



5th INDUSTRIAL REVOLUTION AND ROLES OF ACADEMIC LIBRARIES: Cultivating Sets of Skills and Knowledge for Leveraging the Impacts

Abdulaziz Ibrahim

University Library, Kaduna State University, Kaduna
Abdulazizibrahim@kasu.edu.ng

Halima Usman

University Library, Kaduna State University, Kaduna
usmanha09@gmail.com

Yahya Ibrahim Harande

Department of Library and Information Sciences, Bayero University, Kano
yaibrahimah@yahoo.com

Abstract

The Fifth Industrial Revolution (5IR) is revolutionizing the world with emphasis on human-centricity, resilience and sustainability. 5IR presents a transformative period for academic libraries, requiring them to embrace digital technologies, adapt their services to meet evolving users' needs and equip librarians with the skills and knowledge necessary to thrive in this new era of advanced technologies (5IR). Information needed to actualized this paper was gathered from secondary sources of data which were obtained from text books, journal articles, conference papers, and online sources, etc. This involves reading meaning into materials consulted for the purpose of achieving a reliable conclusion. The paper explores the impacts of Industrial Revolution on librarians' roles and responsibilities, highlighting the need for academic librarians to acquire skills and remain relevance in this challenging era. It also examines potential benefits and possible challenges of 5IR for libraries and librarians for efficient service delivery in meeting with users' expectations. The study concludes that academic librarians must be proactive in embracing the changes brought about by 5IR, leveraging its potentials to become embedded librarians and cope with the trending situation (5IR).

Keywords: Fifth Industrial Revolution (5IR), Academic Libraries, Skills and Knowledge

Introduction

The Industrial Revolution is simply expressed as an era that introduced and developed technologies that have to do with changes in technologies that are connected to digital transformation. The first industrial revolution started in the United Kingdom in the 18th century. Steam pressure and mechanical manufacturing were introduced. This, however,

brought a change in the output. The Industrial Revolutions have been instrumental in driving technological and societal transformations. According to Petcu et al. (2020), the Industrial Revolution, spanning from Industry 1.0 to Industry 5.0, has revolutionized the way we work and live. It introduced mechanization, mass production, and the rise of e-commerce. The Fourth Industrial Revolution (4IR) is characterized by the acceleration of the digital, biological, and physical worlds, as well as the growing utilization of new technologies such as artificial intelligence, cloud computing, robotics, blockchain, biotechnology, 3D printing, the Internet of Things, and advanced. The 5th Industrial Revolution, Industry 5.0, aims to optimize resource efficiency and production output by reshaping human-machine interactions. Industry 5.0 aims to redefine industrial processes and human-machine interactions, highlighting the collaboration between humans and intelligent systems. It also emphasizes the bio-economy, utilizing renewable biological resources for industrial purposes, and circular economy principles to enhance resource utilization and minimize waste. The 5th industrial revolution has applications across various industries, including libraries (Rame, Purwanto & Sudarno, 2024).

Conceptual Overview of 5IR:

The fifth industrial revolution (5IR) significantly impacts libraries by driving a shift towards digital transformation, personalized services, and the integration of advanced technologies like AI and machine learning. This revolution necessitates a new role for academic librarians as they adapt to the evolving information management and dissemination environment, ensuring libraries remain relevant and dynamic. The 5th industrial revolution (5IR) allows for more customized and flexible information delivery and services, catering to all diverse user needs, especially in open and distance learning environments. It supports the open access movement, enabling wider access to research materials and fostering a more collaborative research environment.

This evolution of the 5th Industrial Revolution era is intrinsically linked to challenging societies to rethink and adapt existing systems and structures to ensure that the benefits are inclusive and accessible (Pujihastuti, 2023). Additionally, it underscores the importance of preparing a workforce with the skills and adaptability necessary to thrive in this evolving landscape. Skills such as adaptability, digital literacy, and a deep understanding of ethical considerations in technology become invaluable in this context. The development of interdisciplinary skills and the capacity to bridge knowledge gaps between different fields become imperative, as this fusion of knowledge is the driving force behind innovation.

Against the backdrop of the 5th Industrial Revolution, there is an urgent need for academic librarians to cultivate a new set of skills, essentially for navigating this transformative landscape. The ability to adapt to rapidly changing technologies and library environments becomes paramount. One of the defining features of the 5IR era is its steadfast commitment to sustainability, environmental responsibility, and ethical considerations.

Changing Roles of Academic Librarians

With the onset of the Fifth Industrial Revolution (5IR), characterized by the integration of digital technologies, artificial intelligence, and the Internet of Things, the role of libraries is undergoing a significant transformation. In this era of unprecedented change and innovation, the preparedness of academic librarians in skills and knowledge is crucial to ensure that academic libraries continue to fulfill their vital role as guardians of information and knowledge. It's important to note that academic librarians are now at the forefront of managing extensive digital repositories, navigating complex information landscapes, and facilitating access to a variety of resources. To effectively tackle the challenges and seize the opportunities brought by the 5IR, academic librarians need to possess a diverse set of skills and knowledge, encompassing both traditional library practices and emerging technological competencies. This

transition has democratized knowledge access, enabling users to retrieve information from any location with internet connectivity.

Alongside the transition to digital libraries, the roles and responsibilities of librarians have evolved to meet the changing needs of users in the 5IR. Ajani et al. (2022) argue that librarians are no longer solely responsible for cataloging and shelving books; they now serve as curators of digital content, navigators of information landscapes, and educators in digital literacy. In another report, Bashorun et al. (2023) mention that librarians play a crucial role in helping users navigate the complexities of the digital world, providing guidance on information retrieval, evaluation, and citation. Moreover, librarians are increasingly involved in the development and implementation of digital initiatives, such as digitization projects, online learning platforms, and virtual reference services.

The Fifth Industrial Revolution (5IR) transitions from traditional automation to advanced technologies, enhancing connectivity, speed, and innovative solutions, boosting productivity, and creating new business opportunities. (Santhi & Muthuswamy, 2023). For libraries, particularly academic libraries, adoption of 5IR technologies is crucial for delivering inclusive, user-centered services (Akparobore, Omoisejimi, and Nweke, 2020). Librarians are encouraged to integrate tools like artificial intelligence, robotics, the Internet of Things (IoT), cloud computing, and 3D printing to enhance access to information and improve user experiences (Ibinaiye and Jiyane, 2021). These technologies support libraries in providing flexible, remote access to digital resources, thereby extending their service offerings and facilitating internet access for communities, including students (Frank et al., 2021). Additionally, incorporating data science into library services and updating librarian training programs are essential for navigating 5th IR advancements, particularly during crises like epidemics (Ibinaiye and Jiyane, 2021).

Skills Required for 5IR:

However, for academic libraries and librarians to maintain their relevance within the academic community in the era of the Fifth Industrial Revolution (5IR), which is characterized by swift technological advancements and digital metamorphosis, they must possess a diverse skills and competencies enabling them to adapt to the evolving landscape of information management and dissemination. Affum and Dwomoh (2023) note that in the 5IR, information and digital literacy are foundational skills for librarians. As facilitators of information, librarians must excel in navigating the myriad digital resources available to patrons, such as online databases, e-books, and multimedia content. They also possess the ability to critically assess information for its accuracy, reliability, and relevance, while also imparting these skills to library users. In an era marked by information overload and misinformation, academic librarians play a crucial role in assisting patrons in distinguishing between fact and fiction, empowering them to make informed decisions. Also, it is generally believed that technological proficiency is another set of essential skills for librarians in the 5IR. As libraries increasingly rely on digital tools and resources to serve their patrons, Tella et al. (2023) believe that librarians must be comfortable with a wide range of technologies, including library management systems, digital asset management platforms, and online research tools. They must also stay abreast of emerging technologies that have the potential to reshape library services, such as artificial intelligence, machine learning, and augmented reality (Oladokun et al., 2023). Given these, librarians can enhance the efficiency and effectiveness of library operations and improve the user experience for patrons.

At the cutting edge of this fifth industrial revolution, ethical considerations hold paramount importance in the digital era, where issues such as privacy, data security, and intellectual freedom are increasingly at the forefront. Librarians are keenly aware of ethical principles and

adhere to best practices in information management, encompassing professional codes of ethics, privacy regulations, and data protection laws (Ajani et al.2023). However, Amiri et al. (2023) state that librarians must be familiar with established metadata standards such as Dublin Core, MODS, and METS, as well as emerging standards for linked data and semantic web technologies. Because metadata standards and information organization systems are fundamental to the effective management and retrieval of digital resources in libraries.

Collaboration and partnerships with other institutions, organizations, and stakeholders are essential for academic librarians to enhance their preparedness in the 5IR. Oladokun et al. (2020) underscore that librarians seek opportunities to collaborate with academic institutions, technology companies, community organizations, and government agencies to leverage collective expertise and resources. Perhaps the integration of emerging technologies into library services is crucial for librarians to remain relevant and responsive to the needs of users in the 5IR (Oseghale, 2023). For academic librarians to explore and experiment with new technologies such as artificial intelligence, machine learning, augmented reality, and blockchain to enhance the delivery of library services. This may include implementing personalized recommendation systems, developing virtual reality-enhanced learning experiences, or using data analytics to optimize library operations (Ross and Maynard, 2021).

In this innovative age of information science and technology, it is crucial for academic librarians to possess the necessary competencies for working in a specialized workplace, where the equipment and the clients' needs are changing rapidly. Such changes are happening at such a fast speed that every day new skills and styles are needed to handle the information and the related ideas (Abotalebi and Biglu 2017).

Opportunities and Challenges of Fifth Industrial Revolution:

The fifth industrial revolution (5IR) introduces both positive and negative impacts for librarians as they key into the evolving landscape of information management and dissemination. It offers numerous benefits for enhancing service provision to meet the customer's expectations. Embracing the 5th IR offers a chance to drive unprecedented creativity and inclusivity, redirecting progress towards purpose and collective benefits. As we transition from the first to the fifth Industrial Revolution, technological advancements in service provision have shifted libraries from manual to computer-based operation, leading to online services delivery. The utilization of artificial intelligence and robotics in services provision and delivery has expanded access to services for learners across different locations. The libraries, using AI and machine learning, can power chatbot, personalize search results, and provide users with relevant information. Also, librarians believe that the 5th IR would improve service efficiency by enhancing data extraction, processing, and packaging. The new era of the 5th IR forced academic librarians to foster collaboration with researchers and technologists to leverage each other's strengths for knowledge sharing and potentialities. This revolution of 5IR presents opportunities for academic libraries to innovate and improve their services, but it also requires academic librarians to adapt and acquire new skills through continuous learning and regular training. To capture it all, the 5th Industrial Revolution has the potential to transform industries and society, prioritizing human well-being, sustainability, and resilience. This transformation will necessitate a reimagining of traditional practices within academic libraries, emphasizing not only the collection and preservation of information but also the proactive engagement with diverse communities. By fostering an environment of collaboration and innovation, academic librarians can play a crucial role in shaping a future that prioritizes knowledge accessibility and societal advancement.

In this era (5IR), machines are expected to collaborate with humans to accomplish tasks, marking a significant shift. This presents a considerable challenge especially in libraries, as people were still adapting to the fourth industrial revolution, which replaced many human jobs with machines. Now, 5th IR introduces a new era of human-machine collaboration in which the most advanced technologies exist. These advanced technologies are costly to obtain and maintain. Not all academic libraries would be able to afford the cost of training skilled and efficient workers to carry out the library services. Financial constraint, outdated technologies and lack of skilled workers can hinder the adoption of these new technologies in libraries. Academic libraries may face increased cyber security risks as they adopt more advanced technologies, potentially compromising user data and library systems. The adoption of these 5th IR technologies may require academic libraries to re-evaluate their staffing and workforce needs, potentially leading to changes in job roles and responsibilities. Apriliyanti and M, (2022) stated that, 5th industrial revolution could significantly alter human life, causing job loss, skill shortages, digital inequality, privacy breaches, cyber security issues, and ethical concerns, necessitating ongoing education and regulation of AI, automation, and libraries.

The 5th Industrial Revolution, characterized by advanced technology and human-machine collaboration, presents a significant challenge in libraries, as people adapt to the new work environment. Tella et al. (2023), stated that libraries struggle to support modern technology, because financial constraints could prevent the development and transformation of smart services and the purchasing of all the equipment needed for the 5th IR. They also listed networking, inconsistent power supply, lack of skilled workers, outdated technologies, economic issues, and high tool costs as challenges to adopting AI and other modern technologies in library operations.

Strategies for Implementing Fifth Industrial (5IR):

According to Rushan, Madhu and Rifkat, (2024), library activities have improved due to information and communication technologies, especially the Industrial Revolution, and the demand for more customization and flexibility in information dissemination and services. Therefore, to thrive in the fifth industrial revolution (5IR), academic libraries must educate people about the 5IR, collect feedback, and train librarians to improve all-driven services that meet user needs (Rushan, Madhu and Rifkat, 2024). The fifth Industrial Revolution (IR) could revolutionize library operations by automating tasks, improving efficiency, and providing real-time usage data, thus enhancing cost-effectiveness (Tella et al, 2023). Therefore, academic librarians need to update their skills and knowledge to effectively implement 5IR technologies and enhance library services. Libraries should evolve into dynamic, intelligent hubs that leverage smart technologies to improve user experiences, streamline operations, and increase knowledge accessibility. This can be achieved by addressing digital equity to ensure access to information and technology for all users. Innovation and skills development among library staff must be fully implement through continuous learning program that will provide regular training and retraining opportunities for librarians to stay update with the latest skills and knowledge. Also, ensuring the idea of partnership and collaboration for service efficiency will drive innovation, creativity and problem-solving approach in libraries. However, the library management should ensure reliable power supply and invest in necessary infrastructure to support the adoption of 5IR technologies.

Conclusion

The 5th IR presents a transformative period for academic libraries, requiring them to embrace digital technologies, adapt their services to meet evolving users' needs, and equip librarians with the skills and knowledge necessary to thrive in this new era of advanced technologies (5th IR). This shift not only enhances access to information but also fosters innovative research opportunities and collaborations. As academic libraries evolve, they must prioritize continuous

learning and adaptability to remain relevant in a rapidly changing digital landscape. The fifth Industrial Revolution (IR) will significantly impact library services, particularly in open and distance learning. Academic librarians must increase technology use and develop services like customized SDI and job automation. Academic libraries will continue to play a crucial role in providing equitable access to information, promoting lifelong learning, and fostering community engagement. However, librarians must remain agile and responsive to the ever-changing needs of users by leveraging emerging technologies, forging strategic partnerships, and innovating new approaches to library services. In the 5th IR and beyond, academic librarians will uphold their roles as trusted guides and champions of knowledge in an increasingly digital world. To achieve this, librarians are expected to position themselves as indispensable partners in the pursuit of knowledge and information in the digital age, ensuring that libraries remain vibrant and relevant institutions for generations to come.

Recommendations:

Academic libraries should develop strategic plans to effectively implement 5IR technologies and services in libraries.

Collaboration and partnerships with other institutions, organizations, and stakeholders are essential for academic librarians to enhance their preparedness in the 5IR.

Libraries should implement robust data security measures to protect user information and maintain trust in library services.

Libraries should develop strategies that promote sustainable knowledge systems focusing on creativity, critical thinking, and problem-solving, as well as transparency and intellectual freedom.

Libraries should provide continuous learning and training on a regular basis that will keeps up-to-date with the latest skills and knowledge.

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