

Journal of Applied Sciences, Information and Computing
Volume 6, Issue 2, Nov - Dec 2025
School of Mathematics and Computing, Kampala International University



ISSN: 3007-8903

<https://doi.org/10.59568/JASIC-2025-6-2-12>

Converging Futures: Library 5.0 as a Reflection of Society 5.0 Paradigms toward Intelligent, Inclusive, and Human-Driven Knowledge Environments

¹Augustine Uzoma Madu, ²Ibrahim Vand, ³Ifeoma Chigozie Okechuchukwu Akanu

¹Department of Library and Information Science, University of Maiduguri. Maduau2014@gmail.com

²Ramat Library, University of Maiduguri. ibrovandi@gmail.com

³Federal Polytechnic, Unwana Ebonyi State. Celebritygul4u@gmail.com

Abstract

This concept paper explores the convergence of Library 5.0 and Society 5.0, their shared goal to create intelligent, inclusive, and human-centered knowledge environments. It describes how libraries can implement the people-centric and technology-integrated principles of Society 5.0, particularly within the context of emerging knowledge societies in Sub-Saharan Africa. The study combines conceptual frameworks to create a model pertaining to Library 5.0 as a cognitive reflection of Society 5.0, drawing on adaptive systems theory, human-centered design, and knowledge ecology. Three interrelated elements, technological convergence, human-centered values, and institutional intelligence are highlighted in the model as essential instruments for transforming library systems in a way that is both ethical and sustainable. The review's findings indicate that Library 5.0 marks a paradigm shift in library evolution, where human values of empathy, inclusion, and trust are harmonised with intelligent technologies like AI, IoT, and data analytics. In evolving knowledge environments, libraries are envisioned as flexible socio-technical environments that promote resilience, digital equity, and collaborative learning. The policy implications for sub-Saharan African governments, academic institutions, and libraries are, the potential of Library 5.0 to embody the ideals of Society 5.0 by transforming libraries into adaptable ecosystems that harmonize intelligent technologies with human and cultural values were discussed.

Keywords: Library 5.0; Society 5.0, Human-centered innovation, Adaptive systems, Knowledge ecology, Artificial intelligence, Sub-Saharan Africa

1. Introduction

In the era of digital intelligence and hyper-communication, both Society 5.0 and Library 5.0 are innovative paradigms that integrate human values, new technology, and social innovation. The goal of Society 5.0, which was first introduced in Japan's Fifth Science and Technology Basic Plan, is to build a "super-intelligent society" in which cyber and physical systems work together harmoniously to enhance sustainability and human welfare (Cabinet

Office, Government of Japan, 2016; Fukuyama, 2018; Saha, 2025)

According to this paradigm, development is redefined by technology's ability to support inclusive, knowledge-based societies rather than by its dominance in the field. The next step in the evolution of libraries from information repositories to intelligent, adaptive, and human-centred ecosystems that employ data analytics, user-centred design, and

artificial intelligence (AI) to promote fair access and group learning is known as Library 5.0 (Al-Zahrani et al., 2025). This phase aligns digital transformation with ethical and social priorities and positions libraries as intermediary institutions that support innovation, digital citizenship, and lifelong learning.

1.1 Theoretical Foundations

Three interconnected theories of adaptive systems theory, human-centred design, and knowledge ecology form the foundation for the development of Library 5.0 within the larger framework of Society 5.0. All of these theories work together to offer a logical framework for understanding how institutional adaptability, technology, and human intelligence are convergent.

According to adaptive systems theory (Holling, 2001; Boyd & Falk, 2011), libraries are complex and evolving social and technological systems capable of learning, self-regulating, and transforming in response to environmental and societal shifts. Within this framework, Library 5.0 represents a flexible and adaptive infrastructure that integrates technological innovations, such as artificial intelligence, data analytics, and the Internet of Things, with human values and ethical governance. Furthermore, human-centered design (Norman and Draper, 1986; Krippendorff, 2005) provides an ethical and methodological foundation that ensures technological progress remains human-centered, emphasizing empathy, inclusivity, and participatory engagement in the creation of intelligent systems. In this respect, Library 5.0 embodies a design philosophy where user experience, accessibility, and trust are at the heart of digital transformation, closely aligned with the Society 5.0 vision of a hyper-intelligent, human-led society.

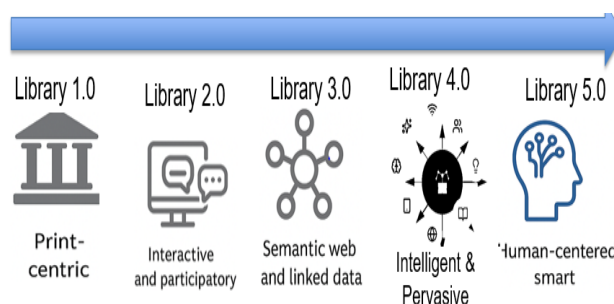
Furthermore, the theory of the knowledge environment (Capra, 1996; Nardi & Odey, 2000) frames the library as a living ecosystem in which knowledge, technology and human factors interact symbiotically to maintain collective intelligence and promote collaborative learning.

This ecological perspective highlights the interconnectedness of human cognition and intelligent systems in building sustainable, ethical, and inclusive knowledge environments. These theoretical visions converge to position libraries not as passive institutions in the digital age, but as adaptive, empathetic, and environmentally intelligent entities that evolve with society. Thus, Library 5.0 emerges as both a mirror and a driver of Society 5.0, fostering a vision of a smart, equitable, and human-

centred knowledge future that integrates resilience, empathy, and sustainability into the core of learning and innovation.

The evolution of libraries has shifted from passive knowledge repositories to proactive, human-centered hubs, resulting in parallel societal transformations. The library evolution model (Fig. 1) traces this co-evolution from print-centric Library 1.0, which mirrored early agrarian and industrial societies, to interactive Library 2.0, reflecting Society 3.0's participatory nature. Library 3.0 harnesses semantic web technologies aligned with Society 4.0's innovations driven by AI and big data. Finally, Library 5.0 emerges as a human-centred smart model

Figure 1 Evolutionary Trajectory of Libraries



Emphasising empathy and well-being, indicative of Society 5.0's balance between technology and social needs (Carayannis & Morawska-Jancelewicz, 2022). This transformation illustrates libraries' adaptive missions in response to evolving technological and social demands.

Significant collaboration between socio-technological evolution and the organisation of knowledge is evident in the historical development of societies and libraries. Every societal stage, from Society 1.0 to Society 5.0, has a library paradigm that reflects the principles of the time in terms of thought, technology, and culture. A comparative snapshot of this co-evolutionary pattern is given in the table 1.

The coevolution of societies and libraries reflects an enduring dialogue between technological progress, human cognition, and social organization. Across history, as societies evolved from hunting and gathering communities to super-smart, knowledge-driven civilizations, libraries simultaneously transformed from rudimentary repositories of oral and written knowledge to intelligent, human-centered ecosystems. This parallel trajectory demonstrates that libraries have never been static entities; rather, they have continuously adapted to the epistemic demands

and technological infrastructures of their times (Casson, 2001; Lankes, 2016).

In the first stage of human evolution, society 1.0, the age of hunter-gatherers, knowledge was primarily collective and implicit, transmitted orally through stories, myths, and communal rituals. Information served immediate survival and cultural functions, while memory resided within individuals and groups rather than in external storage systems. Although formal libraries did not exist, early record-keeping through clay tablets, carvings, and symbols laid the foundation for preserving collective memory (Judy, 1984; Casson, 2001). This stage, often considered Library 1.0, represents the embryonic stage of information preservation, characterized by the integration of memory, ritual, and oral knowledge systems that maintained social cohesion within small

communities. The transition to Society 2.0, marked by the agricultural revolution and the formation of settled civilizations, led to the institutionalization of knowledge through written manuscripts and records. Agricultural surpluses and stable governance structures enabled the development of temple-based writing, record-keeping, and education systems (Eisenstein, 1980; Harris, 1999). Libraries, accordingly, evolved into repositories of manuscripts, often associated with religious and royal institutions, such as the Library of Alexandria or the House of Wisdom in Baghdad. Knowledge shifted from oral to written, from sacred to administrative, and from communal to organized. Thus, the agricultural library reflected the hierarchical and paternalistic nature of agrarian society, preserving both sacred texts and bureaucratic documents, and setting a precedent for organized knowledge systems in later centuries.

Table 1. Evolutionary Phases of Society and Library Systems Figure 1. Evolutionary Trajectory of Libraries: From 1.0 to 5.0

Phases	Society Evolution	Library Evolution	Dominant Features
1	Hunting and Gathering Society	Clay Tablets and Oral Traditions	Oral transmission; libraries as cultural memory keepers. Preservation and collection of manuscripts; access restricted to elites.
2	Agrarian Society	Manuscript Libraries	
3	Industrial Society	Print and Public Libraries	Mechanisation of access: online catalogues and user interaction.
4	Information Society	Digital and E-Libraries	Integration of ICT, AI, and data analytics for efficiency and remote access.
5	Super-Smart Society	Intelligent, Human-Centered Library 5.0	Human-machine collaboration, inclusivity, empathy, and knowledge co-creation.

Industrial society (Society 3.0) reshaped the social and informational landscape. Industrialization spurred urbanization, literacy, and the expansion of public education, while Gutenberg's printing press revolutionized the production and dissemination of knowledge (Eisenstein, 1980). Libraries evolved in parallel into public institutions, providing democratic access to printed materials and embodying Enlightenment ideals of progress, rationality, and citizenship (Black, 2000; Battles, 2011). The Library 3.0 model became a cornerstone of civic education and social mobility, emphasizing the importance of access to printed knowledge as a public good. At this stage, libraries symbolized society's investment in intellectual capital, industrial innovation, and democratic participation. The relationship between society and libraries has become institutionally symbiotic, with libraries supporting the development

of the industrial workforce and national identity, while society reciprocates through public funding and policy support. The emergence of Society 4.0, often referred to as the Information Society, has redefined the human-information interface through digitization and networking (Castells, 2011). The proliferation of computers, the internet, and data storage technologies has decentralized information flows and broken down geographical barriers. Knowledge production has become rapid, distributed, and collaborative. In response, the Library 4.0 has emerged as a digital and hybrid ecosystem, integrating electronic databases, electronic catalogs, and virtual access to information resources (Lankes, 2016). Libraries have transcended their physical boundaries, becoming platforms for distance learning, open scholarship, and digital literacy.

However, this transformation has also highlighted challenges such as information overload, the digital divide, and concerns about algorithmic biases that underline the limitations of technological progress (Drucker, 2012). Thus, while Society 4.0 contributed to democratizing access to knowledge, it also revealed the need for more human-centered, ethical, and sustainable frameworks for information governance. The current shift to Society 5.0 represents a paradigm shift from an information-centric to a human-centric innovation model. Initially conceived within Japan's National Policy Vision, Society 5.0 envisions a "hyper-intelligent" society in which cyberspace and physical space are seamlessly integrated to enhance human well-being (Hitachi-University of Tokyo Lab, 2020; Fukuda, 2020). Unlike its predecessor, Society 5.0 focuses on balancing technological advancement with social inclusion, positioning artificial intelligence, robotics, and the Internet of Things as tools to achieve.

A constant interaction between human cognition, social organization, and technological advancement has driven the co-evolution of societies and libraries. Libraries have evolved from basic stores of oral and written knowledge to become intelligent, human-centered environments, reflecting the progression from hunter-gatherer cultures to knowledge-driven civilizations. This evolution indicates that libraries have continually adapted to the technological and cognitive requirements of their eras. (Casson, 2001; Lankes, 2016).

2. Research Methodology

2.1 Society 5.0, Library 5.0, and Human-AI Convergence

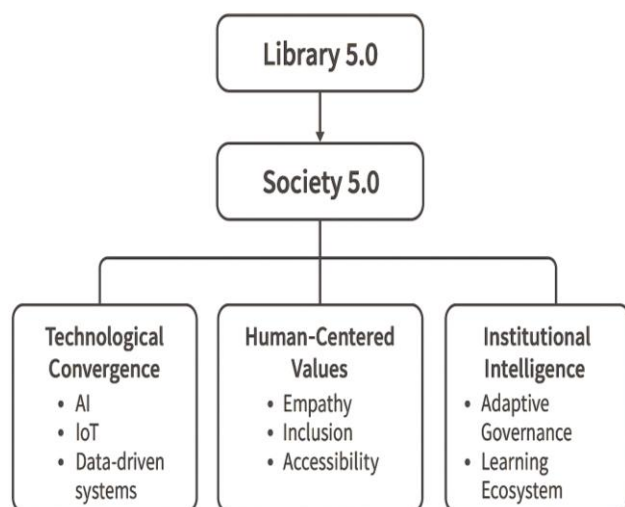
Studies indicate that the concept of Society 5.0 illustrates how advanced digital infrastructure can be leveraged to achieve human well-being rather than simply accelerating economic growth (Lily & Sharma, 2025; Gobinath, 2024). Originating from Japan's Fifth Basic Science and Technology Plan, the concept of Society 5.0 expresses a drive to build a "super-intelligent" society in which cyberspace and physical space are closely integrated to address social challenges using artificial intelligence, the Internet of Things, and comprehensive data analytics (Cabinet Office, 2016; Holroyd, 2020). Studies emphasise that the defining characteristic of Society 5.0 is its human-centredness, deliberately redirecting technological pathways to support inclusion, sustainability, and quality of life (Fukuyama, 2018; Hitachi-University of Tokyo Laboratory, 2020). Critical literature emphasises governance aspects, ethical frameworks, algorithm transparency, and institutional capacity as

vital for Society 5.0 to attain equitable outcomes instead of worsening existing disparities (Magni et al., 2023).

Meanwhile, emerging studies on Library 5.0 portray libraries as institutional translations of these societal goals in the field of knowledge infrastructure. While the early stages of library development prioritised collection preservation, digitisation, and user interaction, Library 5.0 focuses on knowledge collaboration between humans and intelligent systems, integrating the values of accessibility, participation, and sustainability into service design (Naikar & Paul, 2025; Adigun et al., 2024; Oyedokun, 2025). Library 5.0 literature highlights several recurring themes: (1) the shift from retrieval to recommendation and understanding meaning (artificial intelligence and semantic systems), (2) the ethical imperative of data governance in knowledge services, and (3) the role of libraries as community platforms for lifelong learning and digital citizenship (Yani Wu, 2024). It is important to note that the literature discussing Library 5.0 in low- and middle-income contexts indicates that hybrid applications, low-cost digital solutions, mobile-centric services, and community-based co-design are more appropriate than the wholesale adoption of cutting-edge technology packages (Egwe & Solomon, 2022; Inogwe, et al., 2025).

The intersection of artificial and human intelligence in structured environments is being studied (Jarahi, 2018; Anastasio, 2025). In addition to enabling new avenues for collaborative innovation, where algorithmic tools improve human judgement, creativity, and reflective practice, these studies highlight AI's potential to replace human responsibilities (Naikar & Paul, 2025). Three main points are highlighted in studies on the intersection of humans and AI: (a) To ensure continued adoption, AI design must prioritise interpretability and user trust; (b) participatory design approaches guarantee that AI systems reflect local knowledge and needs; and (c) the link that turns technological potential into a comprehensive social good is capacity building, skills, literacy, and governance (Magni et al., 2023).

Additionally, studies have identified Library 5.0 as being at the intersection of societal visions such as Society 5.0, emerging human practices, and artificial intelligence; in this context, libraries serve as spaces for implementing ethical AI, promoting equality of knowledge, and fostering social inclusion.

Figure 2. Conceptual Model

As a cognitive reflection of Society 5.0, the conceptual model (Figure 1) illustrates how libraries evolve to embody the same human-centred, intelligent, and sustainable qualities envisioned in the broader agenda for societal transformation. According to Japan's Fifth Science and Technology Basic Plan, the concept of "Society 5.0" refers to a paradigm shift from an information-based society to a hyper-intelligent society where human values and technological advancements combine to enhance quality of life (Cabinet Office of Japan, 2017; Fukuda, 2020). According to this model, libraries should adapt to this shift by serving as knowledge environments that incorporate artificial intelligence, human intelligence, and collaborative social learning in addition to being information repositories (Modiba & Chisita, 2023). The role of librarians in these ecosystems is crucial (Genting et al., 2023).

2.2 Technological Convergence

The first dimension, technological convergence, describes how cutting-edge technologies like cloud computing, blockchain, big data analytics, artificial intelligence (AI), and the Internet of Things (IoT) are integrated into library systems (Madu, et al., 2024). According to the Society 5.0 paradigm, these technologies are symbiotic rather than merely functional, linked via cyber-physical systems that facilitate intelligent decision-making (Fukuda, 2020). This convergence facilitates digital preservation, context-aware services, automated metadata creation, and personalised learning environments within the framework of Library 5.0. For instance, IoT-enabled

smart shelves or sensors can maximise resource utilisation and improve user experience, while AI algorithms can help with semantic discovery (Bhopalwad, 2025; Ansah, 2025). In order to reflect the cognitive architecture of Society 5.0, this technological blend guarantees that libraries move from digital archives to adaptive knowledge ecosystems.

2.3 Human-Centered Values

The second dimension draws attention to human-centred values and takes an ethical and inclusive approach to Society 5.0. While the earlier industrial revolutions focused on productivity and mechanisation, Society 5.0 emphasises human well-being, inclusion, and equity (Carayannis & Morawska-Jancelewicz, 2022). Library 5.0 shares these principles with service design that prioritises global access, intellectual empathy, and cultural relevance. For example, user-friendly interfaces for users with different abilities, multilingual access, and social initiatives demonstrate how libraries create inclusivity in digital environments (Purnomo et al., 2024). In sub-Saharan Africa, these efforts are to enhance the reduction of digital and information inequalities by transforming libraries into socially responsive innovative spaces that promote technological progress and human dignity (Modiba & Chisita, 2023).

2.4 Institutional Intelligence

Institutional intelligence, which is the third dimension, reflects a librarian's ability to adapt, learn, and govern in complex knowledge ecosystems. Institutional intelligence includes organisational learning, knowledge transfer, and strategic analysis related to library practices and societal changes (Nonaka & Takeuchi, 2019). It has been argued that Library 5.0 organisations are conceptualised as learning organisations that use real-time data analysis, predictive analytics, and participatory governance systems to inform decision-making (Alzahrani et al., 2025). These institutions serve as knowledge intermediaries between human societies and intelligent systems, to bridge the knowledge gap between human interpretation and machine reasoning. This ability to adapt is said to strengthen Library 5.0's "scientific thinking" mission, ensuring that technological adoption remains grounded in ethics and public interest. In sub-Saharan Africa, institutional intelligence is centred on enhancing libraries' function within organisational structures. By means of policy engagement, libraries can promote policy alignment, digital capacity, and cooperation among their constituencies as well as

align local innovation contexts with global sustainability frameworks like the UN SDGs (Cyr & Connaway, 2020).

2.5 Interconnectivity of the Dimensions

The model suggests that technological convergence, human values, and organizational intelligence are all synergistic. Technological systems enable inclusivity, human values legitimize organizational practices, and organizational intelligence ensures sustainability and ethical governance. This tripartite structure positions Library 5.0 as a microcosm and mirror of Society 5.0: an ecosystem that both accommodates and influences the shared evolution of human AI. The conceptual agreement between the three confirms that shared reflective logic libraries not only adapt to societal transformations, but also effectively shape the ethical and epistemological norms of those transformations (Fukuda, 2020).

3. Discussion and Policy Implications

From a Sub-Saharan African perspective, the convergence of Library 5.0 and Society 5.0 provides a transformative opportunity to reimagine knowledge infrastructures in line with sustainable development goals. Governments should prioritize national policies that integrate libraries within digital transformation frameworks, enabling them to serve as platforms for innovation, civic learning, and inclusive access. At the higher education level, universities must embed digital and AI literacy within curricula, positioning libraries as living laboratories for interdisciplinary research and innovation. At the library level, strategic investments in staff capacity, data governance, and smart technologies are essential to operationalize Library 5.0 principles. Regional collaborations among African libraries can strengthen collective intelligence, promote open access, and reduce infrastructural disparities.

4. Conclusion and Future Directions

This conceptual paper articulates the shared vision of Library 5.0 and Society 5.0 as complementary paradigms for intelligent, human-driven, and sustainable knowledge ecosystems. By integrating technological convergence with social inclusion, the model provides a theoretical basis for libraries as cognitive infrastructures that enable adaptive learning and societal transformation. Future research should explore empirical validation of the model through comparative and regional studies, focusing on how African libraries can embed human-centered intelligence within national innovation systems. Furthermore, policy design must emphasize ethical AI governance, cross-sectoral collaboration, and

capacity development to sustain the Library 5.0 vision in the context of the global knowledge economy.

5. References

- [1] Abdullahi, J. (2023). Library Services in Covid-19 Era: Bridging the Gap and Improving Access to Libraries and Information in Sub-Saharan Africa. *World Libraries*, 27(1), 1-13
- [2] Adigun, G. O., Ajani, Y. A., & Enakrire, R. T. (2024). The intelligent libraries: Innovation for a sustainable knowledge system in the fifth (5th) Industrial Revolution. *Libri*, 74(3), 211-223. <https://doi.org/10.1515/libri-2023-0111>
- [3] Alzahrani, S., Shakir, K., Yazeed, A., Salaudhin, N., & Ahmed, S. (2025). Navigating the technological frontier: Tracing the journey from library 2.0 to library 5.0 and its impact on knowledge repositories. *Information Development*. <https://doi.org/10.1177/02666669251348907>
- [4] Ansah, E. I. (2025). The role of artificial intelligence in modern libraries. *International Journal of Innovative Science and Research Technology*, 10(6), 28-34. <https://doi.org/10.38124/ijisrt/25jun063>
- [5] Anastasiou, S. (2025). Integrating human resource management and artificial intelligence in educational leadership: Pathways toward transformational change. *Academic Journal of Interdisciplinary Studies*, 14(3), 7. <https://doi.org/10.36941/ajis-2025-0044>
- [6] Battles, M. (2011). *Library: An unquiet history*. W. W. Norton & Company.
- [7] Bharti, S. (2025). Bridging the AI adoption gap in the workplace: A human-centered roadmap for ethical and effective integration. *International Journal of Science and Research (IJSR)*, 14(4), 1186-1188. <https://doi.org/10.21275/sr25414103338>
- [8] Bhopalwad, S. V. (2025). Transforming libraries: The role of artificial intelligence in enhancing modern library services. *International Journal of Science and Research (IJSR)*, 14(7), 325-328. <https://doi.org/10.21275/sr25630101056>
- [9] Black, A. (2000). *The public library in Britain, 1914-2000*. British Library.
- [10] Boyd, E., & Folke, C. (2011). *Adapting institutions: Governance, complexity and social-ecological resilience*. Cambridge University Press.
- [11] Cabinet Office, Government of Japan. (2016). *The 5th Science and Technology Basic Plan*. Tokyo, Government of Japan. <https://www8.cao.go.jp/cstp/kihonkeikaku/>

- [12] Capra, F. (1996). *The web of life: A new scientific understanding of living systems*. Doubleday.
- [13] Carayannis, E. G., & Morawska-Jancelewicz, J. (2022). The futures of Europe: Society 5.0 and industry 5.0 as driving forces of future universities. *Journal of the Knowledge Economy*, 13(4), 3445-3471. <https://doi.org/10.1007/s13132-021-00854-2>
- [14] Casson, L. (2001). *New Haven and London: Libraries in the ancient world*. Yale University Press.
- [15] Castells, M. (2011). *The rise of the network society*. John Wiley & Sons.
- [16] Cyr, C., & Connaway, L. S. (2020). Libraries and the <sc>UN</sc> sustainable development goals: The past, present, and future. *Proceedings of the Association for Information Science and Technology*, 57(1). <https://doi.org/10.1002/pra.2.237>
- [17] Drucker, P. (2012). *Post-capitalist society*. Routledge.
- [18] Eneogwe, U., Egbuchua, E., Madubuko, C. C., & Ajala, C. (2025). From Traditional to Smart Libraries: A New Paradigm for Information Access and Service Innovation in Developing Nations. *Advance Journal of Linguistics and Mass Communication*, 9(5), 1-9.
- [19] Eisenstein, E. L. (1980). *The printing press as an agent of change*. Cambridge University Press.
- [20] Fukuda, K. (2020). Science, technology and innovation ecosystem transformation toward society 5.0. *International Journal of Production Economics*, 220, 107460. <https://doi.org/10.1016/j.ijpe.2019.07.033>
- [21] Fukuyama, M. (2018). *Society 5.0: Aiming for a New Human-centered Society: Japan's Science and Technology Policies for Addressing Global Social Challenges*. Retrieved October 23, 2025, from https://www.hitachihyoron.com/rev/archive/2017/r2017_06/pdf/p08-13_TRENDS.pdf
- [22] Ginting, R. T., Samosir, F. T., Yurinda, A. D., Majidah, & Madu, A. U. (2023). The role of librarians in the era of society 5.0. *Record and Library Journal*, 9(1), 159-171. <https://doi.org/10.20473/rlj.v9-i1.2023.159-171>
- [23] Gobinath, T. (2024). Society 5.0 the next revolution in human progress. *Shanlax International Journal of Arts, Science and Humanities*, 11(3), 61-68. <https://doi.org/10.34293/sijash.v11i3.6898>
- [24] Goody, J. (1984). *The domestication of the savage mind* (2nd ed.). Cambridge University Press.
- [25] Gultom, S. D., Koesbardiati, T., & Yuadi, I. (2025). Integrating generative AI into society 5.0: A paradigm for sustainable education. *Research and Development in Education (RaDeN)*, 5(1), 505-518. <https://doi.org/10.22219/raden.v5i1.40665>
- [26] Harris, M. H. (1999). *History of libraries of the western world* (4th ed.). Scarecrow Press.
- [27] Hitachi-UTokyo Laboratory. (2020). *Society 5.0: A people-centric super-smart society*. Springer.
- [28] Holling, C. S. (2001). Understanding the complexity of economic, ecological, and social systems. *Ecosystems*, 4(5), 390-405. <https://doi.org/10.1007/s10021-001-0101-5>
- [29] Holroyd, C. (2020). Technological innovation and building a 'super smart' society: Japan's vision of society 5.0. *Journal of Asian Public Policy*, 15(1), 18-31. <https://doi.org/10.1080/17516234.2020.1749340>
- [30] Igwe, K. N., & Sulyman, A. S. (2022). Smart libraries: Changing the paradigms of library services. *Business Information Review*, 39(4), 147-152. <https://doi.org/10.1177/02663821221110042>
- [31] Jarrahi, M. H. (2018). Artificial intelligence and the future of work: Human-AI symbiosis in organizational decision making. *Business Horizons*, 61(4), 577-586. <https://doi.org/10.1016/j.bushor.2018.03.007>
- [32] Krippendorff, K. (2005). *The semantic turn: A new Foundation for design*. CRC Press.
- [33] Lankes, R. D. (2016). *The new librarianship Field guide*. MIT Press.
- [34] Lily, M., & Sharma, D. B. (2025). Inclusive society: A pathway to achieving sustainable development goals. *International Journal of Environmental Sciences*, 11(3), 503-510. <https://doi.org/10.64252/3qtwrj32>
- [35] Madu, A. U., Odenigbo, P., & Yakubu, S. A. (2024) Walking the Talk: Envisioning Sustainable Libraries in Nigeria through Diversity and Inclusion in the Digital Era. *Journal of Library and Information Management, Technology, Education*, 1(2), 29-44.
- [36] Magni, D., Del Gaudio, G., Papa, A., & Della Corte, V. (2023). Digital humanism and artificial intelligence: the role of emotions beyond the

- human-machine interaction in Society 5.0. *Journal of Management History*, 30(2), 195-218. <https://doi.org/10.1108/jmh-12-2022-0084>
- [37] Modiba, T. M., & Chisita, C. T. (2023). Libraries in an era of constant flux: Establishing smart libraries in South Africa. *Global Knowledge, Memory and Communication*. <https://doi.org/10.1108/gkmc-12-2022-0290>
- [38] Naikar, S., & Paul, M. (2025). The future role of smart libraries in 21st century: A study. *Journal of Emerging Technologies and Innovative Research (JETIR)*, 12(1), 756-763.
- [39] Nardi, B. A., & O'Day, V. (2000). *Information Ecologies: Using technology with heart*. MIT Press.
- [40] Nonaka, I., & Takeuchi, H. (2019). *The wise company: How companies create continuous innovation*. Oxford University Press.
- [41] Norman, D. A., & Draper, S. W. (1986). *User centered system design: New perspectives on human-computer interaction*. CRC Press.
- [42] Oyedokun, T. T. (2025). Reimagining libraries in the fifth Industrial Revolution (5IR): The impact of robotics, artificial intelligence (AI), metaverse, blockchain, and emerging technologies. *Business Information Review*, 42(2), 112-124. <https://doi.org/10.1177/02663821251328839>
- [43] Purnomo, G. W., Wikandani, P. R., & Suprpto, A. (2024). Strengthening accessibility and inclusivity in libraries: The role of adaptive technology in supporting visually impaired users. *Knowledge Garden*, 2(1), 48-62. <https://doi.org/10.21776/ub.knowledgegarden.2024.2.1.15>
- [44] Rane, N. L., Kaya, Ö., & Rane, J. (2024). Advancing industry 4.0, 5.0, and society 5.0 through generative artificial intelligence like ChatGPT. *Artificial Intelligence, Machine Learning, and Deep Learning for Sustainable Industry 5.0*. https://doi.org/10.70593/978-81-981271-8-1_7
- [45] Saha, A. (2025). Human-centred innovation in society 5.0. *Society 5.0*, 143-173. <https://doi.org/10.1201/9781003643166-7>
- [46] Yanyi Wu. (2024). Future of information professions: Adapting to the AGI era. *Scientific and Technical Information Processing*, 51(3), 273-279. <https://doi.org/10.3103/s0147688224700199>