

**ACHIEVING EFFICIENT LIBRARY SERVICES THROUGH INNOVATIVE TECHNOLOGIES
IN TERTIARY INSTITUTIONS IN AKWA IBOM STATE**

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Abstract

This research aims to evaluate the attainment of efficient library services through innovative technologies in tertiary institutions. The study employed an ex post facto design. The research was carried out in the Akwa Ibom State. The study's population encompassed librarians and students of library science in tertiary institutions located in Akwa Ibom State. The study employed a stratified sampling technique to select a sample of 97 respondents from various educational institutions. Specifically, 10 librarians and 50 library science students were chosen from the University of Uyo; 2 librarians and 7 library science students were selected from the College of Education; 3 librarians and 10 library science students were included from Akwa Ibom State Polytechnic; and finally, 2 librarians and 15 library science students were chosen from Federal Polytechnic. The data collection process involved the use of a questionnaire known as the "Technology and Efficient Library Services Questionnaire (TLESQ). The process of face and content validation of the instrument was conducted by a single expert in the fields of test, measurement, and evaluation. This expert's involvement aimed to ascertain the accuracy and appropriateness of the instrument for the study. The Cronbach's alpha technique was employed to assess the instrument's reliability level. The obtained reliability coefficient was an average value of 0.84 and this was high enough to justify the use of the instrument. The researcher subjected the data generated for this study to appropriate statistical techniques such as descriptive statistics for answering the research questions while simple regression in testing the hypothesis. The test for significance was done at 0.05 alpha level. Based on the results obtained from the study, it can be inferred that the use of big data technology, library mobile apps, and virtual reality technology has a substantial impact on the distribution of library services within tertiary institutions located in Akwa Ibom State. One of the recommendations was that there is a pressing need to actively pursue the implementation of a contemporary library system that leverages new technical tools, which have the potential to demonstrate the transformative power of current technology in libraries and information centres.

Introduction

In the present day, the Akwa Ibom state is witnessing a transition in the delivery of library and information services, as they shift from traditional manual methods to modern technological approaches. The rapid advancement of technology has led to its increasing integration within society. Smart appliances and voice-controlled assistants exemplify the ongoing technological advancements aimed at enhancing individuals' daily life. For instance, Esew and Ikyembe (2013) argue that the internet, as a technological innovation, possesses the capacity to supplement, reinforce, and augment educational achievements,

thereby benefiting all stakeholders involved. Library services are undergoing a transformation in terms of their philosophical underpinnings, operational models, and methods of information dissemination. Through the utilisation of cutting-edge technologies, libraries and librarians are actively engaged in the construction of an enhanced world for their clients. With the continuous advancement of technology, novel tools have been unearthed to offer efficient services within a reduced timeframe. Libraries in industrialised nations such as the United States, the United Kingdom, and Germany are increasingly integrating novel technology into their operations in order to enhance learning, research, and information dissemination, thereby providing patrons with optimal services. Librarians in Akwa Ibom State are facing challenges in the adoption and integration of advanced technology to facilitate learning, research, and information access for their users.

According to Mwamba (2002), there has been a noticeable change in the approach to library operations in Nigeria. The shift is observed from a library-centric focus to an information-centric one. This means that the emphasis has moved from viewing the library solely as an institution to recognising it as a provider of information. Additionally, the role of librarians has evolved from being skilled information specialists who operate within various information environments. This transformation necessitates the adoption of a new method called automation of library functions. The purpose of this method is to improve access and delivery of information that is not physically confined within the library's physical space. Instead, it involves utilising library networking to facilitate the provision of information and extending it to area networking for all types of information resources. Nevertheless, libraries are currently undergoing a transformation in both their operational methods and the manner in which they provide services. The role of information technology is of utmost importance in the process, leading to an elevation in the standards of users' expectations and anticipations for novel value-added services.

Statement of Problem

The issue of introducing technology-based services in academic libraries inside higher institutions in Akwa Ibom has been a matter of concern over the previous three decades. The issues are believed to be linked to inadequate information and communication technology (ICT) infrastructure, bureaucratic procedures, limited internet bandwidth, scarcity of IT professionals and personnel, absence of a comprehensive policy framework, unpredictable or unreliable power supply, insufficient assistance from university administration, and financial limitations. The collective elements mentioned above serve as impediments to the complete implementation of technology-driven library services.

Objectives of the Study

The aim of this study was to assess the efficient library services through innovative technologies in tertiary institutions in Akwa Ibom State. Specifically, the study sought to:

1. To determine the effect of library mobile apps technology on library services in tertiary institutions in Akwa Ibom State.
2. To determine the effect of virtual reality technology on library services in tertiary institutions in Akwa Ibom State.
3. To determine the effect of big data technology on library services in tertiary institutions in Akwa Ibom State.

Research Questions

The following research questions were formulated to guide the study.

1. What is the effect of library mobile apps technology on library services in tertiary institutions in Akwa Ibom State?
2. What is the effect of virtual reality technology on library services in tertiary institutions in Akwa Ibom State?

3. What is the effect of big data technology on library services in tertiary institutions in Akwa Ibom State?

Hypotheses

The null hypotheses will be tested.

HO₁: There is no significant effect of library mobile apps technology on library services in tertiary institutions in Akwa Ibom State.

HO₂: There is no significant effect of virtual reality technology on library services in tertiary institutions in Akwa Ibom State.

HO₃: There is no significant effect of big data technology on library services in tertiary institutions in Akwa Ibom State.

LITERATURE REVIEW

Innovative Technologies

According to the Oslo Manual (2005), innovation is characterised as a process that yields novel or considerably enhanced items (products or services), processes, marketing strategies, or company structures. As stated in the Frascati Manual (OECD, 2002), technological innovations encompass innovative or substantially altered technological items and processes that exhibit technological originality in terms of their performance characteristics, as opposed to mere enhancements. Technology innovation engenders a perception of engaging in technological pursuits purely for the intrinsic value of advancing technology itself. Technological innovation more accurately embodies the business rationale of enhancing corporate value through the enhancement of technological elements within a product or service. A technological innovation refers to the introduction or enhancement of a product or process that exhibits substantial divergence in its technological attributes compared to its previous iterations. Albert (2006) posits that the concept of innovative technology can be seen as a process that shapes or modifies cultural norms and practises. One contemporary illustration may be observed in the emergence of communication technology, which has diminished obstacles to interpersonal engagement and consequently facilitated the emergence of novel subcultures. The ascent of cyberculture, rooted in the advancement of the Internet and computer technology, serves as a prime exemplification of this phenomenon (Macek, 2007). Technology, as a cultural pursuit, has a historical precedence over both science and engineering, as these disciplines formalise certain parts of technical endeavours. In this context, it maintains its association with artistic pursuits. However, librarians are incorporating a wide range of technologies into their library services to effectively meet the demands of their current and potential patrons. This document highlights some prevalent state-of-the-art technology including:

Library Mobile Apps: The proliferation of mobile applications has emerged as a prominent phenomenon subsequent to the development of Android applications. These applications provide individuals with uninterrupted access to their mobile devices. The integration of mobile applications into the library's services will enhance the overall usefulness of the library. The utilisation of mobile applications for converting services has the potential to establish a unified platform for patrons and users. The provision of self-service options for printing, copying, and scanning. According to Hahn (2012), a significant number of individuals do not engage in home printing. In light of this, the proposed service aims to provide users with a centralised access point for printing, allowing them to select and print desired pages. Additionally, customers will have the convenience of paying for the service online. Library services in the context of modern information technology encompass a range of offerings aimed at both current and potential members. These services serve the purpose of keeping individuals informed about the latest advancements and amenities being introduced within the library.

Big Data: Numerous firms utilise big data to establish a customised user experience repository. The primary objective of this technology is to enhance the visibility and utilisation of library services by

offering users comprehensive information about their options and facilitating access to a wide range of resources and services through its implementation. Librarians are need to be mindful of their personal data (Cuifeng, 2013).

Artificial Intelligence: Artificial Intelligence (AI) is increasingly garnering attention in several aspects of our daily lives, as it primarily emphasises the dissemination of information to consumers. The perception of libraries as facing challenges in their operations is often associated with the term "artificial intelligence," which connotes a non-human, automated nature. According to Russell et al. (2016), the use of this particular element in library services facilitates seamless access to information for individuals.

Block-Chain Technology: Blockchain technology is increasingly being embraced by librarians in various libraries as a toolset. The introduction of this technology took place in 2008, originally. This technology enables the utilisation of a decentralised database, granting anyone access to pseudonymous digital transactions through networking. According to Nicholson (2017), the collection and storage of data can facilitate user accessibility.

Virtual Reality: Virtual reality (VR) has the potential to enhance users' proximity to the library. The utilisation of virtual reality technology has been integrated into industrialised nations, encompassing applications such as training workshops and virtual library tours. Numerous novel technologies have been implemented worldwide, with virtual reality (VR), augmented reality (AR), and mixed reality (MR) emerging as prominent phenomena that librarians are utilising to showcase the advancements within the library domain. Virtual reality (VR), augmented reality (AR), and mixed reality (MR) are immersive technologies that can be utilised within library services to provide virtual field excursions. These experiences can encompass a wide range of educational and recreational activities, such as exploring the solar system, simulating tornadoes, navigating through a virtual refugee camp, examining a three-dimensional model of the human body, virtually visiting holiday destinations, previewing college campuses, or even tes Various new technologies are being implemented in both developed and developing nations, enabling library patrons to explore them beyond the physical confines of the library (Swanson, 2007).

Library Services

Libraries serve a significant function as a dependable and advantageous source of knowledge within an academic curriculum. Saika and Chandel (2012) conducted a study examining the satisfaction of users with library resources, services, and information seeking behaviour at Tezpur University. The study revealed that providing guidance to users by librarians can effectively fulfil their information needs and ensure the availability of both print and electronic resources. This perspective aligns with the findings of a study conducted by Norliya (2009), which emphasises the need of university libraries implementing strategic planning in order to develop and provide services that prioritise customer pleasure. It might be argued that there exists a profound and noteworthy correlation between library services and the acquisition of information. In their study, Pandey and Singh (2014) discovered that a substantial proportion of participants expressed contentment with the materials and services provided by the library. Upon the advent of books, the circulation service emerged as the preeminent and favoured resource among users.

Poll (2008) identifies several key factors that have a significant impact on the overall quality of service provision in libraries. These factors include correctness and reliability, the speed and accuracy of services, accessibility, the competency of library workers, and the effectiveness and efficiency of their assistance. To ensure the efficacy of library services, it is imperative that the library staff possess both competence and a willingness to assist patrons, while also ensuring the accuracy and reliability of the services rendered. Sohail et al. (2012) argues that providing instruction on the use of library resources and services is vital in facilitating users' fulfilment of their information requirements. Additionally, it was discovered that the students predominantly relied on periodicals, textbooks, and lecture notes as their primary sources of information. It has been proposed that the inclusion of recent editions of textbooks and reference

materials in the library's collection, as well as the provision of guidance to users on utilising library resources, would be beneficial. According to Tiefel (2004), it has been hypothesised that a significant portion of library patrons lack awareness regarding the extensive range and high calibre of information resources accessible within university libraries. The author highlighted that users frequently express contentment with resources that a seasoned librarian would deem insufficient or unsuitable. The study revealed that discipline significantly impacts usage patterns and preferences, with faculty personnel exhibiting a higher level of library utilisation. The library provides a range of services encompassing different sorts. However, below are types of library services provided by libraries in Akwa Ibom State:

Audio/Visual Service: The library offers an audio-visual service that allows members to access and utilise the various audio-visual materials. In order to enhance user experience, the requisite equipment has been furnished for this objective. The library staff also provides assistance to members in utilising these resources.

Current Awareness Service: The library provides a current awareness service to its members, ensuring they are consistently updated on the latest acquisitions inside the library. Library customers receive regular email notifications including a compilation of recently acquired materials, referred to as "NEW ARRIVALS."

Multimedia Section: The library has recently implemented a Multimedia department, which has ten state-of-the-art PCs that are equipped with multimedia capabilities and internet access. This part provides the necessary equipment for utilising various forms of information media, such as CDs, DVDs, audios, videos, and others. Its purpose is to enhance users' accessibility to digital information resources.

Online Reservation of Books: The online reservation system allows library customers to reserve books that have already been issued. Books that have been reserved are not reissued. Library patrons receive automated email notifications when a reserved book becomes available for pickup, and the book will be stored at the circulation desk for a period of two days. In the event that the reserved book remains uncollected for a period of two days, it will be either allocated to other users or returned to the shelves.

Photocopying/Printing Service: Photocopying and printing facilities are offered in the library. Users have the option to acquire photocopies of necessary information from reference materials, including reference books, encyclopaedias, dictionaries, periodicals, magazines, and similar sources, upon making the appropriate payment.

Reference Services: The library offers reference and referral services to its patrons. Inquiries are addressed by utilising a comprehensive range of available sources. In the event that the necessary information source is not present or easily obtainable at the IST Library, users will be directed to alternative libraries where the desired material may be accessible.

Selective Dissemination of Information (SDI): The SDI service aims to offer library users with relevant content based on their specific areas of interest, ensuring that they remain updated with the newest advancements and expertise in their respective fields.

Effect of Innovative Technologies on Library Services

The transition from conventional libraries with location-specific collections to digital libraries, where information and knowledge sources are not limited by geographical limits, appears to enhance the capabilities of library services and information dissemination to users. The impact of technology on the library setting is evident in various aspects of our daily routines worldwide. Nkanu and Okon (2010) assert that libraries driven by information and communication technology (ICT) are undergoing a progressive transformation into contemporary information service centres. These centres offer a range of electronic services, such as electronic cataloguing, inter-library loan services, and circulation functions. According to Ogunshola (2004), while traditional communication channels will continue to be significant, the emergence of new information and communications technologies presents a considerable opportunity for the widespread dissemination of knowledge at a minimal expense. Moreover, these technologies have the

potential to bridge knowledge disparities both within nations and between developed and developing countries. Information and Communication Technology (ICT) is playing a significant role in influencing the reputation and perspectives of librarians, particularly in developing nations. Additionally, ICT is enhancing the competencies of librarians, enabling them to provide sustainable library services in the modern day (Iwe, 2005). The impact of modern technology on library services has also resulted in the emergence of novel operational patterns in library work routines, including:

- Self-service circulation
- Automated materials handling
- Mobile staff service desks and,
- Automated materials dispensing kiosks.

METHODOLOGY

Expost-facto design was adopted for the study. The study was conducted in Akwa Ibom State. The population of the study consisted of librarians and students of library science in tertiary institutions in Akwa Ibom State. Stratified sampling technique was used to select 10 librarians and 50 library science students from University of Uyo; 2 librarians and 7 library science students from College of Education; 3 librarians and 10 library science students from Akwa Ibom State Polytechnic; 2 librarians and 15 library science students from Federal Polytechnic giving the total of 97 respondents that constituted the sample size used for the study. The instrument titled “Technology and Library Services Questionnaire (TLSQ)” was used for data collection. Face and contents validation of the instrument was carried out by one expert in test, measurement and evaluation to ensure that the instrument was accurate for the study. Cronbach Alpha technique was used to determine the level of the reliability of the instrument. In this case the average reliability coefficient obtained was 0.84 and this was high enough to justify the use of the instrument. The researcher subjected the data generated for this study to appropriate statistical techniques such as descriptive statistics for answering the research questions while simple regression in testing the hypothesis. The test for significance was done at 0.05 alpha level.

Results and Discussion

Hypothesis One: The null hypothesis states that there is no significant effect of big data technology on library services in tertiary institutions in Akwa Ibom State (see table 1).

TABLE 1: Simple regression analysis of the effect of library mobile apps technology on library services in tertiary institutions in Akwa Ibom State

Model	R	R-Square	Adjusted R Square	Std. error of the Estimate	R Square Change
1	0.93a	0.87	0.87	1.33	0.87

***Significant at 0.05 level; df= 95; N= 97; critical R-value = 0.207**

The above table 1 shows that the calculated R-value 0.93 was greater than the critical R-value of 0.207 at 0.5 alpha levels with 95 degree of freedom. The R-Square value of 0.87 predicts 87% of the effect of library mobile apps technology on library services in tertiary institutions in Akwa Ibom State. This rate of percentage is highly positive and therefore means that there is significant effect of library mobile apps technology on library services in tertiary institutions in Akwa Ibom State. The result, therefore, is cognate with the research findings of Hahn (2012), who stated that mobile apps have become a top trend after the invention of Android applications. And that, through the adoption of mobile apps into the library's services, the library has gained more usability. Converting services through mobile apps puts patrons and users on one page.

Hypothesis Two: The null hypothesis states that there is no significant effect of virtual reality technology on library services in tertiary institutions in Akwa Ibom State. In order to test the hypothesis, regression analysis was performed on the data (see table 3).

TABLE 2: Simple regression analysis of the effect of virtual reality technology on library services in tertiary institutions in Akwa Ibom State

Model	R	R-Square	Adjusted R Square	Std. error of the Estimate	R Square Change
1	0.95a	0.91	0.91	1.05	0.91

***Significant at 0.05 level; df= 95; N= 97; critical R-value = 0.207**

The above table 2 shows that the calculated R-value 0.95 was greater than the critical R-value of 0.207 at 0.5 alpha levels with 95 degree of freedom. The R-Square value of 0.91 predicts 91% of the effect of virtual reality technology on library services in tertiary institutions in Akwa Ibom State. This rate of percentage is highly positive and therefore means that there is a significant effect of virtual reality technology on library services in tertiary institutions in Akwa Ibom State. The result, therefore, is in agreement with the research findings of Swanson (2007), who asserted that virtual reality is an advanced technology that is being adopted in both developed and developing countries, and they can help patrons try them outside of the four walls of the library, and this technology has brought users closer to the library.

Hypothesis Three: The null hypothesis states that there is no significant effect of library mobile apps technology on library services in tertiary institutions in Akwa Ibom State. In order to test the hypothesis, regression analysis was performed on the data, (see table 2).

TABLE 3: Simple regression analysis of the effect of big data technology on library services in tertiary institutions in Akwa Ibom State

Model	R	R-Square	Adjusted R Square	Std. error of the Estimate	R Square Change
1	0.91a	0.83	0.83	1.50	0.83

***Significant at 0.05 level; df= 95; N= 97; critical R-value = 0.207**

The above table 3 shows that the calculated R-value 0.91 was greater than the critical R-value of 0.207 at 0.5 alpha levels with 95 degree of freedom. The R-Square value of 0.83 predicts 83% of the effect of big data technology on library services in tertiary institutions in Akwa Ibom State. This rate of percentage is highly positive and therefore means that there is significant effect of big data technology on library services in tertiary institutions in Akwa Ibom State. The result, therefore, is cognate with the research findings of Cuifeng (2013), who stressed that many organisations help create a personalised user experience library using big data. And the purpose of this technology is to promote library services by providing the user's information about their choices and providing resources and services under this technology.

Conclusion

As technological advancements continue to progress, novel tools have been identified that offer efficient services within a reduced timeframe. Currently, libraries are undergoing a transformation in both their operational methods and the manner in which they provide services. The utilisation of information technology is of utmost importance in facilitating the provision of services within the library setting. Contemporary library services have become integrated with a diverse range of cutting-edge technologies. Technological innovation more accurately embodies the business rationale of enhancing corporate value through the enhancement of technological elements within a product or service. The study concludes that library mobile apps, virtual reality technology and big data technology significantly affect the dissemination of library services in tertiary institutions in Akwa Ibom State.

Recommendations

1. There is a pressing need to actively pursue the implementation of a contemporary library system that leverages new technical tools, which have the potential to demonstrate the transformative power of current technology in libraries and information centres.

2. The provision of sufficient financial assistance by the government is important in order to facilitate the establishment of information technology infrastructure that is both relevant and up to date, aligning with the highest standards seen globally.
3. Librarians are expected to possess both competence and a willingness to assist users, while also prioritising the provision of accurate and dependable services.

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