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IMPACT OF THE FIFTH INDUSTRIAL REVOLUTION ON LIBRARY SERVICES AT FEDERAL UNIVERSITY OF EDUCATION PANKSHIN: A LIBRARY STAFF PERSPECTIVE

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Abstract

This study explores the impact of the fifth industrial revolution on library services at Federal University of Education Pankshin. Descriptive research design was adopted for the study, data were collected through self-constructed questionnaire from 23 library personnel that formed the population of the study. The study used census sample as the population is manageable. The Statistical Package for the Social Sciences version 21 was used to analyse the data from the completed questionnaires. The analysis revealed that: 71% of respondents agreed the fifth industrial revolution will enhance information retrieval and user services; staff face challenges related to skill gaps which align with why 90% of the respondents lacked training on usage of fifth industrial revolution tools. Resistance to change is their major challenge as 70% of library staff have gotten 10 years and above working experience. The study concludes that while fifth industrial revolution offers transformative opportunities for library services, its successful integration requires targeted training and adaptive strategies to address human and operational challenges.

Keywords: *Fifth Industrial Revolution, library services, artificial intelligence, automation, library staff, University of Education Library*

Introduction

The Fifth Industrial Revolution (5IR) is a paradigm shift in industrial development from 4th industrial revolution. It focuses on human-centricity, sustainability, and resilience within the production ecosystems. The 5IR focused on the role of humans in collaboration with advanced technologies such as artificial intelligence, robotics, and the Internet of Things (Nahavandi, 2019). These technologies are to create synergistic human machine work environments that support creativity, adaptability, and personalised value creation. This framework has gained significant attention as a transformative response to global socio-

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economic and environmental challenges, giving attention to ethical technological deployment, worker well-being, and a core tents of future industrial growth. The technology has been deployed in different professions and a great impact has been felt including the library profession.

The 5IR has the potential to completely change librarianship. The 5IR transformed libraries by incorporating advanced technologies and collaborative methods, with librarians playing a pivotal role in navigating these changes to deliver innovative and inclusive services to clients in open and distance learning environments (Ekwueme, Oluwaseun, Ajie, Ofudu, & Ambrose, 2024). By incorporating the 5IR into libraries, librarians can play a bigger part in creating and sharing knowledge, which will increase clients patronising the library. To stay relevant and make sure they are prepared to meet the digital and educational needs of future generations, librarianship must adjust to these technological advancements as the 5IR continues to take shape. Libraries have historically been viewed as the primary location for research and education, housing actual books, journals, and other printed materials (Rahmanova, 2025). But the quick development of digital technologies has changed this function, turning libraries into multipurpose places where people can access online databases, e-learning resources, and digital content

Nigerian libraries are beginning to align with adoption of 5IR, but progress remains very slow. Joel (2025) affirmed that using 5IR in Nigerian libraries is in a very low level. Some libraries have initiated digital transformation but still experience some challenges in the full implementation of the tools. Emiri (2023) carried out a research on adoption of 5IR technologies in Nigeria libraries, the results showed that although digital technologies are on ground, there has been poor adoption of 5IR technologies in libraries in Nigeria, indicating a partial readiness of the using the 5IR in the libraries. Libraries are changing to accommodate virtual environments, providing remote access to digital resources, virtual reference services,

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and collaborative online platforms in response to the growth of online learning and the growing use of technology in education, (Rao & Ranganadham, 2025). This change is evident in the physical layout of libraries, which are being redesigned to meet the ever changing information needs of clients. This is greatly observed in university libraries. University libraries will continue to play a crucial role in the educational ecosystem as institutions of higher learning embrace digital transformation, helping students acquire the skills they need to thrive in a rapidly evolving digital world.

In Universities of education, library and information services are essential because they support lifelong learning, teacher preparation, and academic excellence. Since universities of education are establishments devoted to training teachers, they need strong library systems that give students access to a wide range of current and varied educational materials, such as scholarly articles, teaching strategies, textbooks, and pedagogical research. These resources are essential for giving aspiring educators the information and abilities they need to provide high-quality instruction at different levels. Modern library and information services go beyond traditional book lending by promoting digital literacy, which empowers teachers and students to use electronic databases, online journals, and open educational resources to conduct independent research and develop critical thinking skills.

Universities of Education libraries also act as knowledge centres that assist with professional development programs, policy research, and curriculum development. In light of the continuous digital revolution, incorporating 5IR technologies like cloud computing, artificial intelligence (AI), and open-access repositories improves the effectiveness and usability of library services while guaranteeing that aspiring teachers are ready for the changing needs of the educational field (Indraji, Dominic, Kothandaraman, 2024). As a result, a library with adequate resources and cutting-edge technology serves as more than just an academic

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support centre; it is a strategic tool for raising the standard of teacher preparation and, consequently, the quality of the educational system as a whole.

Statement of the Problem

The fifth industrial revolution has improved library services globally through integration of 5IR technologies. Libraries that have adopted these 5IR technologies are increasingly able to meet the dynamic information needs of their clients not minding the location. In contrast, the library at the Federal University of Education Pankshin continues to struggle with inadequate technological infrastructure, limited digital tools, and irregular staff capacity in advanced use of 5IR technologies. These problems have hindered its ability to align with global trends, resulting in workflow inefficiencies, reduced quality service delivery, and a widening gap between the library's current operations and the expectation of users who are becoming increasingly exposed to digitally enhanced information environment.

It has been established in several literatures one is Yakubu, Yagana, and Umar (2023) who posited that use of 5IR technologies in Nigeria academic libraries is extremely scarce. Little is known about how universities of education tasked with training future teachers are adapting to this new industrial phase, despite their strategic importance in shaping digital competencies for education sector. Moreover, no empirical study has specifically examined how library staff at the Federal University of Education Pankshin perceive the opportunities and challenges associated with integrating 5IR tools into library operations. This gap in knowledge makes it difficult to design technological advancement in such institutions. Therefore, this study is necessary to provide an evidence-based understanding of the impact of fifth industrial revolution.

Objectives of the Study

The objectives of this study are to;

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1. Examine the impact of Fifth Industrial Revolution technologies on library services at the Federal University of Education Pankshin.
2. Identify the challenges hindering the integration of Fifth Industrial Revolution technologies in the university library.
3. Determine strategies for improving the integration of Fifth Industrial Revolution technologies in the library.

Literature Review

Impact of the Fifth Industrial Revolution on Library Services

Empirical studies increasingly show that 5IR is reshaping library services through human-technology collaboration rather than technology driven system. Studies conducted in academic libraries across Europe, Asia and parts of Africa reveal that the initiation of 5IR technologies have significantly improved information accessibility, service personalisation, and operational efficiency (Ajani, Tella, Salawu and Abdullahi, 2022). For instance, a research carried out by Isiaka et al (2024) on perceived awareness and usefulness of artificial intelligence technology for efficient library operations. It adopted descriptive survey design, and results have shown that 5IR technologies reduce search time, enhance user satisfaction, and support evidence-based decision making among users, while also augmenting library staff roles rather than displacing them. These findings suggest that 5IR enable libraries to transition from traditional service models to adaptive, user-responsive information environments that better align with contemporary academic needs.

Also, empirical evidence from Nigeria presents that the 5IR technologies are on ground in some libraries. Studies such as Ekwueme et al. (2024) confirm that digital technologies have enhanced remote access to information resources and expanded service reach. Nigerian academic libraries indicate that inadequate infrastructure, insufficient institutional support, and

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limited staff preparedness significantly moderate the impact of advanced technologies on service delivery (Nwobu, Dumbiri, Lbia & Oladokun, 2024). Notably, existing literature remains largely focused on research intensive universities, with minimal empirical attention given to Universities of Education. This gap underscores the need for institution-specific, staff-centred empirical studies to deepen understanding of how to sharpen library services in the institution.

Challenges in Integrating the Fifth Industrial Revolution in Library Services

Studies carried out consistently reveal that the integration of 5IR technologies in library services is constrained by human, financial, and infrastructure capacities. One among so many research is a research carried out by Safana and Fari (2024) on application of artificial intelligence (AI) for information services delivery: Exploring the readiness and challenges in some university libraries in Katsina state. The findings revealed that; financial instability and cost of AI systems, fear of job lost, lack of skilled librarians, lack of AI specific policy document and cost of AI technologies are the challenges affecting the adoption of AI in university libraries. Significant skill gaps, finance and support from administration are affecting the adoption of 5IR technologies (Tella, Bamidele, Olaniyi & Yusuf, 2023; Alala, Uzoaru, & Odikwa, 2024). These gaps are often linked to inadequate continuous professional development, with empirical findings highlighting that many librarians lack practical training in data analytics, machine learning applications, and digital systems management required for modern services.

In always trying to integrate 5IR, libraries face different barriers when attempting to adopt new technologies. Funding and infrastructure are noticeable challenges in Nigerian universities as survey-based and case studies demonstrate that inconsistent funding, unreliable power supply, limited internet bandwidth, and outdated ICT infrastructure affect adopting 5IR

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technologies (Nwobu et al., 2024). Moreover, weak institutional support structures and policy has remained unchanged critical barriers as traditional administrative frameworks often fail to prioritise innovation oriented library transformation (Thiruppathi, 2024). These structural constraints are compounded by ethical and governance concerns, particularly around data privacy, algorithmic transparency, and digital surveillance, which librarians are frequently ill-prepared to manage due to limited institutional guidelines and technical expertise (Rajkumar et al., 2024). Collectively, the literature suggests that without targeted investment in staff up skilling, sustainable funding, and resilient digital infrastructure, the promise of the 5IR will remain unevenly realised across Nigerian university libraries.

Strategies for Enhancing Library Services in the Context of the Fifth Industrial Revolution

In finding strategies to mitigate the challenges affecting 5IR in the library, the literatures increasingly suggest using digital transformation and organisational change frameworks. Digital transformation models emphasise that effective technology adoption extends beyond the mere deployment of tools but rather consideration should be given to strategic alignment, process re-engineering, and capability development (Wang & Zhang, 2025). Empirical studies of academic libraries demonstrate that the integration of 5IR technologies enhances service efficiency and user engagement only when challenges have been overcome (Oseghale, 2023). From this perspective, academic libraries such as those in universities of education are encouraged to mitigate their challenges and leverage on 5IR technologies in providing their services.

Organisational change theories further explain the conditions under which 5IR technologies can be successfully implemented in library settings. Technology Acceptance Model (1989) was propounded by Fred Davis, is a theory commonly used in technology usage

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and what leads to its usage. According to the technology acceptance model, users' behavioural intentions predict their acceptance of technology, which is determined by their perception of technology's usefulness in performing the task and perceived ease of use (Marikyan & Papagiannidis 2025). Studies indicate that library staff acceptance of emerging technologies is strongly influenced by usefulness and perceived ease of use of the technologies (Ullah & Usman, 2023). The theory means the library staff needs to make participatory decision with continuous professional development, institutional support and reduce resistance to change will mitigate the challenges. Consequently, a strategy that integrate technology acceptance theories with organisational change principles offer a robust pathway for libraries to enhance service delivery, resilience, and relevance in the era of fifth industrial revolution.

Methodology

The study adopted a descriptive survey design. Population is the 23 library staff working in the library, which comprises professional librarians, paraprofessional library staff and support library staff. The census sample technique was used because of the small population, hence no sampling. The instrument used was questionnaire for the respondents to elicit responses from them. The questionnaire has a cover page that introduced the research title, aim of the research, promise of ensuring that information gotten will be confidential, and time needed to fill it. The questionnaire is into four sections; section A is on demographic information of the respondents, section B is on responses that address impact of the 5IR on library services, section C is on challenges in integrating 5IR technologies, and section D is on strategies for enhancing integration of 5IR technologies. Ethical clearance was gotten before sharing the questionnaire.

The instrument was validated by two professors in library science at University of Jos, and an expert of Test and measurement in the Federal University of Education Pankshin. The validators made some observations by inputting some items in the questionnaire, and deleting

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repeated questions. The instrument for data collection demonstrated good internal consistency reliability, with a Cronbach's alpha coefficient of 0.78, indicating that the items effectively measure a single underlying construct. The researcher distributed the questionnaire to all library staff working at the University Library. After the questionnaire was filled, the respondents returned them filled. The Statistical Package for the Social Sciences was used to analyse the data from the completed questionnaires. Descriptive statistics analysis will be used to analyse the data using Statistical Package for the Social Sciences version 21. The choice of descriptive analysis is to make the data understandable and interpretable. The statistics will be presented in mean, percentages, standard deviation, and frequency distribution. The mean decision is 2.50. It therefore follows that any factor with a mean of 2.50 and above indicates agreement while those with mean less than 2.50 indicates disagreement.

Results

Data collected through the questionnaire were analysed and presented using frequencies, percentages, mean scores and standard deviation. The results are presented in tables and interpreted accordingly.

Section A: Demographic Details

Table 1.0 Educational Qualification of respondents

S/N	Qualifications	Frequency
1	Secondary school Certificate	3
2	Diploma in Library Science	8
3	Degree in Library Science	5
4	Postgraduate Certificate	3
5	No response	2
	Total	**21**

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Table 1.0 above shows the educational qualification of the respondents.

Table 2.0. Years of Experience of respondents

S/N	Years of Experience	Frequency
1	0-5 years	2
2	6-10 years	4
3	11-15 years	4
4	16 years and above	10
5	No response	1
	Total	**21**

The respondents have varying years of experience in librarianship.

Table 3.0. Have you received any formal training on usage of fifth industrial revolution?

S/N	Item	Frequency
1	Yes	2
2	No	19
	Total	21

Responses from the respondents shows that just a disappointing 2 out of 21 respondents have received any formal training on the usage of industrial revolution.

SECTION B: Impact of the Fifth Industrial Revolution on Library Services

Table 4.0: How would you assess the overall impact of the fifth industrial revolution on library services at the Federal University of Education Pankshin?

Variables	**VP**	**P**	**N**	**N**	**VN**	$\bar{x}$	**S.D**	**Decision**

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How would you assess the overall impact of the fifth industrial revolution on library services at the federal university of education Pankshin?	**5**	**10**	**2**	**2**	2	3.66	1.23	Accepted

(Keys: VP= Very Positive P= Positive N= Neutral N= Negative VN= Very Negative, $\bar{x}$= Mean S.D = Standard deviation)

The majority of respondents (15 out of 21) viewed the impact of the 5IR on library services as either Very Positive or Positive. With a mean score of 3.66 indicates a moderately positive overall perception of the impact.

Table 5.0: What specific improvements in library services have you seen as a result of the adoption of fifth industrial revolution technologies?

Variables	Improved access to resources	Enhanced search and retrieval systems	Better resource management	Improved customer service
What specific improvements in library services have you seen as a result of the adoption of fifth industrial revolution technologies?	**14**	**7**	**8**	**5**

The responses indicate that 14 participants identified **improved access to resources** (such as online databases and eBooks) as a key enhancement in library services resulting from the adoption of 5IR technologies. Additionally, 7 respondents selected **enhanced search and retrieval systems** (AI-based), 8 chose **better resource management** (including automation

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and the Internet of Things), and 5 highlighted **improved customer service** (through AI-driven chatbots and virtual assistants) as notable advancements.

SECTION C: Challenges in Integrating Fifth Industrial Revolution Technologies

Table 6.0: What are the primary barriers to integrating fifth-generation technologies into university library services?

Barrier	**Frequency**
Limited Funding	3
Inadequate Infrastructure	1
Lack of Skilled Staff	4
Limited Support	1
Insufficient Training	8
Lack of Awareness	2
Resistance to Change	2

Mean Score: 3.80 **Standard Deviation**: 1.75

8 respondents identified insufficient training as the most significant challenge, indicating a widespread concern about staff and user preparedness to use fifth-generation technologies. Other Notable Barriers identified by the respondents includes; Lack of skilled staff (4 responses): Suggests gaps in technical expertise within the library system. Limited funding (3 responses): A recurring challenge in education sectors, implying restricted budgets to implement advanced technologies. Lack of awareness, resistance to change (2 each): Points to cultural and informational hurdles. Inadequate infrastructure and limited support (1 each): These appear to be less significant but still present. Mean Score of 3.80 reflects an average that leans toward the middle to higher range of concern, indicating that respondents overall view

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the listed barriers as substantial and worthy of attention. Standard deviation of 1.75 is relatively high, indicating a wide variation in responses.

SECTIION D: Strategies for Enhancing Integration of Fifth Industrial Revolution Technologies

Table 7.0: What strategies would you recommend for overcoming the challenges of integrating fifth industrial revolution technologies into university library services?

Strategies	Frequency
Training and capacity building for library staff on emerging technologies	8
Employing skilled staff that knows advanced technologies	5
Increase funding for library technology development	4
Infrastructure upgrades	1
Encouraging collaboration between the library, faculty, and administration	8
Creating awareness about emerging technologies	1
Building partnerships with technology and encouraging accepting change	1

Mean Score: 3.80 Standard Deviation: 1.59

The data reveals that the most recommended strategy for overcoming challenges in library technology and services is training and capacity building for library staff on emerging technologies, accounting for 38.1% of the responses. This indicates a strong consensus on the need to enhance staff competencies to keep pace with technological advancements. Employing skilled staff who are knowledgeable in advanced technologies follows at 23.8%, further

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emphasizing the importance of human capital in addressing library-related challenges. Increasing funding for library technology development was also notable, with 19% of respondents supporting this approach, suggesting that financial investment remains a key concern. Other strategies such as infrastructure upgrades, promoting collaboration between the library and other academic units, creating awareness about emerging technologies, and building partnerships with technology providers received lower individual mentions (4.8% each), but collectively highlight the multifaceted nature of the challenges faced.

Discussion of Findings

Impact of the Fifth Industrial Revolution on Library Services

The findings confirm that the 5IR has positively influenced library services at the Federal University of Education, Pankshin, particularly in improving information accessibility, service personalisation, and operational efficiency. This aligns with prior empirical studies which report that the adoption of 5IR technologies enhances remote access to information resources and expands service reach in academic libraries (Ajani et al., 2024; Ekwueme et al., 2024). The generally positive perception among library staff suggests that even modest integration of 5IR can yield tangible service improvements. Consequently, the study extends existing literature by demonstrating that, in Universities of Education, the impact of the 5IR is shaped more by foundational digital access and efficiency gains than by fully developed intelligent systems.

Challenges in Integrating Fifth Industrial Revolution Technologies

The findings indicate that insufficient staff training and skill deficits constitute the most significant barriers to integrating 5IR technologies into library services, corroborating prior studies that identify limited professional preparedness as a key constraint to technology adoption in academic libraries (Tella et al., 2023; Alala et al., 2024). The relatively high variation in responses (SD=1.75) reflects uneven institutional experiences, supporting Rajkunmar et al. (22024) assertion that ethical, cultural, and structural factors shape technology

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integration differently. Consistent with evidence from Nigerian universities, financial instability, high technology costs, fear of job displacement, and inadequate infrastructure frustrate adoption (Safana & Fari, 2024; Nwobu et al., 2024). Collectively, these findings suggest that academic libraries depends primarily on sustained institutional investment, targeted staff capacity development and policy development rather than technology availability alone.

Strategies for Enhancing Integration of Fifth Industrial Revolution Technologies

In line with the study objective of identifying strategies for enhancing the integration of 5IR technologies, the findings reveal that staff training and capacity building constitute the most critical intervention for improving library services. This supports existing evidence that library staff need to develop skills of using 5IR technologies as key to digital transformation (Tella et al., 2023). The emphasis on recruiting skilled personnel and increasing funding further highlights that sustainable 5IR integration in libraries depends on deliberate investment in human capital rather than technology acquisition alone.

The findings are theoretically grounded in Technology Acceptance Model; which explains technology adoption in terms of perceived usefulness and ease of use (Marikyan & Papagiannidis, 2025). The prioritisation of training and institutional support suggests that library staff are more likely to accept and utilise 5IR technologies when they feel competent and recognise their relevance to service delivery. For Nigerian libraries, these results imply that achieving meaningful 5IR integration requires structured professional development, participatory change management, and sustained funding particularly Federal University of Education Pankshin

Recommendations

Based on the findings, the following recommendations are:

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1. The library should enhance staff capacity by implementing continuous training and professional development in 5IR technologies.
2. The library management should adopt participatory management by involving library staff in decision making and communicate technology benefits to reduce resistance and enhance acceptance.
3. The institution should strengthen infrastructure and funding by providing reliable infrastructure and dedicate funding to support sustainable 5IR adoption.
4. Government and institutions should establish technology specific policies on data security, privacy, and responsible use to build staff confidence and guide implementation.
5. The library management should introduce advanced technologies to consolidate existing services.

Conclusion

The study concludes that while the integration of 5IR technologies has positively influenced library services at the Federal University of Education, Pankshin, major challenges such as insufficient training, lack of skilled staff, and limited institutional support persist. Effective adoption depends largely on strengthening human capacity and institutional collaboration. Addressing these gaps is essential for libraries to fully realise the benefits of 5IR technologies and remain relevant in the evolving information landscape.

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