

ASSESSMENT OF THE INNOVATIVE TECHNOLOGIES AND ITS IMPLICATIONS ON LIBRARY SERVICES IN TERTIARY INSTITUTIONS IN AKWA IBOM STATE

Theresa Nse UDO-OKON, *Ph.D*
Department of Educational Technology and Library Science
University of Uyo, Uyo

AND

EKONG, Xavier Moses, *Ph.D*
Department of Educational Technology and Library Science
University of Uyo, Uyo

ABSTRACT

The aim of this paper was to assess innovative technology and its implications on library services in tertiary institutions in Akwa Ibom State. 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. As technologies evolve from time to time, new tools have been discovered to provide optimal services in minimal time. Presently, libraries are experiencing a change in the mode they function and their service delivery process. Information technology is playing a critical role in the dissemination of services in the library. Today's library services are blended by various kinds of innovative technologies. Base on the findings of the study, it was concluded that big data technology, library mobile apps, and virtual reality technology significantly affect the dissemination of library services in tertiary institutions in Akwa Ibom State. One of the recommendations made was that there is need to deliberately work towards the realisation of modern library system using advanced technological tools capable of showcasing the capability of modern technologies to transform libraries and information centres.

KEYWORDS: Innovative technology, Library service, Tertiary institutions and Rivers State.

Introduction

In Akwa Ibom State today, library and information services delivery are being transformed from their manual operations to new ways using technology. Technology continues to evolve, and as it does, it is becoming more and more integrated with society. Smart appliances and voice-controlled assistants are just two examples of how technology is evolving to make people's lives easier. For example, the technology called the internet has the ability to compliment, reinforce, and enhance educational accomplishments for the benefit of all (Esew and Ikyembe, 2013). Library services are assuming a different dimension in philosophy, model, and information delivery. By experimenting with the latest technologies, libraries and librarians are constructing a better world for their patrons. As technologies evolve from time to time, new tools have been discovered to provide optimal services with minimal time. In developed countries like the USA, the UK, and Germany, libraries are adopting new technologies for learning, research, and information to give patrons the best possible services. Librarians are struggling more to implement these cutting-edge technologies for learning, research, and information for their users here in Akwa Ibom State.

Mwamba (2002) observed that in the case of Nigeria, there is a shift in focus of operations from library-centred to information-centred; from the library as an institution to the library as an information provider; and from the librarian as a skilled information specialist functioning in all-related information environments, which requires the use of a new method known as automation of library functions for the enhancement of information access and delivery not physically contained within the four walls of the library, but from library networking for information provision to area networking for all types of information resources provided. However, libraries are experiencing a change in the mode in which they function and their service delivery process. Information technology is playing a critical part in the process and thus raising the standards of users' anticipations and expectations of new value-added services.

Statement of Problem

Challenges in implementing technology-based services in academic libraries in tertiary institutions in Akwa Ibom have been considered alarming for the past three decades. The challenges are thought to be associated with insufficient ICT infrastructure, bureaucratic processes, poor internet bandwidth, lack of IT experts and staff, lack of a policy framework, erratic or unstable power supply, lack of support from the university management and financial constraints. All these together constitute the factors prohibiting the full provision of technology-based library services. It is on this ground, this research seeks to assess various

innovative technologies and their implications on library services and, at the same time, offers to provide appropriate recommendations that would serve to overcome challenges associated with the successful implementation of technology-based service delivery in tertiary institutions in Akwa Ibom State.

Objectives of the Study

The aim of this study was to assess innovative technology and its implication on library services in tertiary institutions in Akwa Ibom State. Specifically, the study sought to:

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

Hypotheses

The null hypotheses will be tested.

1. There is no significant effect of big data technology on library services in tertiary institutions in Akwa Ibom State.
2. There is no significant effect of library mobile apps technology on library services in tertiary institutions in Akwa Ibom State.
3. There is no significant effect of virtual reality technology on library services in tertiary institutions in Akwa Ibom State.

Concept of Innovative Technologies

The Oslo Manual (2005) defines innovation as an activity that produces new or significantly improved goods (products or services), processes, marketing methods, or business organisations. According to the Frascati Manual (OECD, 2002), technological innovations comprise new or significantly modified technological products and processes where technological novelty emerges, unlike improvements, from their performance characteristics. Technology innovation gives a sense of working on technology for the sake of technology. Technological innovation better reflects the business consideration of improving business value by working on the product or service's technological aspects. A technological innovation is a new or improved product or process whose technological characteristics are significantly different from before. According to Albert (2006), innovative technology can be viewed as an activity that forms or changes culture. A modern example is the rise of communication technology, which has lessened barriers to human interaction and, as a result, has helped spawn new subcultures; the rise of cyberculture has as its basis the development of the Internet and the computer (Macek, 2007). As a cultural activity, technology predates both science and engineering, each of which formalises some aspects of technological endeavor. In this sense, it remains connected with artistic endeavors.

Types of Innovative Technologies

Numerous technologies are being adopted by librarians in their library services in order to satisfy the needs of their present and prospective members. Some popular cutting-edge technologies are mentioned here:

- **Big Data:** Many organisations help create a personalised user experience library using big data. 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. The librarians must keep their personal data in mind (Cuifeng, 2013).
- **Block-Chain Technology:** Block-chain technology is another tool-set being adopted by librarians in different libraries. This technology was introduced in 2008 initially. Under this technology, a decentralised database can be used, which provides access to everyone to a pseudonymous digital transaction via networking. The data can be collected and stored for the user's accessibility (Nicholson, 2017).
- **Library Mobile Apps:** Mobile apps have become a top trend after the invention of Android applications. Through these apps, people have constant access to their mobiles. By adopting mobile apps into the library's services, the library will gain more usability. Converting services

through mobile apps may connect patrons and users on one page. Self-service printing, copying, and scanning solutions: As many people don't print at home, under this service, a central access point for printing can be given to the users to print pages of their choice and pay dues online for the service (Hahn, 2012). Library services in modern information technology offer such services for present and prospective members in order to update them about new facilities being launched in the library.

➤ **Virtual Reality:** The users may be brought closer to the library under this technology. Virtual reality technology has been implemented in developed countries, which includes training/workshops and a virtual tour of the library. Many new technologies have been introduced across the globe, but the potential of virtual reality (VR), augmented reality (AR), and mixed reality (MR) are top trends among librarians to show the world the experience being made in the library field. MR, AR, and VR are virtual field trips which could be used in the library services for a solar system, tornado, walk around a refugee camp, a 3D model of the human body, a vacation spot, previewing a college system, or test driving a new car. These are some advanced technologies that are being adopted in both developed and developing countries, and they can help patrons try them outside of the four walls of the library (Swanson, 2007).

➤ **Artificial Intelligence:** In our daily activities, artificial intelligence is gaining more attraction as this application focuses on delivering information to the users. People think of it as a difficult job for libraries, but the name implies that it is artificial, not human. By adopting this feature in services, libraries can connect people to information easily (Russell et al., 2016).

➤ **Drones:** A drone is a small flying device that can be controlled remotely. Many librarians have implemented such technology in their libraries. These drones can provide services to the handicapped and all those who don't have time to physically visit the library. So, the implementation of this technology will give more services directly to the users.

Concept of Library

A library is a collection of materials, books, or media that are easily accessible for use and not just for display purposes. According to ALA (2010), a library is a collection of resources in a variety of formats that are organised by information professionals or other experts who provide convenient physical, digital, bibliographic, or intellectual access and offer targeted services and programmes with the mission of educating, informing, or entertaining a variety of audiences and the goal of stimulating individual learning and advancing society as a whole. It is

responsible for housing updated information in order to meet the user's needs on a daily basis (Wikipedia 2021).

The library has become a centre for information access and distribution, learning and teaching activities, presentations and exhibitions, and social networking connections. The main purposes of a library are to disseminate books and information for free or close to free, to archive information, and to provide a community space for people to interact around information. Therefore, give people the tools necessary to manage information in a sensible way. Institutional libraries, organised to facilitate access by a specific clientele, are staffed by librarians and other personnel trained to provide services to meet user needs. By extension, the room, building, or facility that houses such a collection is usually, but not necessarily, built for that purpose. Kaur and Verma (2006) conducted a survey which explored how the purpose of using a library varies from person to person.

The majority of users visit the library for the issue and return of books, then for consulting periodicals and journals, and many for photocopying work. Rubin (2010) states that the library is now a part of a complex and dynamic educational, recreational, and informational infrastructure. Libraries, as gateways to knowledge and culture, play a fundamental role in society. The resources and services it offers create opportunities for learning, support literacy and education, and help shape the new ideas and perspectives that are central to a creative and innovative society.

Concept of Library Services

Libraries play an important role as a reliable and beneficial information provider in an academic curriculum. In a study conducted by Saika and Chandel (2012) on the user's satisfaction with library resources, services, and information seeking behaviour of students and research scholars at Tezpur University, it was found that if the librarians gave guidance to the user, it would help them to meet the information needs of the user and make available all resources in the form of print or e-resources to the users. This viewpoint is also consistent with a study conducted by Norliya (2009), who stated that university libraries must adopt the direction of vital planning in the creation and delivery of services based on user satisfaction, which plays a critical role. That is to say, there exists a mystical and significant relationship between library services and information attainment. Pandey and Singh (2014) found in their study that a large number of respondents were satisfied with library resources and services. When they discovered books, the circulation service was the most widely used resource and the most preferred service by users.

According to Poll (2008), there are fundamental issues that affect the overall quality of service delivery in libraries, such as accuracy and

reliability, the speed and accuracy of services, accessibility, competence, effective and efficient helpfulness of library staff, and so on. In other words, for the services to be effective, library staff should not only be competent and willing to help users but also ensure that the services provided are accurate and reliable. According to Sohail et al. (2012), instruction given in the use of library resources and services is necessary to help users meet their information needs. They also found that journals, text books, and lecture notes were the most popular sources of information for the students. They have suggested that the latest editions of text books and reference materials should be added to the library collection and users should be guided towards the use of the library resources. Tiefel (2004) postulated that most library users are ignorant of the quality and variety of information available in the academic library. He pointed out that the users are often satisfied with materials that an experienced librarian would find inadequate and/or inappropriate. It was identified that discipline has a major influence on usage patterns and preferences, and that faculty members tend to use the library more intensively. The following are the various types of services rendered by the library.

Types of Library Services

Current Awareness Service: Library members are regularly informed about the recent acquisitions in the library. A list of "NEW ARRIVALS" is sent to the library users by e-mail on a regular basis.

Selective Dissemination of Information (SDI): Keeping in view the area of interest of the library members, selected material is provided to them in order to keep them abreast of the latest knowledge in their field.

Reference Services: The library provides reference and referral services to its users. Queries are answered using all possible sources. If the required information source is not available or accessible at the IST Library, the users are referred to other libraries where the required information may be available.

Online reservation of books: If a book has already been issued, library users can reserve it using this online reservation system. Reserved books are not reissued. A library user is automatically informed through email when a reserved book is returned and the same is held at the circulation desk for two days. If the reserved book is not collected within two days, it is issued to other users or shelved.

Audio/Visual Service: Library members can utilise audio-visual resources available in the library. To facilitate the users, the necessary equipment has been provided for this purpose. The library staff also extends help to the members in using these resources.

Photocopying/Printing Service: Photocopying and printing facilities are available at the library. On payment, users can obtain photocopies of required information from reference materials (such as reference books, encyclopedias, dictionaries, journals, magazines, and so on).

Recommendation of library material: We welcome faculty, staff, students, and other members to recommend any material that can add value to our library collection. The purchase of recommended items is subject to approval and the availability of funds. However, we try our best to honour all the recommendations of our valued library members.

Multimedia Section: A Multimedia section has been established in the library with 10 of the latest computers equipped with multimedia and internet facilities. Equipment required for the use of different types of information media (like CDs, DVDs, audios, videos, etc.) is available in this section so that users can have better access to the information resources in digital format.

Effect of Innovative Technologies on Library Services

The shift from traditional libraries with site-specific collections to digital libraries where information and knowledge sources have no geographical boundaries seems to expand the services of library and information delivery to users. The implications of technology in the library environment remain visible in our daily activities across the globe. According to Nkanu and Okon (2010), ICT-driven libraries are gradually being transformed into new information service centres, providing electronic cataloguing, electronic inter-library loan services, and electronic circulation functions, etc. For Ogunshola (2004), traditional channels of communication will remain important, but the new information and communications technologies hold great potential for broadly disseminating knowledge at low cost and for reducing knowledge gaps within countries and between industrial and developing countries. ICT is shaping the image and perceptions of librarians, particularly in developing countries, as well as improving the skills of librarians for sustainable library services in the 21st century (Iwe, 2005). The effect of innovative technology on library services has also brought about new operational patterns in library work routines, such as:

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

Methods

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

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 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 1 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.

Hypothesis Two: 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 2: 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 2 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 Three: 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 3: 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 3 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.

Conclusion

As technologies evolve from time to time, new tools have been discovered to provide optimal services with minimal time. Presently, libraries are experiencing a change in the mode in which they function and their service delivery process. Information technology is playing a critical role in the dissemination of services in the library. Today's library services are blended with various kinds of innovative technologies. Technological innovation better reflects the business consideration of improving business value by working on the product or service's technological aspects. The study concludes that big data technology, library mobile apps, and virtual reality technology significantly affect the dissemination of library services in tertiary institutions in Akwa Ibom State.

Recommendations

1. There is need to deliberately work towards the realisation of modern library system using advanced technological tools capable of showcasing the capability of modern technologies to transform libraries and information centres.
2. The government should make adequate financial support to facilities the provision of relevant and up to date information technologies infrastructure to meet best global practices.
3. Librarians should not only be competent and willing to help users but should also ensure that services provided are accurate and reliable.

REFERENCES

- Borgmann, A. (2006). Technology as a Cultural Force: For Alena and Griffin (fee required). *The Canadian Journal of Sociology*, 31(3), 351–360.
- Cuifeng, H. (2013). Library services innovation and development in the era of big data [J]. *The Library*, 1.
- Esew, M. & Ikyembe, P. B. (2013). ICT and Transformation of Nigerian Libraries in Enhancing Educational Development in Academic Institutions: Challenges and Solutions. *Information and Knowledge Management*, 3(12), 53-58.
- Hahn, J. (2012). Mobile augmented reality applications for library services. *New Library World*, 113(9/10), 429–438.
- Institute of Space Technology (2015). *Library services*. Available at: <https://www.ist.edu.pk/library-intro-services>
- Iwe, J. I. (2005). Globalization of information and the Nigerian Librarian. *IFLA journal*, 31(4) 342- 349.
- Macek, Jakub. (2007). *Defining Cyberculture*. Archived from the original on 3 July 2007. Retrieved 25 May 2007.
- Mwamba, A. (2002). *The computerization process: System design and implementation. Into the information Age*. UK iNASP Publication: 45-63
- Nicholson, J. (2017). The library as a facilitator: How bit coin and block chain technology can aid developing nations. *The Serials Librarian*, 73(3-4), 357–364.
- Nkanu, W.O. & Okon, H. I. (2010). Digital Divide: bridging the gap through ICT in Nigerian Libraries. *Library Philosophy and practice*.
- Norliya, A. K. (2009). Evaluating users' satisfaction on academic library performance. *Malaysian Journal of Library and Information Science*, 14(2), 101-115.
- Ogunsola, L.A. (2004). Nigerian university Libraries and the challenges of Globalization: The way forward. *Electronic Journal of Academic and Special Librarianship*. Vol.5 no. 2-3
- Pandey, S. K. and Singh, M. P. (2014). Users' satisfaction towards Library resources and services in Government Engineering College of Guru

- Gobind Singh Indraprastha University Delhi: An evaluative study. *Journal of Lib. Info. and comm. Tech.*, 6(1 & 2).
- Poll, R. (2008). *High Quality, High Impact Performance and outcomes measures in libraries*. Retrieved from https://www.ifla.org/VII/s22/Impact_and_outcome_of-libraries-01-07-01.pdf.
- Russell, S. J., & Norvig, P. (2016). *Artificial intelligence: a modern approach*. Malaysia: Pearson Education Limited.
- Saika, M. A. & Chandel, A. S. (2012). Use and Users satisfaction on Library resources and services in Tezpur University (India): a study. *Annals of Library and Information Science*, 59, 148-154.
- Sohail, M. D., & Pandye, A. (2012). Use of library resources in Univeristy libraries by students: a survey with special reference the Univeristy of Kalyani. *IASIC Bullentin*, 57(2), 122-128.
- Swanson, K. (2007). Second life: A science library presence in virtual reality. *Science & Technology Libraries*, 27(3), 79-86.
- Tiefel, V. (2004). The gateway of Information: A system redefines. *How Libraries are used in American Libraries*, 22(9).