Awareness and Perception of Certified Librarians of Nigeria Towards the Use of Robotic Technologies in the Libraries

Atanda Saliu Sambo
Federal University of Petroleum Resources, Effurun, Nigeria
ORCID:0000-0002-4675-7768

Gloria Oyovwe-Tinuoye
Federal University of Petroleum Resources, Effurun, Nigeria
ORCID:0000-0002-4326-9232

Received: 15th January, 2023 - Revised: 26th April, 2023 - Accepted: 3rd June, 2023

DOI: https://dx.doi.org/10.4314/glj.v28i1.3

Abstract

The study adopted the social survey technique and the population of the study comprised 452 certified librarians of Nigeria libraries that were certified by the Librarians' Registration Council of Nigeria (LRCN) on November, 24th, 2021. The librarians who took part in the survey were chosen using a random sampling method. One out of every three librarians being admitted on the day was given the questionnaire. The researcher used Statistical Package for the Social Sciences (SPSS version 20.0) application software with simple percentages chosen for easier analysis and interpretation. The findings of this study revealed that certified librarians are averagely aware of the existence of robotic technologies usage for library services and the anxiety of employee retrenchment is the major anxiety, despite they are aware that, the innovative apparatuses will increase global recognition and enhance library services. It shows that certified librarians are faced challenges towards the use of robotic technologies such as potential job loss, inadequate funding and epileptic among others. The study recommended that certified librarians should keep up with modern trends in information dissemination by learning fundamental skills that are technologically compatible among others

Keywords: Consciousness, Perceptive, Robot technology (RT), Apparatus, Artificial intelligence (AI)

Introduction

The adoption of a robotic library assistant in Nigerian libraries might help to solve several issues that currently plague working licensed librarians. Robotic technologies (RT) minimize the human labour required for searching, selecting, and giving back the book to the user. The procedure of looking for the books and bringing them back takes time for the practising certified librarians. The work will be more exact and take less time as robots are deployed. According to Tredinnick (2017), a robot is a collection of technologies and methods from the field of computing science that can adapt its reasoning to changing environmental circumstances. Robotic technologies are used by established libraries to facilitate and enhance library operations, improve library services, and foster efficiency to properly carry out their mandate. Tay (2014) looked at robotic applications for, among other things, the quick and effective delivery of books, magazines, newspapers, and brochures at the Temasek Polytechnic Library.

While this has been happening, numerous academics have provided diverse definitions of robotics. Robots are mechanical devices that automate tasks under direct human supervision or following a pre-established plan and a set of general rules, according to Talaviya et al. (2020). According to Abraham (2019), robotics refers to a class of machines that can be utilized to execute a variety of computer-programmed automated tasks. It is clear from these two definitions that robotics is a branch of artificial intelligence (AI) that deals with ongoing motor tasks as well as machine learning. Similarly, Tella (2020), opined that robotics and AI are tightly related. This

suggests that machine learning and perceptual and motor tasks are both important to robots. For instance, the Roanoke County Public Library has a Pepper robot (Jones, 2018). Several forms of library enquiries can be answered by this kind of robot.

Robots in libraries free up librarians' time to concentrate on other crucial information services that cater to the changing needs of the modern world. According to Harisanty et al. (2020), some areas where robotic technologies have been integrated into library operations include shelving and finding library materials, security, inquiries and responding to repetitive reference and directional queries, outreach and public relation (PR) via library tours, and even information illiteracy training. Robots are also helpful for automated storage and retrieval systems, which have facilitated library management. According to Tella (2020), university libraries must improve the calibre of their services to better position themselves to benefit from the promise of robotic technologies. The need for university librarians to use RT and AI technology is also emphasized by Talley (2016) as a way for them to better serve scholars and other library users. According to Grant and Camp (2018), many university libraries, especially those in industrialized nations, have incorporated AI or RT into a variety of library activities, including circulation and reference services. Grant and Camp specifically mentioned the introduction of the Mentor Library's librarians in Ohio. Similarly, Asemi and Asemi (2018) used the Exploratory Factor Analysis (EFA) method to research the top AI robot applications that can be used in libraries.

According to IBA Global Employment Institute (2017), librarians must have the essential technical, communication, creative, and ICT abilities in addition to having a solid understanding of mathematics for AI robots technology adoption in university libraries to be successful. Few librarians, according to Cox et al. (2019), possess the abilities necessary to support RT's practical application. Using RT technologies in library operations encourages critical thinking and improves useful library use. In rich nations, many university libraries have begun implementing AI, however in the majority of developing nations, this is not the case. In light of this, the current study examines university librarians in Nigerian institutions' perceptions and awareness of artificial intelligence (AI).

The focus of this research is on certified librarians who have been accepted by the Librarians Registration Council of Nigeria (LRCN). In light of this, the purpose of this study is to find out more about how licensed librarians' awareness and perception of RT in Nigerian libraries.

Statement of the Problem

Automation is being used for several library services, including acquisition, cataloguing, serials, and others. However, using RT would make a variety of library jobs less dependent on interpersonal connections. Based on this, assessing the acceptance of robot installation in Nigerian libraries as a development in automation will unquestionably offer information about the current level of establishing libraries' acceptance of robotic technology.

Many academic libraries in developed countries have piloted this technology into the libraries' activities such as NY Public Library, Temasek Polytechnic Library, Library UMKC Library, University of Chicago Library, and Shanghai Library etc. Meanwhile, these studies wish to know through certified librarians of Nigeria, if RT technology has been applied to the libraries' activities in Nigeria. The lack of studies connecting robotic technology to librarianship suggests that there is limited awareness of and perception of certified librarians of Nigeria towards the use of RT in libraries. In contrast to other disciplines, library and information science have not seen an exponential rise in the usage of RT. A search of the Ebscohost database revealed that between 2011 and 2021, not a single study published on the knowledge and opinions of Certified Nigerian Librarians about the use of robotic technology in libraries was published in Nigeria. The absence of study on this subject has left a gap in the literature that has to be filled if libraries are to join in the RT discourse. Since RT will affect libraries in the future, this study on the opinions of Nigerian-trained librarians is important. The study will provide recommendations for the application of robotic technology in libraries around the world, including those in Nigeria.

Objectives of the Study

The general objective of the study is to examine the awareness and perception of certified librarians in Nigeria towards the use of robotic technologies in libraries.

The specific objectives of the study are to:

1. To establish the level of awareness of robotic technologies by certified librarians in Nigeria.

2. To identify certified librarians' perception towards robotic technologies in Nigeria.

3. To identify possible challenges that certified librarians may face towards the use of robotic technologies in Nigeria.

Literature Review

It is no longer news that humanoid robots with artificial intelligence (AI) are now available in libraries in both rich and developing nations, as reported by Tella (2020). Robotics design, development, use, and application are also topics of AI (Abram, 2019). In essence, a robot is a machine that can perform a complex series of tasks autonomously under the guidance of a computer program. Kim (2017) claims that humanoid robots can welcome guests and give directions in libraries. Libby, a robot at the University of Pretoria Libraries in South Africa, already performs such tasks. Libraries, according to Papy & Jakubowicz (2017), are teeming with cutting-edge initiatives that are empowering users and enhancing their research capacity. The role of robotic technologies in library operations and librarianship has been acknowledged by several professional bodies in the field, including the South African Library Association, the American Library Association, and the International Federation of Library Associations and Institutions (IFLA). Robot adoption in libraries can enhance library services and give users with reliable information that can foster growth and development in the information age (Oladokun et al., 2023). In academic libraries, robotic technology was investigated by Ali et al. (2020). The study's main objectives were to learn how libraries are coping with the use of technology and what part librarians would play in the future of robots. The writers looked at academic literature, strategic plans for university libraries, and library programming.

The study's findings showed that librarians did not react well to the use of technology in libraries. The study's findings also showed that it is challenging for librarians and library managers to incorporate this technology in library systems because of a lack of understanding and awareness about the advantages and cost savings that it could offer to the library. Similarly, Adebayo et al. (2018) stated that library managers will exhibit trust in the adoption and implementation of RT when they are adequately informed of the necessity of providing routine services through the application of the technology. However, suitability for the use of robotic technologies in university libraries depends on several criteria, including the availability of appropriate data, the requirement for policy documentation, the deployment of necessary software and algorithms, and finally, subject-matter expertise (Martinez-Plumed et al., 2021). The amenities required for the efficient use of robotic technology in university libraries are listed by Qomariyah et al. (2020) in a study on Indonesian university libraries. Documents about policies and procedures, technical know-how, and organizational resources, such as human and technological resources, are among these.

According to Nakhoda and Tajik (2017), academic librarians at Tehran University showed a strong aversion to implementing AI robot technology in the library. This was brought on by a lack of knowledge and instruction regarding the application of technologies to library operations. According to Massis (2018), many academic librarians perceive the adoption of RT as a danger since they think it will execute the tasks that should be carried out by them. It should be noted, nonetheless, that the adoption and application of AI in libraries will improve the quality of the services offered by libraries. Similarly, Pinfield et al. (2017) assert that library managers will be ready to adopt the use of robot technologies in libraries if they are well aware of the importance of providing routine services through the application of RT. According to some studies, libraries should create a continuing education strategy to equip staff and patrons with the knowledge and abilities necessary for RT awareness, adoption, and implementation (Arlitsch & Newell, 2017). Furthermore. According to Owolabi K. A et al. (2021), 98 (98%) of the respondents were aware of AI technology used in library operations, whereas 02 (2%) stated they were not.

According to Tella (2020), university libraries must improve the calibre of their services to better position themselves to take advantage of the potential benefits of artificial intelligence. The need for university librarians to adopt AI technologies to better serve scholars and other library users is also emphasized by Talley (2016). The purpose of the question was to learn how academic librarians felt about artificial intelligence. 85 people (32.8%) acknowledged that the adoption of AI robots in university libraries will result in job losses. Sixty-two (23.9%) respondents were in agreement that implementing AI robots in libraries would increase their visibility among academics. However, 40 respondents (15.4%) asserted that using AI robots will enhance academic librarians' ability to accomplish their jobs. The implementation of AI, according to 72 (28%) people, will improve library services' effectiveness, which will raise customer happiness. Artificial intelligence use in various

businesses, including libraries, is the current trend in technological transformation. This acceptance has led to widespread concern about job losses and a significant rise in inequality (Ernst et al., 2018). Advances in AI technology, according to Korinek and Stiglitz (2017) and Méda (2016), may result in employment losses or job polarization. According to Bowles (2017), the implementation of AI could lead to a significant increase in inequality as a result of automation. According to Frey and Osborne (2017), during the next 20 years, AI is expected to replace around 35% of workers in the UK and 47% of workers in the US. According to the World Bank (2016), because the application of robot technologies will result in a high rate of job losses, developing countries may be more wary of it. According to the report, 69% of jobs will be lost as a result of AI adoption in India, 72% in Thailand, 77% in China, and 85% in Ethiopia. These studies collectively show that AI has the potential to cause massive employment destruction as well as job losses. Similarly to this, Asefeh and Asemi (2018) provide a list of numerous applications for AI robot technologies that can be utilized to enhance library services, such as circulation services, book shelving, categorizing library items, and more. Aside from assigning metadata, AI technology can also help with non-textual searches.

According to Decker (2015), adequate technological infrastructure, including a strong WiFi connectivity zone, must be installed in libraries for the effective deployment of robotic technologies. He continues by stating that there needs to be a written policy in place. The use of robotic technologies would, however, result in less frequent human engagement with library operations. Robots can also be used to take the library's inventory using RFID and barcode technologies (Bomble Pranit, R & Dipika, 2015). Similarly, Sambo, Imran, and Akanbi (2022) in their study emphasized challenges faced by certified librarians in the use of digital literacy skills, such as power failure most of the time 321 (82%), lack of digital equipment 305 (78%), my workload is quite overwhelming/cost of digital skills training 297 (75.9%), lack of basic digital literacy skills 261(66.7%), I am not computer literate 201 (51.4%), and I had limited time in my offices due to other. As a result, there is a considerable need for trained information scientists, librarians, and researchers to embrace robotic applications in a variety of settings. By taking the books from the library counter and placing them one by one onto shelves, the Library Management Robot (LMR) will lessen the issues. They also concurred that robotic system deployment aims to reduce the work involved in organizing books in a library, given that their libraries include thousands of books and they have complained that there aren't enough staff to do it (Samuel, 2019).

For the successful delivery of books to customers, Deephi Unnikrishnan et al (2017), and Sharath & Shivashankar (2013) recommended a robot system at the library. Mahalingam, et al (2017) presented a line-following robot for book distribution that travels along a predetermined path to reach the users. Robots can also be used to take the library's inventory using RFID and barcode technologies (Bomble Pranit, R & Dipika, 2015).

Methodology

A social survey approach was used to conduct this research. The questionnaire was used as a research instrument in this study. It was divided into two sections: the first was aimed to collect personal and demographic information from respondents, and the second section was designed to collect information on the awareness, and perception of certified librarians in Nigeria towards the use of robotic technologies. In Abuja Nigeria's capital, twenty-five surveys were sent to librarians. The completed questionnaire was returned and re-administered to the same group of librarians, with the same results as before. The study's participants were 502 Nigerian-certified librarians from various libraries and institutions who were entered by the Librarians' Registration Council of Nigeria (LRCN) on November 24th, 2021.

For examination and expertise assessment, the instrument was sent to three experts whose research interests include information technology, artificial intelligence and resources management. This was done to ensure that the instrument was appropriate. The instrument's performance was measured using the test retests technique, which yielded a reliability value of 0.85. The librarians who took part in the survey were chosen using a random sample method. One out of every three librarians being admitted on that day was given the questionnaire. A total of 452 surveys were issued to librarians, with 372 completed and returned, reflecting an 82.3% response rate. The study was carried out using the Statistical Package for the Social Sciences (SPSS) application software, with simple percentages chosen for easier analysis and interpretation.

Results and Discussion

Out of 452 copies of the questionnaire administered, 372 (82.3%) were completed and returned. Data were presented for analysis using descriptive statistics which include; frequency count and percentages. The second part of the questionnaire was administered to collect information on the awareness, and perception of certified librarians towards the use of robotic technologies skills as well as recommendations was made to enhance the efficiency and effective implementation of robotic technologies in Nigerian libraries.

Table 1. Distribution of respondents by gender

Gender	Frequency	Percentage
Male	238	63.9%
Female	134	36%
Total	**372**	**100%**

Source: Generated by Researcher using SPSS 20.0 from questionnaire response, 2021

Table 1 reveals that 238 (63.9%) were male while 134 (36%) were female. This shows that there are more male-certified librarians in Nigerian libraries than females

Table 2. Distribution of respondents by working experiences

Working Experiences	Frequency	Percentage
0-5 Years	229	61.5%
6-10 Years	82	22%
11-15 Years	53	14.2%
16-20 Years	5	1.3%
20 Years & Above	3	0.8%
Total	**372**	**100%**

Source: Generated by Researcher using SPSS 20.0 from questionnaire response, 2021

Table 2 shows the working experiences of the respondents involved in the survey. 229 (61.5%) were between 0- 5 years of experience while 82 (22%) were between 6 – 10 years of experience whereas 53 (14.2%) were between 11-15 years of experience while 5 (1.3%) were between 16-20 years experiences and 3(0.8%) were between 20 years and above.

Table 3. Distribution of academic qualifications of respondents

Variables	Frequency	Percentage
BLIS	191	51.3%
PGDL	73	19.6%
MLIS	101	27.1%
PHD	7	1.8%
Total	**372**	**100%**

Source: Generated by Researcher using SPSS 20.0 from questionnaire response, 2021

Table 3 shows the academic qualifications of the respondents. 191 (51.3%) had bachelor's degrees in library science while 73 (19.6%) had postgraduate diplomas in library whereas 101 (27.1%) had masters in library and information science and 7(1.8%) had doctorate degrees.

Table 4. Distribution of respondents by libraries

Type of Library	Frequency	Percentage
Academic Library	270	72.5%
National Library	11	2.9%
Public Library	51	13.7%
Private Library/ Corporate Library	16	4.3%
School Library	13	3.4%
Special Library/ Research Library	11	2.9%
Total	**372**	**100%**

Source: Generated by Researcher using SPSS 20.0 from questionnaire response, 2021

Table 4 revealed the types of libraries that present

at (LRCN) induction, 270 (72.5%) were majority from an academiclibraries, 11 (2.9%) national libraries, 51(13.7%) were a public library, 16 (4.3%) private/ corporate library, 13 (3.4%) school library and 11 (2.9%) special/research library. This indicated that academic librarians were the majority involved in the survey.

Table 5. Level of awareness of robotic technologies

Level of awareness	Frequency	Percentage
High level of awareness	119	31.9%
The average level of awareness	182	48.9%
Low level of awareness	71	19%
Total	**372**	**100%**

Source: Generated by Researcher using SPSS 20.0 from questionnaire response, 2021

Table 5 shows awareness towards robotic technologies in Nigerian libraries, majority of the respondents182 (48.9%) reported an average level of awareness while 119(31.9%) reported a high level of awareness whereas 71(19%) reported a low level of awareness. The majority of respondents which shows the average level of awareness of robotic technologies in Nigerian libraries may be a result of a large number of academic librarians involved in the survey.

Objective 2: To identify certified librarians' perception towards robotic technologies in Nigeria

Variables	Frequency	Percentage
Employee retrenchment	271	72.8%
Difficult to operate	63	16.9%
Increase global recognition	251	64.4%
Enhance library services	207	55.6%

Source: Generated by Researcher using SPSS 20.0 from questionnaire response, 2021

Table 6 indicates the perception of licenced librarians towards the use of robotic technologies in Nigerian libraries, majority of the respondents 271 (72.8%) employee retrenchment, 251(64.4%) increase global recognition, 207(55.6%) enhance library services.

Objective 3: To identify possible challenges that certified librarians may face towards the use of robotic technologies in Nigeria.

Table 7.

Variables	Frequency	Percentage
Inadequate funding	257	69%
Epileptic electricity	231	62%
Inadequate ICT facilities	219	58.8%
Insufficient Internet service provider	231	62%
Insufficient robot equipment	198	53.2%
Mechanical problems	213	57.2%
High risk of maintenance	207	55.6%
Lack of expertise to operate it	215	57.7%
Potential job loss	272	73.1%

Source: Generated by Researcher using SPSS 20.0 from questionnaire response, 2021

Table 7 shows potential hindrances that libraries may face in the use of robotic technologies. Several factors were found to be militating against the effective use of robot services delivery to users in the libraries. These include potential job loss 272(73.1%), inadequate funding 257(69%), epileptic electricity/ insufficient service provider231 (62%), inadequate ICT facilities 219 (58%), lack of expertise to operate it 215 (57.7%), mechanical problems 213 (57.2%), high risk of maintenance 207 (55.6%), insufficiency robot equipment 198 (53.2%).

Discussion of findings

The findings of the study discovered that the majority of licenced librarians were averagely aware of

robotic technologies in libraries. This study is in line with the findings of Owolabi et al. (2021) who indicate in their study that the majority of respondents were aware of artificially intelligent technologies in library operations.

The results further revealed the perception of certified librarians in Nigerian libraries towards the use of robotic technologies whereas, participants affirmed the possibility of employee retrenchment, increase global recognition, enhance library services and difficulty to operate. This agrees with the findings of the World Bank (2016) who opined that developing countries may be more hinted at the adoption of robot technologies because it will lead to a high job loss rate. Supported by, Frey and Osborne (2017) emphasise that artificial intelligence would displace about 35% of workers in the United Kingdom and 47% of workers in the United States in the next 20 years.

The results further show that licenced librarians faced diverse challenges in the use of robotic technologies in the libraries such as employee retrenchment, inadequate funding, epileptic electricity, insufficient service provider, inadequate ICT facilities, lack of expertise to operate it, mechanical problems, high risk of maintenance, insufficiency robot equipment. The outcome of this conforms to that of Decker (2015) claims that, for effective adoption of robotic technologies in university libraries, the library management needs to deploy enough technology facilities in the library which include a very strong Wi-Fi connectivity zone. This study also, in line with that of Massis (2018) observes that many academic librarians see robotic technology adoption as a threat because they believe robotic technology will perform the functions meant for them. Likewise, Sambo, Imran and Akanbi (2022) in their study enumerated various obstacles faced by licenced librarians in Nigeria libraries such as power failure most time, lack of digital equipment, workload quite overwhelming/ cost of digital skills training, lack of basic digital literacy skills, I am not computer literate, I had limited time in my offices due to other official assignments.

Conclusion

The results of this study demonstrate that knowledge of robotic technologies is necessary for certified librarians to advance their professional accomplishment and social engagement in the modern Information and Communication Technology (ICT) era. When it comes to gaining access to and using robot technologies, robotic talents outspread beyond the partitions of academia. It ominously affects both the field of librarianship and the future economic transactions of certified librarians. According to the findings, licensed librarians' attitudes toward the use of robotic technologies are that it may lead to employee retrenchment, difficult to operate, increase global recognition and enhance library services. Certified robot awareness was also found to be average. The use of robots in libraries also ran into several challenges for licensed librarians, including layoffs, a lack of funding, unstable electricity, a lack of service providers, a poor ICT infrastructure, a lack of operating expertise, mechanical problems, a high risk of maintenance, and a lack of robot equipment.

The survey also took practice-certified librarians into account. The study can be repeated with additional library staff members because it was conducted among licensed librarians. It will be useful to understand how AI robot technology can be included to help different library activities after reading this paper.

Recommendations

i. Library management should inform practising certified librarians that the use of robotic technologies in libraries does not necessarily result in employee layoffs. Robotic technologies should be incorporated into the educational curriculum at all levels so that the products of such establishments might be engaged in all sectors of the economy and use their expertise in robot experience for national development.

ii. Library management should work harder to ensure that these future researchers and librarians are properly trained, and they should retrain all of their personnel on how to handle and use robotic technologies in the library environment. Robot technologies should be familiarised in all libraries irrespective of a kind to ease efficient and quicker library operation and service delivery in the modern Information and Communication Technology (ICT) epoch.

iii. To employ robotic technologies in libraries efficiently, library management should expand their Internet service providers.

iv. To prevent budgetary allocations from being diverted, library administration should make sure that monies given to the libraries are used effectively.

References

Abraham, S. (2019). Robot in libraries: technological trends that aren't that out there anymore. Retrieved 25th March, 2023 from https://

lucidea.com/blog/robots-in-libraries/.

Adebayo, O. A., Ahmed, Y. O. & Adeniran, R.T (2018). The role of ICT in the provision of library services: a panacea for sustainable development in Nigeria, Library Philosophy and Practice. http://digitalcommons.unl.edu/libphilprac/1951#

Ali, M. Y., Naeem, S. B. & Bhatti, R (2020). Artificial intelligence tools and Perspectives of University librarians: an overview", Business Information Review, 37(3), 12-15. https://journals.sagepub.com/doi/abs/10.1177/0266382120952016

Arlitsch, K., & Newell, B. (2017). Thriving in the age of accelerations: A brief look at the societal effects of artificial intelligence and the opportunities for libraries". Journal of Administration, 57(7), 789-798. https://doi.org/10.1080/01930826.2017.1362912

Asemi, A., & Asemi, A. (2018). Artificial Intelligence (AI) application in library systems in Iran: A taxonomy study. Library Philosophy and Practice (e-journal), 1840, http://digitalcommons.unl.edu/libphilprac/1840/

Bomble Pranit, R. G., & Dipika, S. (2015). Library management robot. International Journal of Recent Technology and Engineering, 1(3), 21-30. https://digitalcommons.unl.edu/libphilprac/1840/

Bowles, J. (2017). The computerization of European jobs Bruegel. Retrieved 13th March, 2023 from https://www.bruegel.org/blog-post/computerisation-european-jobs

Cox, A. M., Pinfield, S., & Rutter, S. (2019). The intelligent library: Thought leaders' views on the likely impact of artificial intelligence on academic libraries. Library Hi Tech, 37 (3), 418–435. https://doi.org/10.1108/LHT-08-2018-0105

Decker, E. N. (2015). The Role of Robotic Telepresence in the Academic Library. In M. Khosrow-Pour, D.B.A. (Ed.), Encyclopedia of Information Science and Technology, Third Edition (pp. 6648-6655). IGI Global. https://doi.org/10.4018/978-1-4666-5888-2.ch653

Deepthi, U., Aswani, C. R., Arjun K. J., Ganesh, S. (2017). Library assistant robots in library management system. International Journal of Engineering Research & Technology, l6 (1), 139-142. doi:10.17577/IJERTV2IS80048

Ernst, E., Morola, R. & Samaas., D. (2018). The economics of artificial intelligence: Implications for the future of work: International Labour Organisation (ILO) future of work research paper series. https://www.ilo.org/wcmsp5/groups/public/---dgreports/---cabinet/documents/publication/wcms_647306.pdf

Frey, C. B., & Osborne, M.A (2017). The future of employment:" How susceptible are jobs to computerisation? Technological Forecasting and Social Change, 1(4), 254-280. https://doi.org/10.1016/j.techfore.2016.08.019

Harisanty, D., Anna, N. E. V., Putri, T. E. and Firdaus, A. A. (2020). Designing 'library smart bot' to support information services in an academic library. Journal of Southwest Jiaotong University, 55(6) 12. doi:10.35741/issn.0258-2724.55.6.15

Jones, I. (2018). Pepper the Humanoid Robot comes to Roanoke County Public Library. Retrieved 25th June, 2019 from https://www.wsls.com/news/Virginia/roanoke/pepper-the-humanoid-robot-comes-to-roanoke-county-public-library

Kim, B (2017). AI-powered robots for libraries: exploratory questions: information technology satellite meeting, Technical University of Applied Sciences, Wildau, http://library.ifla.org/id/eprint/2700/1/s08-2019-kim-en.pdf

Korinek, A., & Stiglitz, J(2017). Artificial intelligence and its implications for income distribution and unemployment". NBER Working Paper No. 24174. National Bureau of Economic Research.URL: https://ideas.repec.org/p/nbr/nberwo/24174.html

Librarian Registration Council of Nigeria (2021). "List of certified librarians" www.lrcn.gov.ng

Mahalingam, S., Aravindb, S., & Devi. R, T (2017). Smart robots in library management system". International Journal of Innovative and Emerging Research in Engineering, 4(1), 74- 79. https://www.researchgate.net/publication/338712408_Application_of_Artificially_Intelligent_Robot_in_Libraries.

Martinez-Plumed, F., Gomez, E. and Hernandez-Orallo, J (2021). Futures of artificial intelligence through technology readiness levels, Telematics and Informatics, 58 (12), 12-21. https://www.sciencedirect.com/science/article/pii/S0736585320301842

Massis, B. (2018). Artificial intelligence arrives in the library. Information and learning sciences", 119(7/8), 456–479. doi:10,1108/ILS-02-2018-0011

Méda, D. (2016). The future of work: The meaning and value of work in Europe. ILO Research Paper No. 18, 1-35. https://www.ilo.org/wcmsp5/

groups/public/---dgreports/---inst/documents/publication/wcms_532405.pdf

Nakhoda, M. & Tajik, S. (2017). A survey of the factors influencing the resistance of the employees of university libraries to technological changes: Study of libraries of Tehran University, Library Management, 24(4), 1-12. doi: 10, 1108/LM-02-2017-0025

Odeyemi, S. O. (2019). Robots in Nigerian academic libraries: Investigating infrastructural readiness and potential for library services Robots in libraries: challenge or opportunity?, Wildau, Germany. https://library.ifla.org/id/eprint/2776/1/s08-2019-odeyemi-en.pdf

Oladokun, B. D., Owolabi, A. K., Aboyade, M. A., Wiche, H. I., & Aboyade, W. A. (2023), "Emergence of robotic technologies: implications for Nigerian academic libraries", Library Hi Tech News. https://doi.org/10.1108/LHTN-02-2023-0031

Owolabi, K. A., Adenekan, F. N., Adeleke, O. A., Ajayi, T. A., & Adesina, O. (2020). Awareness and perception of the artificial intelligence in the management of university libraries in Nigeria, Journal of Interlibrary Loan, Document Delivery and Electronic Reserve, 29 (12), 13-28. https://www.tandfonline.com/doi/abs/10.1080/1072303X.2021.1918602

Payne, L. (2007). Library storage facilities and the future of print collections in North America, Report commissioned by OCLC Programs and Research, www.oclc.org/programs/publications/reports/2007

Pinfield, S., Cox, A., & Rutter, S. (2017). Mapping the future of academic libraries: A report for SCONUL. Report Society of College, National and University Libraries (SCONUL). London https://eprints.whiterose.ac.uk/125508/1/SCONUL%20Report%20Mapping%20the%20Future%20of%20Academic%20Libraries%20-%20published%20version.pdf

Qomariyah, A., Mursidah, G. & Wahyun, D. (2020). Analysis of organizational readiness towards library 4.0: a case study at x library, Record and Library Journal 6(2), 1-23. https://doi.org/10.20473/rlj.V6-I2.2020.110-119

Sambo, A. S., Imran, A. A., & Akanbi , M. L. A. (2022). Digital Literacy Skills Among Certified Librarians in Nigerian Libraries: Library Overview. Journal of Digital Learning and Education, 2(2), 70-79. https://doi.org/10.52562/jdle.v2i2.316

Sharath H. K., & Shivashankar B. S. (2013). Book handling robot for libraries. International Journal of Engineering Research & Technology (IJERT) 2(8). doi:10.17577/IJERTV2IS80048

Talaviya, T., Shah, D., Patel, N. and Tagnick, H. (2020). Implementation of artificial intelligence in agriculture for optimisation of irrigation and application of pesticides and herbicides, Artificial Intelligence in Agriculture, 4(1), 58-73. https://pubag.nal.usda.gov/catalog/6898662

Talley, N. B. (2016). Imagining the use of intelligent agents and artificial intelligence in academic law libraries". Law Library Journal, 108(3), 383–401. https://www.aallnet.org/wp-content/uploads/2018/01/vol-108-no-3-Imagining-the-Use-of-Intelligent-Agents-and-Artificial-Intelligence-in-Academic-Law-Libraries.pdf

Tella, A. (2020). Robots are coming to the libraries are librarians ready to accommodate them? Library Hi Tech News, 37 (8), 13-17. https://doi.org/10.1108/LHTN-05-2020-0047

Tredinnick, L. (2017). Artificial intelligence and professional roles. Business Information Review, 34 (1), 37 - 41. https://doi.org/10.1177/0266382117692621

Wisskirchen, G., Biacabe B. T., Bormann, U., Muntz, A., Niehaus, G., Soler, G. J., & von Brauchitsch, B. (2017). "Artificial Intelligence and Robotics and Their Impact on the Workplace." IBA Global. https://www.researchgate.net/profile/Mohamed-Mourad-Lafifi/post/Social_Robots_or_robots_with_social_functions/attachment/6001ed617e98b40001bc005a/AS%3A980324746031116%401610739041600/download/AI-and-Robotics-IBA-GEI-April-2017.pdf

World Bank. (2016). World Development Report: Digital dividends. Retrieved 25th March, 2023 from https://www.worldbank.org/en/publication/wdr2016

Corresponding Author
Atanda Saliu Sambo
sambo.atanda@fupre.edu.ng