by using correct Boolean searching, databases and OPAC	2.23	.78	Disagree
8	Providing Internet-based question and answer service that connects users with individuals who possess specialized subject knowledge and skill in conducting precision searches	2.26	.80	Disagree
9	Replacing image maps on main campus Web sites.	2.11	.81	Disagree

Table 4 shows the application of mobile technologies for reference service delivery in university libraries in North Central Nigeria in mean and standard deviation. From the Table, it can be seen that only items 2 and 6 with mean values of 2.62 and 2.52 which are above the benchmark of 2.50 are agreed to by the respondents as ways in which mobile technologies are applied for reference service delivery in the university libraries. Other items such as items 1, 3, 4, 5, 7, 8 and 9 with mean values ranging from 2.11 – 2.37 were disagreed as their mean values were less than the benchmark of 2.50.

Research Question 2: How are mobile technologies applied for circulation or lending service delivery in university libraries in North Central Nigeria?

TABLE 3

Mean and Standard Deviation Analysis of Responses on how Mobile Technologies Applied for Circulation or Lending Service Delivery in University Libraries in North Central Nigeria

S/N	Mobile technologies such as laptops, smart phones and tablets etc are used in the circulation or lending service in my library in the following ways:	Mean	SD	Decision
1	Registering new users in the library	2.32	.82	Disagree
2	Obtaining statistics information from the system	2.41	.78	Disagree
3	Writing of overdue notice	2.38	.79	Disagree
4	Storing information on books available on new arrival to the library	2.43	.81	Disagree
5	Charging books out	2.39	.92	Disagree
6	Keeping statistics of customer services	2.42	.82	Disagree
7	Checking borrowers' records for personalize messages	2.34	.83	Disagree
8	Recalling and reservation of library materials	2.69	.81	Agree
9	Tracing or tracking missing materials	2.09	.81	Disagree
10	Supplementing titles in short loan collections that are always in demand by electronic versions on e-book readers.	2.01	.78	Disagree

Table 3 shows the application of mobile technologies for circulation or lending service delivery in university libraries in North Central Nigeria in mean and standard deviation. From the Table, it can be seen that only item 8 with a mean value of 2.69 which is above the benchmark of 2.50 is agreed to by the respondents as a way in which mobile technologies are applied for circulation or lending service delivery in the university libraries. Other items such as items 1, 2, 3, 4, 5, 6, 7, 9 and 10 with mean values ranging from 2.01 – 2.43 were disagreed as their mean values were less than the benchmark of 2.50.

Hypothesis One: The application of mobile technologies for reference service delivery in university libraries in North Central Nigeria is not significantly high

TABLE 4

Chi-Square Goodness of fit test of the application of mobile technologies in reference service delivery in university libraries in North Central Nigeria

Response Options	Observed N	Expected N	Df	χ^2_{cal}	Sig	α - level	Remark
SA	21	53.0					
A	45	53.0					
D	77	53.0					
SD	69	53.0					
Total	212		3	34.646	.074	.05	Not Significant

Df = Degree of Freedom; χ^2_{cal} = Chi-Square Calculated Value; Sig = P-Value, P>0.05

Table 4 shows the Chi-square calculated value of 34.646, degree of freedom (df) =3 and a sig (P-value=0.074) which is less than the alpha value (α) of .05. Since P>.05, the result is significant, therefore the null hypothesis is accepted. This implies that, the application of mobile technologies for reference service delivery in university libraries in North Central Nigeria is not significantly high.

Hypothesis 2: The application of mobile technologies for circulation or lending service delivery in university libraries in North Central Nigeria is not significantly high

TABLE 5

Chi-Square Goodness of fit test of the application of mobile technologies in circulation or lending service delivery in university libraries in North Central

Response Options	Observed N	Expected N	Df	χ^2_{cal}	Sig	α - level	Remark
SA	17	53.0					
A	49	53.0					
D	83	53.0					
SD	63	53.0					
Total	212		3	29.617	.101	.05	Not Significant

Df = Degree of Freedom; χ^2_{cal} = Chi-Square Calculated Value; Sig = P-Value, P>0.05

Table 5 shows the Chi-square calculated value of 29.117, degree of freedom (df) =3 and a sig (P-value=0.101) which is less than the alpha value (α) of .05. Since P>.05, the result is significant, therefore the null hypothesis is accepted. This implies that, the application of mobile technologies for circulation or lending service delivery in university libraries in North Central Nigeria is not significantly high

Discussion of Findings

Based on the findings that emanated from the study, the following were discussed

The first finding of the study revealed that the extent to which mobile technologies are applied for service delivery in university libraries in North Central Nigeria is low. The findings highlighted that while certain mobile technologies like smartphones and cell phones are extensively employed, the majority of others, including Personal Digital Assistants (PDAs), iPods, MP3 players, Tablets, Laptops, and E-book Readers, are utilized to a lesser degree. These findings align with the investigation conducted by Hassan, Musa, and Abdullahi (2017), which explored the adoption and application of Mobile Technologies for Service Delivery. Their study also observed that not all available Mobile technologies were fully incorporated for service delivery, with Library short message service (SMS) notifications being the most commonly employed method. Likewise, the findings correspond with the study by Ekere, Ewulum, Eze, Okpala, and Ebobo (2019), which delved into the utilization of modern technologies for service delivery in special libraries. Their research disclosed that modern technologies were not adequately harnessed for service delivery in the majority of special libraries. Additionally, these results align with the observations made by Odu (2020), who reported that the integration and application of technologies in library services have yet to fully establish themselves in the context of North Central Nigeria. However, these findings diverge from the conclusions reached by Akanbi, Ogunleye, and Sulaiman (2020), whose research indicated that ICT was extensively employed to provide services in specific library areas. Similarly, the findings contradict the outcomes of the study by Amuni, Niran, and Olatunji (2014), who identified that academic library had not fully embraced mobile technology for offering information services.

The observed low extent of application of mobile technologies for service delivery in university libraries across North Central Nigeria can be attributed to a combination of factors. Firstly, the preference for certain mobile technologies like smartphones and cell phones may stem from their widespread adoption and familiarity among both library staff and users. These devices have become integral parts of daily life, facilitating communication and easy access to information. Conversely, the limited utilization of other technologies such as PDAs, iPods, MP3 players, Tablets, Laptops, and E-book Readers may be linked to factors like cost, availability, and compatibility. These devices might require higher initial investments, specialized training, and infrastructure support, which could pose challenges for implementation and integration into library services. The findings resonating with others reinforce the ongoing nature of technological adoption and adaptation in the region while the divergence may reflect variations in the specific library contexts, resources, and priorities, showcasing the dynamic interplay between technology and service delivery within diverse environments. Overall, the current findings underscore the importance of addressing not only technological constraints but also the need for tailored strategies to enhance the incorporation of various mobile technologies for more comprehensive library service delivery.

The second finding of the study revealed that the application of mobile technologies for reference service delivery in university libraries in North Central Nigeria is not significantly high. The findings uncovered that mobile technologies are primarily employed within the reference department to offer reference services, mainly through SMS and identifying pertinent web resources within or outside the reference unit. These outcomes align with the research conducted by Umar, Hussaini, and Abubakar (2019), who explored the integration of Information and Communication Technology (ICT) in Reference and Information Services within academic libraries. Their study unveiled a parallel observation that the application of ICTs, including tools like telephones, for delivering reference services is neither extensively widespread nor highly efficient in university libraries. Contrary to this, the findings diverge from the conclusions of Ibrahim (2019), whose research demonstrated that libraries adopt a diverse array of ICT facilities—such as computers, internet access, CD-ROMs, photocopiers, printers, GSM telephones, online and offline databases, projectors, smart multimedia boards, radio, web blogs, and email—to furnish a range of reference and information services to users. Similarly, the findings do not concur with the findings of Gama (2013), whose study showcased that libraries employ a variety of ICT tools encompassing telephones, chat platforms, emails, photocopiers, projectors, Internet access, and CD-ROMs to deliver various forms of reference services. The observed discrepancies in the present findings could be attributed to variations in technological infrastructure, resource availability, and institutional priorities among the studied university libraries in North Central Nigeria.

Additionally, the study's results indicated that the application of mobile technologies for circulation or lending service delivery in university libraries within North Central Nigeria is not notably extensive. The findings highlighted that mobile technologies are predominantly used for actions such as recalling and reserving library materials specifically within the circulation department. This observation aligns with the conclusions reached by Yemi-Peters, Sokari, Olayemi, Abba, and Gama (2019), whose investigation into the integration of ICT in the circulation services of a University library unveiled a comparable revelation—namely, that the application of ICT in circulation processes remains at a relatively low level. However, these findings diverge from the findings of Aba, Ezeani, and Igwu (2015), whose study reported a substantial use of computer technologies for the provision of circulation services. In other words, while mobile technologies have found a limited niche within circulation processes in the university libraries of North Central Nigeria, this observation contrasts with the higher level of computer technology application noted by Aba, Ezeani, and Igwu (2015) in their research. The present study's findings regarding the limited extent of mobile technology application for circulation or lending service delivery in university libraries within North Central Nigeria can be attributed to a combination of factors. One likely factor is the overall technological infrastructure and readiness within these libraries. If the libraries lack sufficient resources and infrastructure to support widespread mobile technology integration, it can hinder the adoption of such technologies in circulation processes. Additionally, the level of awareness and training among library staff might play a role. Libraries with inadequate training programs and awareness initiatives may struggle to effectively implement and utilize mobile technologies for circulation purposes. Moreover, budget constraints and resource allocation might limit the acquisition of necessary mobile devices and software, further inhibiting their application in lending services. These factors collectively contribute to the observed limited utilization of mobile technologies in circulation activities in the university libraries of North Central Nigeria, setting the study's findings apart from the higher computer technology application level reported by Aba, Ezeani, and Igwu (2015) in their research.

Conclusion

The study concludes that the extent of mobile technology application for service delivery in university libraries in North Central Nigeria is generally low. Despite the widespread use of smartphones and cell phones, other mobile technologies such as PDAs, iPods, MP3 players, tablets, laptops, and e-book readers are underutilized. The findings indicate that while mobile technologies are somewhat employed for reference services through SMS and identifying relevant web resources, their overall application is not significantly high. Similarly, the use of mobile technologies in circulation or lending services is limited, primarily focusing on recalling and reserving materials. The low extent of mobile technology adoption can be attributed to factors such as cost, availability, infrastructure support, and the need for specialized training. These conclusions highlight the necessity for targeted strategies to enhance the incorporation of mobile technologies, thereby improving the comprehensiveness and efficiency of library service delivery in the region.

Recommendations

Based on the findings of the study, the following recommendations are made to enhance the application of mobile technologies for service delivery in university libraries in North Central Nigeria:

1. **Increase Investment in Technological Infrastructure:** University libraries should allocate more resources towards acquiring and maintaining a broader range of mobile technologies, including PDAs, iPods, MP3 players, tablets, laptops, and e-book readers. This investment will ensure that libraries have the necessary devices to offer a wide variety of services and improve overall service delivery.
2. **Implement Training Programs for Library Staff:** To effectively utilize mobile technologies, library staff should undergo regular training and professional development. Training programs should focus on the integration and application of different mobile technologies in library services, ensuring staff are proficient in using these tools to enhance reference, circulation, and other library services.
3. **Develop and Promote Mobile Technology-Based Services:** Libraries should actively develop and promote services that leverage mobile technologies. This includes offering real-time interactive reference services, enhancing SMS and MMS-based services, and using mobile devices for circulation tasks such as registering new users, managing overdue notices, and tracking library materials. Marketing these services to users can increase awareness and encourage more widespread adoption and utilization.

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