What is "Smart" About Smart Libraries?

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ABSTRACT

This is a review paper that focused on examining the components of smart libraries. The paper averred that the components of smart libraries are encapsulated in the acronym "S.M.A.R.T." for "Service, Methods, Automation, Resources, and Technologies". Being smart enables libraries to align with developmental trends and innovations in education delivery in the digital age. This paper argues that as users get more sophisticated in information seeking endeavours, libraries must respond positively by adopting methods and innovations to meet the needs of their users. Failure to meet up to users expectations would see them being by-passed for other information providers. This is what prompted smart libraries. The paper further identified the impediments to the implementation of smart libraries in Nigeria to include: lack of smart skills and technical know-how, poor funding, lack of ICT policy framework, unreliable power supply/ over-dependence on public power supply which is mostly unstable, poor internet connectivity and low bandwidth, lack of smart gadgets and devices, lack of digital literacy among library users, and dogmatism. The paper recommended improved funding of libraries, institutionalization of ICT, provision of alternative source of energy such as solar, training and retraining of library staff, and improved internet access and bandwidth.

KEYWORDS: ICTs, Library Resource, Library Services, Smart Libraries.

INTRODUCTION

Libraries have undergone various stages of evolution. The evolution of libraries has happened through three stages namely modernization, automation and digitization (Nahak & Padhi, 2019). In the same vein, library materials have also evolved from clay tablets, papyrus, cuneiforms, books, CDs, microforms, e-books, database resources, open access, to virtual resources. On a daily basis, technology evolves. This evolution simultaneously triggers changes in the management of libraries and allied institutions as well. Each level of ICT advancement impacts on the library. Today, due to technological innovations, libraries have become smart. Being smart literally means having or showing a quick-witted intelligence. Some libraries have possessed this level of intelligence that has earned them smart libraries. Smart libraries are a product of Artificial Intelligence (AI). Artificial intelligence refers to the ability

of a computer or computer-controlled robot to perform tasks commonly associated with intelligent beings such as humans.

Emphatically, the term 'smart library' appears in various contexts as a synonym for the concept of an 'intellectual library', 'digital library' or 'virtual library (Baryshev, Verkhovets & Babina, 2018). The term 'smart' means flexible, adaptive, extendible, acknowledging and human. Zimmerman and Chang (2018) observed that the term 'smart library' was coined by Aittola, Ryhanen and Ojala in 2003, and librarians have been striving to implement smart libraries in different ways ever since. To him, the term first appeared in the academic corpus in 2003. According to Nahak and Padhi (2019) a Smart Library (SL) is a library without a single physical lending item on the shelves, without books in print, library without shelves, just large cooled servers, whirring digital archives linked through digital networks with machines for copying and distribution. They are those libraries which are having smart readers, e-resources, smart places, Li-Fi facilities with Green eco-environments and smart service, smart librarians. It is a library where all documents are stored in digital format, processed in digital format and accessed through computer with Radio-frequency identification facilities, standard international Integrated Library Management System (ILMS), federated search tools, discovery tools, web-OPAC, Standard Digital Software (Dspace/E-Print), Content Management software (Nahak & Padhi, 2019). Another definition of the smart library is of a library that provides services that are interactive, innovative, informative, real, changing and international (Baryshev, Babina, Zakharov, Kazantseva, & Pikov, 2015). Leicestershire County Council (2021) described a Smart Library as a library that should be able to be opened to library users without being staffed. Thus, technology enables remote control of library buildings, including automatic doors, lighting, self-service kiosks and public computers. This allows the library to significantly extend library opening hours, so more people can use the library at times that is convenient for them (Leicestershire County Council, 2021). The smart library is designed in such a way that any legitimate user who has a computer and connection to the library networks can access not only the resources of that library but also a variety of information available through national and international networks like internet and intranet without being physically present in the library. Library members can have their library card activated for use when the library is in self-access (Smart Library) mode. Any library can become smart if users can have access to the library building, resources and services without the library staff or any other staff for that matter being present.

For effective use of the library, a short induction will be required for library users. This induction will provide all the details users need on how the system works and how to use the Smart Library safely and responsibly. The induction will be available in a number of ways such as in person at the library whilst the library is staffed, or as part of a dedicated induction session in the evening, as well as online induction. To access a Smart Library, a user can scan his/her library card at the door and enter his/her PIN. The door will then open and the user can use the library in the normal way. 15 minutes before closure, an audio loud speaker announcements will begin warning that the library is due to close and the public computers will switch off 10 minutes before closure. Lights will go out once the library is closed (Leicestershire County Council, 2021).

WHAT IS "SMART" ABOUT SMART LIBRARIES?

For a library to be smart, it must have machines programmed with human intelligence to perform library functions as though it was a trained librarian. In other words, a smart library is a conglomeration of hardware and software

installed to act as librarians. It is the authors' expression that the term SMART as used in this paper is an acronym for the components of a smart library. Thus, being SMART stands for:

S = Services

M = Methods

A = Automation

R = Resources

T = Technology

These five are components of a smart library system in our context. They are discussed below:

SMART SERVICES

Smart services are based on artificial intelligence. In this case, technological devices carry out activities that librarians perform. Smart library services are not mutually exclusive from those rendered by library staff in a normal library. The services of the smart library can be separated into the services implemented in the physical spaces of the library as well as on the online, virtual interfaces. By providing smart services, the smart library creates the learning and research digital ecosystem. The implementation of new information technologies in smart library services is clearly a way to increase library opening hours and increase operational efficiency. Traditional library services will be transformed and further developed as these technologies are adopted. The rise of smart library services metamorphosed from sophistication in information seeking behaviours. Information seekers now need information round the clock. However, libraries cannot meet this demand with its limited workforce, thereby responding with the smart library solution.

The main function of smart libraries (SL) is to systematically organize libraries' collections, in a manner that users can interact with digital technologies to serve themselves. SL renders library services faster, better and smartly to its end users through digital technology in different software applications with the help of Internet and Intranet. Smart libraries are technologically driven with artificial intelligent systems. Smart library services were categorized into 8 by Nahak and Padhi (2019) as follows:

1. Library Marketing & Promotion Service, Newsgroups/ Newsletter Services.

2. Electronic Selective Dissemination of Information (E-SDI), Bulletin Board, Discussion Forum.

3. Electronic Board Services, Atmospherics, Mash Ups, Linking different datasets.

4. Ask the librarian /Contac us / Feedback Process, Webliography.

5. Collaborative Digital Reference Services, Video Podcast.

6. E -Document Delivery Services, Institutionalization /personalization–portals.

7. RSS (Really Simple Syndication), Virtual Library Tours, Streaming Media.

8. Value added, aggregator services, Open access publishing, Metadata schemas.

According to Leicestershire County Council (2021), the following services are rendered in a Smart library:

1. Library materials can be borrowed, returned and renewed and payment of charges too using the self-service kiosks.

2. Collect reserved items that are awaiting collection at the reservation collection point and borrow them using the self-service kiosks.

3. Use the public PCs and free library internet WiFi.

4. Print from the public PCs, photocopy and scan documents.
5. Access and browse the library catalogue on public PCs (OPAC).
6. Meet as a group free of charge in the open library space.

SMART METHODS

Smart library services are delivered physically and remotely via internet and intranet access. Therefore, the two dominant methods for delivering smart library services are physical methods and online method. In the physical method of smart library service delivery, technologies such as Internet-of things (IoT) could be used to capture data in real time. Making use of business process re-engineering, a number of processes could be refined. Using a smart library management system that integrates IoT and automating a traditional library's core processes will propel the library towards a next-generation library. Users will be able to communicate smartly with IoT devices to perform relevant tasks (Ozeer, Sungkur, and Nagowah, 2019). Thus, eligible users can come to the library building to enjoy library services in smart mode. A smart library enables the automation of time-consuming and repetitive activities in traditional library like the cataloguing and classification of library resources, searching of catalogue cards, issuing and returning of materials and so on.

On the other hand, in the online method, library services are open to library users without the library staff in attendance or the users present in the library building. The technology enables remote control of library buildings, including automatic doors, lighting, self-service kiosks and public computers (Leicestershire County Council, 2021). This allows us to significantly extend library opening hours, so more people can use the library at times that is convenient for them. Smart libraries can be accessed virtually from remote locations. Thus, library users can as well access the library remotely from the comfort of their homes via their smart devices or through the library's public PCs.

SMART AUTOMATION

We live in an era of great possibilities due to automation made feasible by embedded systems and wireless technologies. Automation describes a wide range of technologies that reduce human intervention in processes. The high point of automation is the invention of the Internet of Things (IoT). According to Gardiner (2019) one of the most recent changes in technology is the shift from the 'Internet of Communication' to the 'Internet of Things' or IoT. This exciting and emerging technology makes it possible to connect everyday objects, that are not themselves computers, by embedding sensors in them. This means that the IoT can include anything from factories, cars, appliances, toothbrushes, doors, chairs, and even lighting system. The data collected from these sensors is then transferred over a network without requiring human interaction, all while having the networking capabilities that make it possible to communicate with each other, access Internet services and interact with people. In short, the IoT are simply objects or things where the infrastructure and technology involved are sensors, processors, cloud computing, and wireless connectivity. IoTs is the heart of smart libraries. Some of the ways that the IoT is already utilized in libraries are technologies such as RFID (radio frequency identification) technology that allows for item identification and item security, machine 2 machine (M2M) communication, which are devices such as self-check kiosks or automated materials handling machines, and semantic search technologies that include metadata and discovery tools (Gardiner, 2019).

SMART RESOURCES

Smart resources include human and material resources. Smart libraries are actually set up to meet the smart needs of smart users. Thus, all efforts put into the smart library project, is geared towards users satisfaction. Users are the most important component of the smart library system (Anyira, 2011).

On the other hand, Information resources of different types carefully selected to meet the needs of library patrons, is what makes a smart library really relevant. The resources are the same available in conventional libraries. Though, smart library resources may require embedded technologies for effective use and control. The resources may include but not limited to e-resources, databases, books, e-journals, e-reference tools, CD, DVD, Audio sets, e-newspapers, reference books, monographs etc.

SMART TECHNOLOGY

Among the factors that determine smart libraries, the existence of technology is essential. The adaptation and use of technology in other areas also have implications for structuring library services. Mobile technology, wireless systems, radio-frequency identification (RFID) technology, light-emitting diode (LED) technology, Internet of Things, data mining, standards and protocols... that enable the library's online systems to work. It can be argued that these technologies alone do not make a smart library, but without them, the services that library users now expect cannot be designed. They are explained below:

1. Wireless technology: wireless access is, of course, becoming more and more common in services, which are linked to other systems. In recent times, all and sundry use wireless devices as a natural part of their lives and libraries have adapted to these needs, too by becoming smart.

2. Mobile technology: in Nigeria, almost all citizens and residents own personal mobile devices through which they access the world-wide web. Libraries need to adapt to these needs: it is no longer enough to make their online content available on a mobile device; new services are also emerging in libraries through various mobile applications.

3. Standards and protocols: the use of standards and protocols is essential for providing online information resources and for building databases. In particular, it is important that the knowledge and resources archived in libraries and repositories are not only available in library's isolation. As part of a smart agenda or a smart campus, this content must also be accessible to everyone in other connected systems more precisely, according to the right permissions and access levels (Nahak & Padhi, 2019; László & Egyetem, 2021).

CHALLENGES ASSOCIATED WITH SMART LIBRARIES IN NIGERIA

Despite the inherent potentials of smart libraries, there are several potential bottlenecks that negate them in Nigeria. They include:

1. Lack of smart skills and technical know-how on the part of librarians, programmers, systems analysts) etc.

2. Poor funding: inadequate funding of libraries poses a serious challenge to the deployment of smart technologies in Nigerian libraries.

3. Lack of ICT policy framework: lack of policy guideline stating the applicability and scope of smart libraries is a potential threat to successful implementation of smart libraries in Nigeria (Nwabueze & Anyira, 2011).

4. Unreliable Power Supply/ over-dependence on public power supply which is mostly unstable.

5.   Poor Internet Connectivity and low Bandwidth.

6.   Lack of computers, telecommunication devices, and smart gadgets.

7.   Lack of digital literacy among library users.

8.   Dogmatism and resistance to technological changes by librarians.

CONCLUSION

Smart libraries are aligned with the developmental trends and innovations in education delivery. Virtual classrooms, distance education, online classes and similar trends are synonymous to education in this age. Smart libraries are changing the landscape of information service delivery in today's world. As users get more sophisticated in their information seeking endeavours, libraries must respond positively by adopting methods and innovations to meet the needs of their users. Failure to meet up to users expectations would see them being by-passed for other information providers.

RECOMMENDATIONS

Based on the findings of the study, the researchers recommend that:

1.   Adequate finance should be allocated to libraries to facilitate the deployment of smart technologies for implementation of smart libraries. Libraries should also source for viable internally generated revenue (IGR) to supplement their subventions.

2.   ICT policy should be put in place at the national level, and at the institutional level to guide the deployment and use of smart libraries.

3.   Besides public source of power supply, libraries should be provided with alternative source of energy such as solar, inverter and the power generating sets.

4.   There is need for training and retraining of library staff on the use of smart library technologies.

5.   The Government should provide adequate infrastructure that would provide the foundation for smart libraries.

6.   Library's parent institution should provide adequate Internet access with fast speed bandwidth for effective functionality of smart library services.

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