

Ghanaian University Libraries' Preparedness for the Fourth Industrial Revolution

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Abstract

As the world is experiencing technological development, the Fourth Industrial Revolution (4IR) is taking prominence in the provision of information to library clients. In a doctoral study which investigated performance management in Ghanaian university libraries, one of the objectives explored was how the fourth industrial revolution has affected the performance of Ghanaian university libraries. Using a mixed methods research approach, the views of 218 university librarians were elicited from selected universities in Ghana. The study found that a significant proportion of Ghanaian university libraries did not apply any 4IR technologies although they were aware of their benefits. Furthermore, the few libraries which did, only applied the aspects of Internet of Things (IoT), cybersecurity and cloud computing. Moreover, most of the libraries were not adequately prepared for implementing 4IR technologies. The study recommends that in order for Ghanaian libraries to remain relevant, address clients' changing needs in terms of information provision and yield high performance, library management should strive to adopt and use most of the 4IR technologies.

Keywords: 4IR, University Libraries, Ghana.

Introduction

The world is currently witnessing innovative technological developments such as the Internet of things (IoT), artificial intelligence, robotics, nanotechnology, 3D printing and other technologies with diverse applications. The amalgamation of such technological discoveries is the fourth industrial revolution (4IR). 4IR is the current and developing technological revolution that changes how modern people live and work. It describes the information technology evolution towards greater automation and interconnectedness (Lund, 2021). The 4IR builds on the fundamentals established by previous industrial revolutions. The invention of the steam engine in the 18th century triggered the first industrial revolution, allowing for the first-time mechanisation of production and driving social change as people became more urbanised. Electricity enabled mass production during the second industrial revolution. Beginning in the 1950s, a third industrial revolution (the digital revolution) saw the development of computers, electronics, and digital know-how to mechanise production. The 4IR follows in the footsteps of the digital revolution but is distinct from it (Schwab, 2016).

As Gray (2016) states "Change will not wait for us: business leaders, educators, and governments all need to be proactive in upskilling and retraining people so everyone can benefit from the 4IR". Therefore, the responsibility to generate the models and settings to permit it to occur needs to be taken, or else we will consume a generation with a lack of skills for the new demands of the labour market and that turns out to be a huge problem to society. Kamble et al. (2018), among others, remind us that the term 4IR is not necessarily new, but it is among Germany's ten "target items of the high-tech strategy action plan of the 2012 project", which envisaged the

amalgamated manufacturing with IT and led to the development of factories that are smart, efficient and adaptable to new technological changes or demands. According to Kamble *et al.* (2018), 4IR technologies include the Internet of Things (IoT), big data analytics, cloud computing, augmented reality and robotic systems, simulation prototypes, and 3D printing. The transformed roles, innovative services, and future of academic libraries have been the focus of attention by many researchers around the world (Catalano *et al.*, 2018; Cox *et al.*, 2019; Dempsey and Malpas, 2018; Schulte *et al.*, 2018) and in South Africa (Chiwere and Becker, 2018b; Hodonu-Wusu and Lazarus, 2018; Kwanya and Stilwell, 2018; Moll and Moll-Willard, 2019; Ocholla *et al.*, 2016; Ocholla and Ocholla, 2017;). The result has been the creation of new library spaces and services, which are suitable for the needs and orientation of individual institutions (Dempsey and Malpas, 2018; Ocholla *et al.*, 2016), in response to the rapidly changing landscape of higher education, influenced by strong research, teaching and learning agenda; ICTs; university ranking; community engagement (for contextualising research and teaching) and the 4IR, all of which demand that library services be accessible anytime, and anywhere.

This 4IR is differentiated from earlier revolutions by the speed of technology, the pervasiveness of its scope and the tremendous impact of new systems, which has dramatically affected this generation.

Human beings and machines are now speedily connecting. Mobile computing, artificial intelligence, online learning of every trade and automation has become the necessity of our day (Hussain, 2019). 4IR Integrates technologies such as robotics, IoT, virtual reality (VR), 3D printing, nanotechnology, autonomous vehicles and artificial intelligence (AI). The impact of 4IR is being felt in almost all spheres of life. Virtually all aspects of human endeavour are being altered by it. Concerning libraries, the fourth industrial revolution is currently changing the responsibilities and roles of librarians worldwide. This situation has called for a fundamental rethink to reequip librarians with the necessary competencies to ensure effective and efficient delivery of services to clients whose needs are dynamic. That is, this era has provided librarians with an excellent opportunity to reinvent themselves. According to

Chisita and Chibanda (2019), digital technologies are causing revolutionary changes in libraries by changing how work is done or accomplished

Statement of the Problem

Beyond the global recognition of the benefits of the 4IR in the attainment of general development scope with education inclusive, not much research work has been done on how the principles of 4IR affect performance, especially amongst library staff who are expected to utilise this more. University libraries are evolving into digital and virtual libraries that use technology to improve their services. Literature from around the world also suggests that academic librarians should adopt new technology as part of their transition to digital platforms in order to remain relevant to today's users (Cao, Liang and Li 2018; Gul and Bano 2019). Librarians should be conscious of the new products and services brought about by the Fourth Industrial Revolution.

According to Hussain (2019), the 4IR has had a significant impact on libraries, and their continued existence is dependent on their ability to align with the 4IR's design principles. It is against this background that this study sought to find out the extent of adaptation of 4IR technologies and how this may be affecting performance of Ghanaian university libraries.

Objective of the Study

The objective of this study was to explore the extent to which Ghanaian university libraries have adopted the 4IR technologies to address the changing needs of clients. Specifically, the study investigated the 4IR awareness level, 4IR technologies used by Ghanaian university libraries, libraries' preparedness towards the implementation of 4IR technologies, the role of library staff in the face of 4IR and how 4IR has affected staff performance in Ghanaian university libraries.

Literature Review

The Fourth Industrial Revolution (4IR) was characterised by the fusion of the digital, biological, and physical worlds and the growing use of new technologies such as artificial intelligence, cloud computing, robotics, 3D printing, and the Internet of things (IoT), and advanced wireless technologies. It

has ushered in a new era of digitised education and library operation (Ndung'u and Signé, 2020). In their study, Ahmat and Hanipah (2018:57) indicate how these innovative technologies affect libraries and information centres. They further indicate how digitalisation has affected most libraries and information environments and how clients can access all information needed without physically being on the library premises and even sometimes without the assistance of library staff. Libraries have no option but to move into this revolution where information professionals fear that some of the 4IR technologies will take over the library.

Some degree of artificial intelligence has already been used by our library systems worldwide. According to IFLA (IFLA Report, 2017), libraries will be proponents and facilitators of the 4IR, in which people design and manufacture their own devices and objects. According to Lund (2021), some of these technologies seem a bit unrealistic, but the library's goal is to serve the information needs of its clients in the best possible way. Therefore, libraries have no option other than to play along to provide effective and efficient service delivery. In whichever form it has come, 4IR will not spell doom for libraries and librarians but rather upgrade it: staff may now work from home, the adoption of artificial intelligence, more connections and communications for libraries, online monitoring of staff performance and monitoring services from home. All these have taken a new dimension in the bid for libraries to remain relevant. 4IR has and will continue to change some job duties of librarians: greater emphasis has now been placed on library instruction but has not made the librarian or the library work irrelevant. Great ideas adopted by leaders in the library field such as OCLC, IFLA and others suggest that libraries will never be left behind (Lund, 2021).

According to Engerer and Sabir (2020), the role of information professionals was divided into three, namely, research librarians, I humanists and information specialists,. According to them, a research librarian provides adequate support to researchers. The I humanist builds the architecture used in identifying research areas, and an information specialist provides the collaborative and communication tools needed in research. As Kirkwood (2018) says, information professionals will remain relevant and should not feel the danger of

being replaced by 4IR technologies. 4IR instead creates modern knowledge, the perfection of duties and redefines skills and jobs needed by the information professional, leading to quality and fast service. 4IR improves performance and augments labour by reducing routine and repetition. Therefore, Ayinde and Kirkwood (2020) encourage information professionals to build up their skills and knowledge regarding 4IR technologies to survive even though the extent to which these innovations are adopted is likely to differ from one library to another.

In a special Global Vision discussion conducted by the International Federation of Library Associations and Institutions in July 2017, there was a discussion on how libraries can unite to tackle the challenges associated with 4IR (Cassell et al., 2017). An agreement that was arrived at states that: *“Libraries enable literate, informed and participative societies. When we look at the future, according to the debates in our teleconference, libraries will be trustworthy information brokers; will do more with new technology; provide universal access to information and scholarly works, whether it be media or information we already know or new media; preserving and providing access to information in all formats and providing trusted and effective support for political and social engagement. Libraries will be advocates for and facilitators of the Fourth Industrial Revolution, where people create their own devices and objects.”*

Flecker et al (2017), on the other hand, stated that *“Personalisation will be increasingly important. Due to the nature of new technologies solving new and meaningful problems for customers, we will start to see them expecting services on their terms according to their ideals and needs. Thus, we will need to develop new business models that cater for our customer's needs on their terms.”*

On strategic actions for libraries, Ahmat and Hanipah (2018) admit that librarians and all library stakeholders provide the support needed to prepare action and strategies to stabilise libraries in the 4IRera. Ahmat and Hanipah (2018) advance four main strategic actions to be taken by librarians and library leaders to adequately propel libraries to manage any changes that may crop up due to change.

With all the necessary support provided by the parent institution, libraries must adopt new techniques by restructuring the activities mentioned earlier to effectively deal effectively with all the issues of concern in the 4IR. New roles, behaviours, processes and skills must be acquired rather than concentrating only on sophisticated technologies such as artificial intelligence. If effective attention is paid to these components, there would be high-level service optimisation, and the libraries' position in our communities will remain relevant.

Research Methodology

The study was conducted in Ghana, precisely in selected university libraries across the country. The mixed method research approach was adopted for this study. The mixed-method research approach has been described by Cameroon (2009) as a silent revolution because of its emphasis on overcoming contradictions between qualitative and quantitative approaches. Collecting data for mixed-method usually involves using questionnaires and interviews, hence the reason why the mixed method approach is adopted to examine the extent of adaptation of 4IR in Ghanaian university libraries (Johnson and Onwuegbuzie, 2004). The two main data collection tools used for the study were questionnaire and semi-structured interview. The questionnaire was used to

solicit data for the quantitative phase of the study, and the semi-structured interview was for the qualitative phase. In Ghana, there are 36 accredited universities, each with a library. However, because university libraries are often homogenous (similar in structure and objectives, it was deemed unnecessary for all 36 university libraries to be included in this study. The researchers relied on a sampling technique that subdivided all the universities based on three main characteristics, chartered private universities, public universities and technical universities. After stratification, the researchers sampled all the strata to ensure representation of all the universities.

The researchers also considered the location and the state of the university, among others. All library staff in the selected university libraries were eligible to participate in the study. In the first sampling level, the universities were categorised into three primary strata or groupings: public, private and technical universities. There are 14 public universities, 12 chartered private universities and eight technical universities (nab.gov.gh/index, accessed on 18th October 2021). Thus, the stratified sampling technique was used to ensure that all three types of universities were included as proportionately as possible. That is, to proportionately sample the 36 Ghanaian universities, the researchers used a formula provided by Kish (1965). For the sake of representation, Kish encourages using a sample fraction of $1/4$ to draw the libraries for the study (Kish, 1965). Each stratum should have the same

Table 1: Sample size of university libraries in Ghana

Library	Public universities	Private universities	Technical universities	Total
Population size	14	12	8	36
Sampling fraction	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$
Final sample size	4	3	2	9

Source: Amoah and Majanja (2021)

Thus, the sample size for public universities was calculated as $(\frac{1}{4} \times 14) = 4$, which is approximately four universities (Kish, 1965). In the view of Kish (1965), the sampling fraction in each stratum should always be made equal to the sampling fraction for the entire population. The actual university libraries that participated in the study were purposively

selected to balance the different geographical, socio-economic, size, age and other factors relating to the varieties of university libraries in Ghana. After the university libraries were selected, all staff from these selected university libraries were used for the study (218), thus adopting the census approach. Harding (2006) defines the census method as the process of

data collection where all units of a population are studied. This gives an accurate measure of the study's population.

The researchers respected the rights of the study participants and ensured that informed consent was sought and obtained from all study participants prior to the conduct of the interviews. The quantitative data was analysed using the Statistical Product and Service Solutions (SPSS) software version 22.0. It is presented using frequencies, tables, graphs, pie charts and percentiles to ensure an easy understanding of the analysis. The qualitative data was managed and analysed manually. Open coding was undertaken through a line-by-line reading of the narrative data to organise and group interview transcripts under specific research questions. The codes were then organised into sequential categories and further collated into initial themes according to their similarity. Heads of the nine libraries sampled were interviewed.

Findings

To know the extent to which Ghanaian university libraries have adopted to 4IR technologies to meet the changing needs of clients, one of the study's

objectives was to know the awareness level of staff concerning the concept under study. How are these technologies being used for libraries to provide timely and adequate information to their clients? This and many other questions were posed to elicit data from the various librarians who partook in the study.

Awareness of 4IR

First, the awareness level of questionnaire respondents was sought. Data revealed that the majority 156 (71.5%) were aware of 4IR, with 13 (6.0%) having no idea about it as presented in Figure 1 below.

Awareness of Different 4IR Technologies

Respondents were asked to indicate the exact 4IR technologies of which they were aware. This multiple response question gave respondents the latitude to select as many as applied. Eighty (36.7%) respondents had heard of IoT, followed by cyber security and cloud computing with 70 (32.1%) and 69 (31.1%), respectively. Full details are shown in Table 2 below.

Table2: Respondent's awareness of 4IR technologies(218)

4IR technologies	Frequency	Percentage (%)
Internet of things (IoT)	80	36.7
Cyber security	70	32.1
Cloud computing	69	31.7
Robotics (artificial intelligence)	68	31.2
Sharing economy	53	24.3
Augmented reality	24	11.1
None of the above	20	9.2
Others	3	1.4

Source: Field data, Amoahand Majanja (2021).

4IR Technologies Used by Respondents’ Libraries

The study further sought to enquire from respondents which of the 4IR technologies mentioned in Table 2 were used in their respective libraries. The results revealed that, out of the 218 most of the respondents 75 (34.4%) used the Internet

of things, and 64 (29.5%) used none of them showing that they were aware of the 4IR technologies, but their libraries used none of them. A considerable number of respondents, 31 (14.2%), stated they had no idea what was used in their libraries. The rest of the data is presented in Table 3.

Table 3: 4IR technologies used by respondents’ libraries (218)

4IR technologies used by respondents	Frequency	Percentage (%)
Internet of things (IoT)	75	34.4
Cloud computing	19	8.7
3-D Printing	13	5.9
Sharing economy	8	3.7
Cyber security	7	3.2
Robotics (Artificial Intelligence)	-	-
Augmented reality	-	-
Others	1	.5
None of the above	64	29.5
No idea	31	14.2
Total	218	100

Source: Field data, Amoahand Majanja (2021).

Interviews with head librarians revealed that the Internet of things, cyber security, library management system and 3-D printing as the 4IR technologies in use and hence corroborates the findings of the study.

The interviewees indicated that libraries have to change to always keep abreast with the times, thus embracing the 4IR technologies. Some of the responses received from the interviewees are:

“Cloud computing allows us to host our data not necessarily on a local server, but on a server on the Internet and will not be the only people who have access to it, so cloud computing is applied. Then we have the Internet of things; we are using RFID, which is

an application of the Internet of things. All our books have a device in them that uses a sensor, and wherever the book is, you can always track it. Then cyber security; you saw how biometric devices are all over the place, both in the library and around the University. It’s an application of cyber security.

Both qualitative and quantitative responses indicated the Internet of things (IoT) as the major 4IR technology used in almost all the libraries. This was followed by cyber security, 3D printing and cloud computing. It was quite interesting to note that some libraries did not have any of the technologies at all, despite the advancements in technology and the changing needs of the clients.

Preparedness of Libraries for the Implementation of Innovative Trends

Having ascertained the level of usage of 4IR technologies among respondents, the study sought

to find out how ready and prepared the libraries were to implement these innovative trends. The findings elicited are presented in Table 4.

Table 4: Level of Preparedness for 4IR (N=218)

4IR technologies Preparedness to Innovative Trends	Frequency	Percentage (%)
Somehow prepared	72	33
Adequately prepared	30	13.8
Unprepared	48	22
Not sure	59	27
No idea	9	4
Total	218	100

Most of the respondents 72 (33.0%) stated their libraries were somehow prepared to implement the innovative trend. A further 30 (13.8%) indicated their libraries were adequately prepared, and 48 (22.0%) said their libraries were unprepared for these

innovative trends. In a quest to confirm the quantitative findings, the researcher posed the same question to the qualitative respondents. Data is present in Table 5 below.

Table 5: Qualitative responses on the library's preparedness for the implementation of new trends

Librarian	Indication
LIB1	<i>We are all prepared, but we need to add more of the 4IR technologies.</i>
LIB2	<i>Not all that prepared because we are now reorganising our library because of the transition.</i>
LIB3	<i>We are very prepared; of course, we may have to put in more effort to ensure its effectiveness.</i>
LIB4	<i>Not adequately prepared but would love to use some of those technologies for effective service delivery.</i>
LIB5	<i>We are prepared and need to upgrade some technologies and also acquire new ones as well as new training for staff members.</i>
LIB6	<i>We are very prepared. Ready to purchase as well as upgrade to meet new demands.</i>
LIB7	<i>Not very well prepared, because it is mostly a mining and technology university, the university management's attention is not fully on the progress of the library.</i>
LIB8	<i>We do not have all it takes, but we are prepared to adopt new technologies to continue to stay in the information business.</i>
LIB9	<i>We are not very prepared, but we are ready to upgrade and use some technologies that will change the face of the library.</i>

Source: Field data, Amoah and Majanja, (2021)

From both quantitative and qualitative responses obtained, it could be realised that the majority of the libraries were not adequately prepared to implement 4IR technologies. Only a few (14%) respondents in the quantitative phase indicated their libraries were well prepared. Only KNUST and UG librarians could indicate their libraries' preparedness to implement the new 4IR technologies. Knowing how to use technologies associated with 4IR is crucial because it helps to increase the performance of staff

and the overall performance of the library. In the quest to ascertain more in-depth information from respondents on 4IR, the researcher sought to find out their knowledge or technical know-how in operating in the era of 4IR. The relevance of library staff in the deployment of 4IR technologies by Ghanaian Universities and whether librarians have the necessary equipment to navigate effectively in the 4IR era. The data were analysed using descriptive and is presented in Table 6 below.

Table 6: Relevance of library staff and the necessary knowledge to operate in the era of 4IR

4IR question		Frequencies	Percentages (%)
Necessary knowledge to operate 4IR	Not sure	106	48.6
	Yes	64	29.4
	No idea	27	12.4
	No	21	9.6
	Total	218	100.0
Role of library staff in the phase of 4IR	Very relevant	128	58.7
	Somehow relevant	61	27.9
	Not relevant	13	5.9
	Not sure	16	7.3
	Total	218	100.0
Necessary equipment to perform effectively in the 4IR era	Somehow	85	39.0
	Not sure	77	35.3
	Very sure	36	16.5
	No idea	20	9.2
	Total	218	100.0

Source: Field data, Amoahand Majanja (2021).

From Table 6 above, the findings revealed that most library staff, 106 (48.6%), were not sure that they had the necessary knowledge to operate in the 4IR era. Respondents were further questioned on the role of library staff in the face of 4IR. Data obtained revealed that the majority, 128 (58.7%), thought that the role of the library staff would always remain relevant in the era of 4IR. Only 13 (5.9%) indicated that the role of librarians would not be relevant in the phase of 4IR. Furthermore, since the 4IR is a technological shift, the researcher asked respondents whether librarians had the necessary equipment to

perform effectively for the libraries' goals to be achieved in this era. Most of the respondents 85 (39%), chose the option 'somehow' showing that librarians are uncertain whether they have the necessary equipment to perform effectively in the 4IR era.

Interviews on the issue of relevance also revealed that library staff will still be needed in this 4IR era; the only difference would be a change in their work routines. Staff have to constantly learn to keep abreast with time to be relevant in this era.

Very relevant, it has rather become more

challenging these days and our importance is even needed the more. The reason is that when you talk of getting information on the Internet these days - what source are they getting? Is it not a popular source? But users are not supposed to even use popular sources; they are supposed to be using scholarly resources, and we [librarians] have what it takes to be able to help them with that (LIB 2).

Another librarian had this to share:

The system is changing; as I told you, everything changed with technology. The people will be relevant when they update. There will be so many other things that we were not doing that we will

need to do (LIB 5)

How 4IR Is Affecting Staff Performance and Service Delivery in Libraries

Tables 5 and 6 respectively represent findings on how the introduction of 4IR has affected staff performance in respondents' libraries and how 4IR has affected library service delivery. Table 7 shows that most of the respondents 92 (35.7%) indicated that they had no idea whether 4IR affected staff performance or not. Data in Table 8 revealed that most of the respondents 71 (47.0%), indicated that they had no idea of how 4IR had affected staff performance, and 25.7 % of the respondents stated that 4IR made service delivery fast and effective. The remaining findings are illustrated in Tables 7 and 8 below.

Table 7: How 4IR affected service delivery

How 4IR has affected staff performance	Frequency	Percentage %
No idea	92	35.7
Fast and effective service delivery	66	25.7
New ways of operations	58	22.5
High performance	32	12.5
Others	9	3.6
Total	257	100.0

Source: Field data, Amoah andMajanja(2021).

Table 8: How 4IR has affected staff performance

How 4IR has affected service delivery	Frequency	Percentage %
No idea	71	47.0
Improved service delivery	50	33.1
Quick access to information	16	10.6
Information is now on smart devices other than libraries	11	7.3
Increased virtual libraries	3	1.9
Total	257	100.0

Source: Field data, Amoahand Majanja (2021).

The same question was posed to librarians to discover the impact of these innovative technologies on service delivery in libraries. Some of the responses are shown below:

There is improved security all over the place through the use of biometric devices. So 4IR has improved the performance of our university (LIB 7).

It has made service delivery effective and efficient. It has affected it positively (LIB 5). Yeah, positively. In the sense that, if for nothing at all, there was the ease of performing the traditional roles that we used to do. They have now become faster. For instance, there was no need to go to the shelves to identify a book. The RFID would help you identify a book faster wherever you were. Is it not good? It is. There is improved networking, and OPAC confirmation is all improved, so you can sit somewhere in a remote area and find out whether the material is available or not (LIB 6).

While most of the quantitative respondents did not have an idea of how 4IR affects staff performance in libraries, the interviews with the respondents revealed that 4IR had a positive impact on the performance of librarians. It has also led to the effective and efficient delivery of library services. Because there was a broader reach to patrons and improved security of our information sources and the library premises as a whole, these views corroborated those provided by some quantitative respondents who had an idea of what this particular question required. Some quantitative respondents stated improved service, quick access to information and an increase in virtual libraries as some of the positive impacts of 4IR on libraries.

Discussions of Findings

According to Schwab (2016), the 4IR builds on the digital revolution that began in the mid-century, blurring the barriers between the physical, digital and biological worlds. However, since its inception in 2016, the 4IR notion has been rare in academic library literature (Catalano et al., 2018; Chiware and Becker, 2018; Moll and Moll-Willard, 2019).

Nevertheless, embedded systems, IoT and cyber-physical systems, big data and cloud computing are already widely used in academic libraries (Avuglah and Underwood, 2019; Chiware and Becker, 2018). With the advent of innovative technological advancements such as the Internet of things, artificial intelligence, robotics and 3D printing, libraries have adopted new approaches to deal with client information needs. Knowing how these innovative technologies affect staff performance and how libraries meet clients' information needs in this era cannot be overemphasised. This study has brought out the responsiveness level of librarians, the technologies university libraries in Ghana are using to ensure maximum performance and the relevance of library staff in this era.

The finding that most of the respondents knew about 4IR and saw it partly as a system for building on the digital revolution is significant even if some saw it partly as the amalgamation of technological discoveries and focused on artificial intelligence. These perceptions align with the description and position espoused by Lund (2021) and therefore primes Ghanaian university libraries' participation in this significant revolution.

Concerning the 4IR technologies used by the libraries, it was significant to find that only a few respondents used the IoT and also that 29.5% did not use any of the 4IR technologies, implying that the 4IR technologies are not widely applied in Ghanaian university libraries yet. This finding implies that Ghanaian university libraries seem to be lagging behind this agrees with Chang and Huynh (2016) recommendation that libraries need to move towards greater automation, efficiency and on-time delivery of information to clients. It is disturbing to note that quite a high number of staff averred to the fact that they had no idea what 4IR technologies their libraries used. This is worrisome because as Ahmat and Hanipah (2018) opines, these innovative technologies significantly affect services, such as how clients could access information globally. Ahmat and Hanipah (2018) recommend that libraries move into this revolution if they want to be in business and remain relevant in this era. A move that cannot be achieved without the staff. According to an agreement reached in a special global vision discussion by IFLA (2017), libraries should do more to ensure that staff are conversant with these innovative technologies and

aim to provide universal access to scholarly works and other information to their clients.

Investigating the libraries' preparedness for implementing 4IR technologies revealed that many were prepared to implement innovative trends even though some were not prepared while others were unsure. Knowing how to use 4IR technologies is critical to improving staff and library performance. But the findings revealed that a most of the staff (48.6%) were unsure whether they had the necessary skills to operate in this era. This finding contradicts one of the four strategic activities that librarians are relevant in this era, as proposed by Ahmat and Hanipah (2018), Hopwood et al. (2012) and Harden and Loving (2015). The need for librarians to acquire multiple skills and knowledge to operate in this era is key to the survival of librarians and information professionals. Ayinde and Kirkwood (2020) also identify the need to build the skills and competencies of librarians for continuous survival.

The role of library staff of how 4IR has affected staff performance and library service delivery in respondents' libraries surprisingly revealed that many did not know whether or not the 4IR affects staff performance (47.0%), 58.7% of the respondents felt the role of library staff is still relevant in the 4IR age. It is hoped that the 35% might in future be persuaded by Dargar and Srivastava (2020), who opined that the role of librarians would still be relevant. However, it would be restructured into three main areas, information specialists, research librarians and I-humanists. Kirkwood (2018) further indicated the relevance of the role of librarians and added that perfection of duties and redefinition of skills and jobs are to be focused on for quality service provision. While only 25.7% of respondents felt that 4IR makes service delivery fast and effective. This was quite an instructive finding because staff performance at this phase is very important for libraries, considering the fact that librarians above other library stakeholders provide the needed support to comprehensively prepare action and implement strategies to stabilise the library in the face of the 4IR.

Conclusions and Recommendations

The study, therefore, concluded that, even though staff were uncertain about the knowledge needed to operate in the 4IR era, their role will always be relevant, despite technological advancement. Librarians will assume new roles to ensure the proper delivery of information to clients, which will go a long way to impact staff performance and the overall performance of libraries positively. It was again concluded that the 4IR impacts library staff performance positively, leading to fast and effective service delivery, new ways of operation and high performance. The 4IR can increase virtual libraries, leading to a broader reach for patrons and improved security in libraries by using biometric devices. The 4IR was acknowledged to have improved service delivery, access to information and overall library staff performance. Based on the conclusions above, the study recommends that library management should strive to adopt and use most of the 4IR technologies that will effectively disseminate information. This will increase staff performance and the library as a whole because of the changing needs of the clients in terms of information provision. Management should also improve staff training to improve the readiness and preparedness of the library to take advantage of the modern technological trend and continue to exist in the era.

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