From Books to Bytes: A Systematic Review of the Role of Information and Communication Technology (ICT) in Academic Library Administration

Umar Mallam Bah[1*], A'dilah Binti Mustafa[2], Moh'D Zool[3]

[1]*Federal College of Education (Technical) Potiskum, Yobe State, Nigeria.*
[2,3]*College of Computing, Informatics and Mathematics, Universiti Teknologi MARA (UiTM),
40150 Puncak Perdana, Selangor, Malaysia.*

Authors' Email Addresses: *[*1]12022415194@isiswa.uitm.edu.my, [2]adillah973@uitm.edu.my,
[3]zoolhilmie@uitm.edu.my*

*Corresponding Author

ABSTRACT

The role of Information and Communication Technology (ICT) in administration is crucial as academic libraries transition from traditional repositories to dynamic digital platforms. This Systematic Literature Review (SLR) delves into ICT's impacts and applications in academic library management. The study focused on: the mechanisms and extent of ICT adoption in administrative functions, the discernible benefits and challenges associated with the deployment of ICT; and the prospective trajectories for ICT utilisation in academic libraries. Following a rigorous review methodology, twenty-six (26) peer-reviewed articles from 2020 to 2023, sourced from ScienceDirect and Web of Science, were reviewed. Findings highlight diverse applications of ICT, ranging from operational tasks such as cataloguing and analytics to strategic responsibilities like decision-making and planning. Significantly, the study uncovers latent research gaps, especially in emerging technologies, ethical ramifications, and geographical nuances, thereby delineating avenues for future academic endeavours . Additionally, the study sheds light on the variegated nature of ICT applications, pointing to success factors, challenges including digital divides, and security concerns. Thus, the study serves as a historical evaluation and prospective guide for scholars, administrators, and policymakers, delineating the intricate interplay between technological innovation, human factors, and strategic planning in academic library administration.

Keywords: *digital cataloguing, digital transformation, electronic resource management, ICT in academic libraries, technology adoption*

INTRODUCTION

Libraries in many institutions have undergone a profound metamorphosis; far surpassing their traditional role as custodians of books and scholarly journals(Kaur, 2015; Saharkhiz et al., 2017). It has emerged as an intricate, multifaceted institution, serving as the linchpin in the scholarly ecosystem of higher education (Corrall, 2022; Harris, 2018). Within the corridors of these libraries, one can find an assemblage of rich information resources, state-of-the-art technological platforms, and myriad learning

opportunities (Susan Mathew & Baby, 2011). The libraries not only cater to the academic needs of faculty and students but also extend their services to engage with the community at large (Bangani & Dube, 2022; Lucky & Harkema, 2018). Central to this evolutionary trajectory is the domain of library administration, an entity responsible for a spectrum of functions including but not limited to acquisition strategies, cataloguing, user services, and outreach programs (Cox et al., 2019; Jewell & Mitchell, 2021; Lee, 2020). It is the administration that orchestrates the seamless operation of these complex systems. In the past, administrative positions that included duties like customer relations, inventory control, and circulation controls were carried out manually (Christensen et al., 2018). However, in the digital age, these tasks have undergone a paradigm shift, transmigrating to sophisticated digital platforms (Asif & K. Singh, 2019; Baryshev et al., 2020). Enter Information and Communication Technology (ICT), a technological framework that has become inextricable from the lexicon of modern library administration (Lavrik, 2020). Far from being a mere facilitative tool, ICT is deeply embedded in the operational fabric of academic libraries, enhancing their efficiency, broadening their service scope, and elevating their quality benchmarks (Adaeze & Nzewi, 2020). In an era marked by interconnected global networks, the omnipresence of mobile devices, and the relentless quest for instantaneous, reliable information, the importance of ICT has been exponentially magnified (Lee et al., 2021; Nour, 2018). It ~~plays an indispensable role~~ is indispensable in various administrative undertakings such as digital asset management, data analytics, electronic resource planning, and strategic governance (Karanja, 2017). The seismic shift toward ICT integration is symptomatic of a larger transformation sweeping across educational landscapes worldwide. This monumental transition is propelled by an amalgamation of factors, encompassing advancements in software engineering, ubiquitous digitisation of academic and informational resources, escalating user expectations for immediate access to diversified knowledge bases, and an organisational imperative for operational efficiency.

Given the monumental changes rippling through academic libraries, this scholarly paper seeks to delve into the intricate dimensions of ICT adoption, its multifaceted impacts, and its prospective trends in the ecosystem of academic library administration. Through an exhaustive and rigorous review, the paper aspires to furnish invaluable insights to elucidate the complex dynamics at play, thereby benefiting academic researchers, library administrators, institutional decision-makers, and policy architects in comprehending the transformative role and future pathways of ICT in academic libraries.

Objectives of the Study

The overarching aim of this study is to engage in a meticulous critical analysis and synthesis of extant scholarly works that pertain to the incorporation and utility of ICT within the sphere of academic library administration. Hence, to achieve this comprehensive scrutiny, the study is guided by a set of explicitly delineated objectives:
a. To investigate the multifaceted roles and impacts of ICT within academic library management, from operational tasks to strategic responsibilities.
b. To explore the challenges and benefits of ICT deployment, emphasizing areas like benefits, digital divides, security concerns, and technological adoption.
c. To identify and analyse core thematic domains central to the integration of ICT in academic library administration, while uncovering latent research gaps and nuances in the existing literature.
d. To serve as a comprehensive guide for stakeholders, scholars, administrators, and policymakers, highlighting the relationship between technological innovation, human factors, and strategic planning in the evolution of academic libraries.

By navigating through these distinct yet interrelated objectives, the study aims to contribute a seminal scholarly artifact that offers a nuanced understanding of the complexities, opportunities, and challenges associated with ICT deployment in the realm of academic library administration.

Significance and Rationale of The Study

The significance and rationale of this study are multifaceted, addressing a range of critical issues pertinent to the contemporaneous and swiftly transforming milieu of academic library administration. The current study is significant for many important reasons, including its timely publication at a time when educational institutions are increasingly moving toward digitisation. First, it investigates how ICT can revolutionise the operational efficiency of administrative tasks within academic libraries, extending from digital cataloguing to automated user services, thereby elucidating avenues for the enhancement of operational efficiency. Second, given the global ubiquity of ICT and its escalating integration into educational contexts, the review holds universal applicability, offering critical insights transferable across diverse pedagogical frameworks and geographical terrains. Third, the study bears significant policy implications; as resource allocation toward technology burgeons, educational stakeholders, ranging from institutional administrators to policy architects require rigorous, evidence-based precepts to guide their investment and implementation decisions. Fourth, despite the existence of myriad studies probing discrete aspects of ICT in academic libraries, a comprehensive, synthesised review is conspicuously absent: a lacuna this study aims to fill, thereby offering a more unified understanding of the extant scholarship. Fifth, the research pays heed to the end-user experience, scrutinizing how the incorporation of ICT directly mediates both user satisfaction and engagement levels, thus allowing libraries to optimise their services accordingly. Sixth, the review is sensitive to ethical and security dimensions, addressing the pivotal concerns of data privacy and cybersecurity in environments replete with sensitive information. Lastly, by highlighting extant research gaps and illuminating prospective avenues for scholarly inquiry, the review serves to enrich the research agenda in this vital sector. Collectively, these factors position this review as a seminal scholarly contribution that furnishes a nuanced, holistic perspective on the intricate interplay between ICT and academic library administration, with ramifications extending to the broader educational ecosystem.

Motivation of the Study

The impetus for undertaking this study emanates from a confluence of academic exigencies, technological trends, and practical imperatives, foregrounding the study within the vibrant, yet intricate, interplay between ICT and academic library administration. As educational institutions undergo a seismic shift toward digital infrastructures, the role of academic libraries is correspondingly transmuted, elevating them from mere repositories to dynamic hubs of scholarly activity and intellectual discourse. Administrative functionalities, once executed through labor-intensive, manual processes, are now increasingly reliant upon digital paradigms, auguring a transformative influence of ICT in shaping the operational canvas. This inexorable shift has catalyzed a slew of scholarly inquiries; however, these efforts remain largely piecemeal and devoid of an integrative framework, thus precipitating a need for a nuanced understanding of how ICT interfaces with library operations to influence not just administrative efficiency but also user engagement, policy development, and ethical considerations. Additionally, the study is motored by an exigent need for evidence-based guidelines that can inform administrative and policy decisions, especially when substantial fiscal investments are at stake. Furthermore, as educational landscapes become more globally interconnected, the research aims to offer a transnational perspective on ICT adoption, addressing diverse educational ecosystems and geopolitical contexts. On another front, the study is galvanised by ethical and security imperatives, given the burgeoning concerns around data privacy and cyber vulnerabilities in the digital age. Finally, by pointing out gaps in the literature and unexplored academic grounds, the study acts as a prospective scaffold which marks out productive areas for future research Thus, this review is predicated upon an assemblage of interlocking motivations that collectively advocate its academic and practical indispensability.

In the ensuing segments of this article, the contents were meticulously arranged into a coherently structured format to explore the role of ICT in the domain of academic library administration. Section 2 elaborates on the rigorous methodology deployed to collate and evaluate pertinent articles from peer-reviewed journals, thereby forming the empirical foundation upon which the study's subsequent analyses are constructed. Section 3 embarks on a comprehensive review of the existing

literature, emphasizing the crucial impact of ICT on both tactical and strategic aspects of academic library administration. This section amalgamates insights from seminal scholarly works to lend nuance and depth to the investigation. Key findings that shed light on the complexities of ICT applications in academic libraries are presented in Section 4, enhancing the discourse with a carefully calibrated blend of quantitative metrics and qualitative. Finally, Section 5 synthesises the study's core conclusions, offering a unified analytical framework while identifying promising avenues for future research in this vital academic area.

METHODOLOGY

To investigate the pivotal role and emergent challenges of ICT in the contemporary landscape of academic library administration, this study employs a Systematic Literature Review (SLR) as its foundational methodological framework. This methodological approach is particularly apt given the SLR's demonstrated capacity for rigorous collation, in-depth evaluation, and meticulous synthesis of diverse strands of scholarly literature, thereby enabling a nuanced and impartial appraisal of the complex dimensions underlying the application of ICT in academic libraries. Concentrating on key operational aspects such as digital cataloguing, e-resource management, user services, and strategic decision-making, the SLR crystallises the multifaceted impacts of ICT within the institutional library environment. By diligently aggregating and dissecting a voluminous corpus of academic research, the SLR employed for this study augments the intellectual rigor of existing knowledge while concurrently laying a robust groundwork for ongoing discourse on the technological, ethical, and policy-oriented facets of ICT implementation in academic library administration.
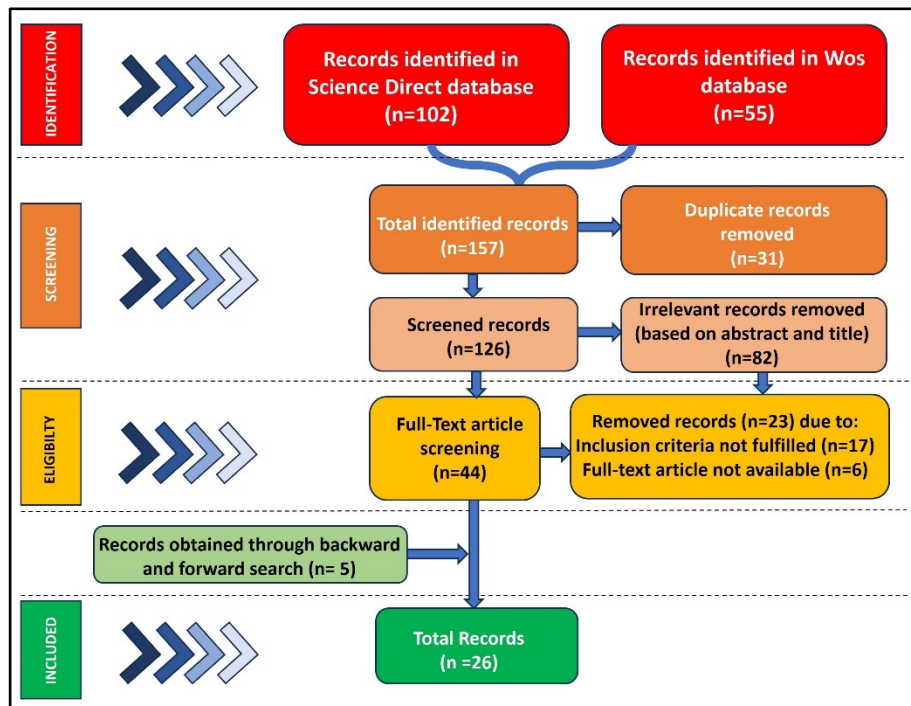
Article Selection Method

Figure 1: Flowchart of The Systematic Review Process Based on PRISMA.

ICT plays a crucial role in academic library administration. To thoroughly grasp its significance, the implementation of a dual-database search strategy, utilizing the extensive databases of Web of Science (WoS) and ScienceDirect were used. The choice for WoS database for the study was due to its robust multidisciplinary coverage, and ScienceDirect database for its expansive, high-quality academic repository (Abioye et al., 2021). This two-pronged approach by PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines ensures methodological rigor

(Moher et al., 2009; Page et al., 2021), as shown in Figure 1. Given the rapidly evolving landscape of ICT in educational settings, this review focuses on studies published between 2020 and 2023, capturing the latest advancements, challenges, and trends. Keywords driving the search terms: "ICT in academic libraries," "library administration," "digital cataloging," "e-resource management," "user services," "strategic planning," "ICT challenges," and "ICT ethics," were used in various combinations to retrieve the most pertinent articles for the study. The review also adhered to rigorous inclusion and exclusion criteria. Five specific inclusion metrics targeted articles that closely aligned with the research objectives previously mentioned. Four exclusion metrics helped eliminate studies that were either tangentially related or did not meet scholarly quality benchmarks. This strategic approach ensures that the findings are both current and robust, contributing to a fundamental understanding of ICT's transformative role in academic library administration.

Inclusion and exclusion criteria

To ensure the highest level of academic rigor and relevance in investigating the role of ICT in academic library administration, it was necessary to establish strict inclusion and exclusion criteria for literature selection. Each article incorporated into the review had to fulfill all predefined inclusion benchmarks while avoiding any characteristics that would merit its exclusion. This meticulous approach ensures that the selected studies offer a precise and nuanced understanding of the many facets of ICT's impact on library administration, ranging from operational efficiency and user experience to ethical considerations and future research opportunities. Through this methodology, we aim to address existing gaps in the literature, delivering comprehensive insights into how ICT is transforming academic library administration in the digital age. Table 1 delineates the specific criteria used for inclusion and exclusion in this systematic review.

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Table 1: Predefined Inclusion and Exclusion Criteria

Inclusion Criteria		Exclusion Criteria	
Item	**Description**	**Item**	**Description**
Language	Only articles published in English will be included to ensure accurate interpretation and analysis	Non-Academic Sources	Articles that are not peer-reviewed such as opinion pieces, editorials, or commercial publications
Peer-Reviewed	Articles must be peer-reviewed and published in a journal or conference proceedings that are widely recognised for their academic rigor	Technological Focus Only	Articles that solely focus on the technical aspects of ICT without considering its impact on library administration
Empirical Studies	Articles must contain empirical data specifically related to the adoption or impact of ICT in academic library administration	Irrelevant Themes	Articles that discuss ICT in libraries but are not directly related to administrative functions, such as articles solely discussing digital literacy among library users.
Relevance to Administrative Functions	Articles must focus on the administrative aspects of academic libraries such as resource management, cataloging, strategic planning, or user services as influenced by ICT	Insufficient Data	Studies that do not provide adequate empirical evidence to support their claims, rendering them less valuable for a rigorous analysis
Global Scope	Articles must be globally relevant, irrespective of the country or institution where the research was conducted, allowing for cross-contextual analysis and insights.		

By meticulously articulating these inclusion and exclusion criteria, the objective is to mitigate selection bias, thereby ensuring the incorporation of only the most pertinent and academically rigorous research into the review. This methodological rigor serves to bolster both the credibility and reliability of the study's findings. Furthermore, the clearly defined criteria offer a structured framework that not

only enhances the study's internal validity but also provides a robust foundation for future researchers seeking to replicate or extend the scope of this investigation.

Selected articles

In an era marked by accelerating technological innovation and the transformative ripple effects of global events like the COVID-19 pandemic, academic libraries find themselves at a complex intersection of user demands, digital imperatives, and institutional dilemmas (Ashiq et al., 2022). This scholarly anthology coalesces these multifarious dynamics into a cohesive framework, offering critical insights that span an array of geographical landscapes, institutional settings, and temporal contexts. Through an integrative lens, the compendium synthesises a multitude of specialised research perspectives that probe into various dimensions, encompassing technological transition, data privacy considerations, organisational culture, and evolving user engagement paradigms. While the studies coalesce to elucidate common challenges faced globally, they also highlight unique, region-specific constraints and opportunities, thereby contributing to a nuanced understanding of the intricate ecosystem defining contemporary academic libraries. The succeeding section elucidates the various interplay of ICT and its impact on academic library administration.

Converging Frontiers: The Role of ICT In Shaping Academic Library Administration in the Digital Age

In an era marked by accelerating technological innovation and the transformative ripple effects of global events like the COVID-19 pandemic, academic libraries find themselves at a complex intersection of user demands, digital imperatives, and institutional dilemmas (Ashiq et al., 2022). This scholarly anthology coalesces these multifarious dynamics into a cohesive framework, offering critical insights that span an array of geographical landscapes, institutional settings, and temporal contexts. Through an integrative lens, the compendium synthesises a multitude of specialised research perspectives that probe into various dimensions, encompassing technological transition, data privacy considerations, organisational culture, and evolving user engagement paradigms. While the studies coalesce to elucidate common challenges faced globally, they also highlight unique, region-specific constraints and opportunities, thereby contributing to a nuanced understanding of the intricate ecosystem defining contemporary academic libraries. The succeeding section elucidates the various interplay of ICT and its impact on academic library administration.

Intersecting Paradigms: The Transformative Influence of ICT On Academic Library Administration Across Diverse Geopolitical Landscapes

In the aspect of digital transformation, academic libraries have emerged as essential nexuses, arbitrating between an expanding arsenal of ICT options and the diversifying needs of the academic community. This scholarly synthesis embarks on a meticulous inquiry into this fluid landscape, through an array of pivotal studies that triangulate ICT's role in reshaping academic library administration.

Initiating the discourse, Sulle & Wema, (2023) scrutinise the Students' Knowledge Ambassadors program at Mzumbe University in Tanzania. While lauding its acceptance, they foreground its infrastructural inadequacies and mentoring gaps as areas demanding ICT-centric interventions. This microcosmic scrutiny is expanded by Otike et al., (2022), who assert that ICT-driven, business-oriented innovation strategies are instrumental for the adaptive resilience of academic libraries in an increasingly digitised environment. Adding impetus to this argument, Ifijeh & Yusuf, (2020) underscore the exigency for Nigerian academic libraries to metamorphose towards ICT-enabled service models, a need accentuated by the imperatives of pandemic-driven remote accessibility. Correspondingly, Mensah & Onyancha, (2021) highlight the preliminary stages of social media strategy

development in Ghanaian academic libraries, signalling ICT's inescapable role in enhancing user engagement and outreach. Within the same temporal framework dictated by the COVID-19 pandemic, works by Kang et al., (2022) and Chisita et al., (2022) delve into China's and Zimbabwe's academic libraries, respectively. Both accentuate the accelerated adoption of digital platforms and document perceptible preference for electronic resources over traditional print media among library users. The study by Green, (2022) provides further empirical gravitas to this trend, documenting a swift transition towards ICT-aided digital resources and remote operational configurations. Substantiating this shift, Guo & Huang, (2021) illuminate the criticality of information literacy initiatives in Chinese academic libraries, albeit with an emphasis on the looming challenges posed by content quality and misinformation in an ICT-saturated environment. Transitioning to the domain of automation, Hussain & Ameen, (2023) offer a discerning appraisal of ICT-driven automated systems in Pakistani university libraries. While acknowledging palpable operational enhancements, they expose extant barriers such as infrastructural deficiencies and resource constraints. Conclusively, Adetayo, (2023) research focuses on the post-pandemic pedagogical landscape at Adeleke University in Nigeria, advocating for ICT infrastructure adaptations to align with emergent student predilections for online assessments.

Again, in the fast-paced, technologically driven landscape of academic libraries, ICT's (Information and Communication Technologies) role as an indispensable facilitator of transformation is coming to the forefront. As such various studies distil how ICT is not just a digital tool but a complex actor that intersects with various facets of academic library administration, encompassing issues of technology adoption, user engagement, staff well-being, digital preservation, and information literacy. Opening the scholarly dialogue, Tella et al., (2020) conduct a rigorous examination of cloud computing in Nigerian academic libraries. Their research elevates the discourse by highlighting that user perceptions of security and reliability are cardinal determinants that shape cloud adoption, thereby making a case for robust ICT frameworks. This seamlessly integrates with the study by Ocran et al., (2020), focusing on mobile technology-based services at the University of Cape Coast. While documenting high user enthusiasm and proficiency, the study finds an incongruity between user readiness and extant resource allocation, as well as workforce training. This illuminates the need for managerial strategies that align ICT infrastructure with user expectations and staff competencies. Transitioning from a user-oriented lens to an internal organisational perspective, Murgu, (2021) contributes a seminal work on employee well-being among digital scholarship librarians in ARL institutions. The study observes that technostress is relatively low, but other role-specific and organisational factors exacerbate stress levels. This finding amplifies the necessity for comprehensive ICT management strategies that take into account not just technology but also human factors. Building on this multi-dimensional perspective, Ahmad & Rafiq, (2022) provide a broad evaluation of digital preservation strategies within Pakistani public universities. Despite significant financial investments in technological infrastructure, the study surfaces glaring lacunae in policy governance, workforce training, and skill acquisition. This points to the criticality of an integrated ICT strategy that melds technology, policy, and human resources for effective digital preservation. Asim et al., (2022) extend this analytical framework by examining the limited implementation of Internet of Things (IoT) technologies in Pakistani academic libraries. They attribute this constraint to systemic challenges such as financial limitations and a scarcity of technical expertise, underscoring the need for a nuanced approach to ICT adoption that takes into account fiscal realities and skillsets. Concluding the scholarly narrative, Deja et al., (2021) foreground information literacy as a linchpin in the ICT ecosystem. They argue that nurturing a proactive information culture within academic settings hinges on information literacy, thereby elevating it from a pedagogical tool to an administrative imperative.

Furthermore, in the intricate domain of academic library administration, ICT has ascended to a pivotal role, interfacing with an array of operational facets, ranging from financial sustainability and data privacy to metadata management, electronic resource management, and information security. Within this complex milieu, a growing body of scholarly research endeavours to elucidate the subtle dynamics through which these administrative functions are progressively influenced and transformed by ICT. This line of inquiry not only exposes emergent challenges but also illuminates potential pathways for innovative solutions. Initiating this academic conversation, Zubair et al., (2023) explore

the economics of ICT integration, focusing on the adoption of the Virtual Integrated Library System (VILS) across six Nigerian universities. Their findings emphasise the challenges posed by fiscal constraints and escalating subscription costs, thereby creating an impetus for the consideration of cost-effective, open-source alternatives like Koha. In doing so, they provide a financial contextualisation to the ongoing discourse on technological adoption in library administration. Progressing to the domain of data privacy, Eroğlu & Çakmak, (2020) contribute to a critical, under-researched area by scrutinizing the data privacy awareness of administrative staff in Turkish academic libraries. The study's findings indicate a substantial deficit in data privacy literacy among personnel, calling attention to the necessity for targeted educational initiatives. The impact of this research extends beyond the immediate context, raising imperative questions about the role of ICT in cultivating a data-responsible administrative culture in academic libraries globally. Boczar et al., (2023) then shift the lens toward metadata management, another crucial ICT-mediated administrative task. They offer an analytical account of the University of South Florida's consolidation of its expansive digital collections. Here, batch processing emerges as a pivotal instrument for metadata transformation, crucial for enhancing the discoverability of a myriad of resources. This study amplifies the discourse on ICT's role in resource optimisation and cataloguing efficiency within academic libraries. Broadening the scope to electronic resource management, Bentil et al., (2021) employ the Techniques of Electronic Resource Management (TERMS) framework to examine existing practices in Ghanaian academic libraries. Their research reveals stark gaps and underutilised opportunities in both public and private sectors, offering an evaluative snapshot that could catalyse revisions in ICT-related strategies for more effective electronic resource management. Lastly, Kavak & Odabaş, (2023) pivots the discussion toward information security, a critical yet often-overlooked dimension of academic library administration. Their investigation into Turkish university libraries establishes a compelling link between the availability of a structured corporate information security management guide and the effectiveness of enacted security measures. This adds a layer of complexity to the role of ICT, positioning it as not just a tool but a comprehensive framework requiring strategic governance for effective information security.

Additionally, in the increasingly complex landscape of academic library administration, ICT has become a fulcrum around which diverse operational and strategic considerations revolve. Recent scholarship offers a prism through which to understand this intricate relationship, illuminating the nuances of technological adoption, dynamic capabilities, and regional specificities, all situated within varied institutional and geographical contexts. Launching this intellectual discourse, Jadhav et al., (2023) present the Dynamic Capabilities of an Academic Library (DCAL) model, a conceptual framework emphasizing the triad of core dynamic capabilities: searching, seizing, and transforming. Deploying Structural Equation Modelling (SEM) as a methodological underpinning, their work offers an empirical scaffolding to assess academic libraries' adaptive capacities to societal and technological metamorphoses. This lends quantitative rigour to our understanding of how libraries can strategically navigate the ICT landscape. Yakubu et al., (2023) contribute to this dialogue by focusing on the particular context of North-Eastern Nigeria, where they examine cloud computing adoption in academic libraries. Utilizing the Technology-Organisational-Environmental (TOE) and Diffusion of Innovation (DOI) frameworks, their research crystallises a range of factors affecting adoption, from technophobia to policy mandates. The scholarship thus enriches the ongoing conversation by exploring the complex interplay between institutional, technological, and environmental determinants influencing the integration of cloud computing solutions. Advancing this focus on localised technological landscapes, Akwang, (2021) dissects the implementation of Web 2.0 technologies within academic libraries in Akwa Ibom State, Nigeria. Despite the high perceived utility of these technologies, the study identifies financial constraints and gaps in professional development as primary barriers. This adds a critical dimension to the discourse, emphasizing the importance of targeted resource allocation and skill enhancement in the context of ICT adoption. In a broader geographical sweep, He & Huang, (2023) examine a decade-long transformation in the utilisation of Web Content Management Systems (WCMS) across the globe's top 1,000 academic libraries. Their insights point to Drupal's rising prominence and reveal compelling regional variations in WCMS adoption. Such an analysis not only offers a macroscopic view of technological trends but also draws attention to the significance of regional idiosyncrasies in ICT strategies. Lastly, Huang et al., (2023) transport the discussion to the frontier of

Artificial Intelligence (AI), scrutinizing its integration within strategic paradigms of academic libraries in the United Kingdom and mainland China. Their findings suggest a marked divergence in the strategic prioritisation of AI technologies despite their emerging importance. This observation adds an extra layer of complexity to the discussion, urging academic libraries to critically evaluate the role of emerging technologies within their strategic portfolios.

Cumulatively, in the evolving field of academic library administration, the scholarly discourse coalesces around the essential roles played by ICT in addressing multifarious institutional challenges and opportunities. Several studies have explored this intricate nexus, revealing overarching themes unified by technological adaptability, human engagement, and strategic resilience. This synthesis aims to distil these scholarly contributions into a comprehensive understanding, centered on the imperative of judiciously leveraging ICT within the complexities of academic library ecosystems. Significantly, the literature across diverse regional and disciplinary contexts attests to the primacy of dynamic capabilities in academic libraries. As illustrated in studies like those deploying the DCAL model, these capabilities span technological innovation, human capital development, and strategic foresight. They elucidate the compelling need for a synergistic blend of technological platforms and user-centric services, fine-tuned to the specificities of regional and global environments. Cloud computing adoption in North-Eastern Nigeria offers a poignant case in point. These studies underscore the manifold challenges inhibiting technological assimilation, which range from financial constraints to localised technophobia. The North-Eastern Nigerian context thus epitomises a broader narrative that reflects the intricate balance between technological potential and the real-world constraints facing academic libraries. Web Content Management Systems (WCMS) are another focal area explored globally, providing insights into how different geographical regions are navigating the implementation and management of digital content. Drupal's growing popularity as a WCMS, for example, showcases the collective gravitation towards more agile and user-friendly platforms, while also revealing geographical peculiarities in technology adoption strategies. Turning to the frontier of Artificial Intelligence (AI), studies examining its role in the United Kingdom and mainland China articulate a significant divergence in strategic emphasis. Despite AI's emerging role as a transformative agent in academic library services, these findings prompt caution, advising academic libraries to rigorously evaluate the adoption and integration of such technologies within their strategic matrices. Equally crucial is the human-centric perspective brought forth in the literature, which illuminates the intrinsic importance of information literacy, employee well-being, and effective resource management. These elements serve as vital underpinnings for successful ICT integration and underscore the necessity for a holistic approach that encapsulates technological, human, and organisational considerations. Additionally, the COVID-19 pandemic emerges as a salient factor accelerating the digital transformation within academic libraries. This global crisis has precipitated an urgent need for agile responses and strategic realignments, further amplifying the role of ICT as both an enabler and a disruptor in this shifting landscape. In conclusion, the consolidated body of scholarship emphasises the convoluted yet imperative nature of ICT's role in academic library administration. It accentuates the multifaceted challenges and opportunities that academic libraries face, compelling them to integrate technological, human, and strategic dimensions in a coherent and context-specific manner. Hence, the intellectual tapestry woven by these scholarly inquiries serves not only as an analytical retrospect but also as a prospective blueprint, guiding academic libraries toward judiciously navigating the complexities of an increasingly digitalised and interconnected global ecosystem. Table 2 presents a summary of the salient findings derived from the relevant studies.

Table 2: Implications and Trends of ICT Adoption in Academic Library Administration: Synopsis of Relevant Literature

Author(s) & Year	Focus of Study	Key Findings	ICT-related Implications for Academic Library Administration
(Sulle & Wema, 2023)	Students' Knowledge Ambassadors at Mzumbe University, Tanzania	Positive reception but infrastructural and mentoring gaps	Need for ICT-centric interventions for infrastructure and mentorship

Author(s) & Year	Focus of Study	Key Findings	ICT-related Implications for Academic Library Administration
(Otike et al., 2022)	Business-oriented innovation in academic libraries	Necessity of ICT-driven strategies for adaptive resilience	ICT as a tool for strategic innovation and adaptability
(Ifijeh & Yusuf, 2020)	Transformation towards ICT-enabled services in Nigerian academic libraries	Urgency heightened by pandemic-driven remote needs	Mandate for ICT infrastructure to facilitate remote accessibility
(Mensah & Onyancha, 2021)	Social media strategy in Ghanaian academic libraries	ICT's role in enhancing user engagement and outreach	ICT as an enabler for community building and outreach
(Kang et al., 2022)	Digital platforms in Chinese academic libraries	Accelerated adoption and preference for electronic resources	Validation of digital-first strategies
(Chisita et al., 2022)	Digital platforms in Zimbabwean academic libraries	Accelerated adoption and preference for electronic resources	Reinforces the push toward digital resources
(Green, 2022)	Transition to ICT-aided resources and operations	Swift transition towards digital resources and remote operations	Urgency for ICT to facilitate remote operational configurations
(Guo & Huang, 2021)	Information literacy in Chinese academic libraries	Importance, yet challenges due to content quality and misinformation	ICT is both an asset and a challenge for information literacy
(Hussain & Ameen, 2023)	Automated systems in Pakistani academic libraries	Operational enhancements but existing infrastructural and resource barriers	ICT as a means for automation, but constrained by resources
(Adetayo, 2023)	Post-pandemic pedagogy at Adeleke University, Nigeria	Student preference for online assessments	ICT adaptations needed for assessment strategies
(Tella et al., 2020)	Cloud computing in Nigerian academic libraries	User perceptions of security and reliability shape adoption	Need for robust ICT frameworks centered around security and reliability
(Ocran et al., 2020)	Mobile technology services at the University of Cape Coast	High user enthusiasm but incongruity with resource allocation and staff training	Align ICT infrastructure with user expectations and staff competencies
(Murgu, 2021)	Employee well-being among digital scholarship librarians in ARL institutions	Low technostress but role-specific and organisational factors contribute to stress	Comprehensive ICT management strategies considering human factors
(Ahmad & Rafiq, 2022)	Digital preservation in Pakistani public universities	Significant investment but lacunae in policy governance and workforce training	Integrated ICT strategy combining technology, policy, and human resources
(Asim et al., 2022)	Implementation of IoT in Pakistani Academic Libraries	Financial limitations and scarcity of technical expertise limit adoption	A nuanced approach to ICT adoption considering fiscal constraints and skillsets
(Deja et al., 2021)	Information literacy as an ICT ecosystem component	Information literacy elevated from a pedagogical tool to an administrative imperative	Positioning information literacy as a critical component in ICT strategy
(Zubair et al., 2023)	Economics of ICT integration in Nigerian universities	Fiscal constraints and escalating subscription costs challenge adoption	Consideration of cost-effective, open-source alternatives like Koha
(Eroğlu & Çakmak, 2020)	Data privacy awareness in Turkish academic libraries	A significant deficit in data privacy literacy among staff	The necessity for educational initiatives to cultivate data-responsible culture
(Boczar et al., 2023)	Metadata management at the University of South Florida	Batch processing as a pivotal tool for metadata transformation	Enhancing resource discoverability and cataloguing efficiency via ICT
(Bentil et al., 2021)	Electronic resource management in Ghanaian libraries	Gaps and underutilised opportunities in both public and private sectors	Revisions in ICT-related strategies for effective electronic resource management
(Kavak & Odabaş, 2023)	Information Security in Turkish University Libraries	The Link between a structured corporate security guide and effective security measures	Comprehensive ICT framework requiring strategic governance for effective information security

Author(s) & Year	Focus of Study	Key Findings	ICT-related Implications for Academic Library Administration
(Jadhav et al., 2023)	DCAL model and academic libraries' adaptive capacities	Empirical framework using SEM to assess adaptive capacities	Quantitative rigor in understanding how to strategically navigate ICT
(Yakubu et al., 2023)	Cloud computing in North-Eastern Nigeria's academic libraries	Factors like technophobia and policy mandates affect the adoption	The complexity of institutional, technological, and environmental determinants
(Akwang, 2021)	Web 2.0 technologies in Akwa Ibom State, Nigeria	Financial constraints and skill gaps are primary barriers	Importance of targeted resource allocation and skill development
(He & Huang, 2023)	WCMS in the global top 1,000 academic libraries	The rising prominence of Drupal; regional variations in adoption	Significance of regional idiosyncrasies in ICT strategies
(Huang et al., 2023)	AI in academic libraries in the UK and mainland China	Divergence in strategic prioritisation of AI technologies	Critical evaluation of emerging technologies in strategic portfolios

FINDINGS AND DISCUSSION

In this section, we present an integrated synthesis of seminal findings culled from meticulously peer-reviewed scholarly studies that probe the role of ICT in academic library administration. Each selected research contribution underwent a scrupulous content analysis, leveraging advanced statistical techniques and methodologies to unearth emerging themes, salient trends, and discernible patterns in this intricate domain. Complementing the quantitative probes, an expansive qualitative analysis was executed to elucidate nuanced aspects such as technological adoption, organisational dynamics, and user engagement, which are intricately woven into the fabric of the extant scholarship. By drawing upon these multifaceted analytical pathways, we delineate the multifunctional role of ICT in academic libraries, spanning domains like cloud computing, metadata management, employee well-being, digital preservation, and electronic resource management, among others. This analytical framework thereby serves as an interpretative lens for deconstructing the complex interplay of technological, human, and organisational elements that collectively define the transformative impact and administrative imperatives of ICT within the academic library setting.

Statistical analysis

For a comprehensive analysis of the pivotal role of Information and Communication Technology (ICT) in the management of academic libraries, systematic reviews of 26 empirical studies were conducted. These were methodically organised into seven salient thematic clusters: technology adoption, user engagement, staff well-being, digital preservation, information literacy, Information Security, and electronic resource management, as illustrated in Figure 2.
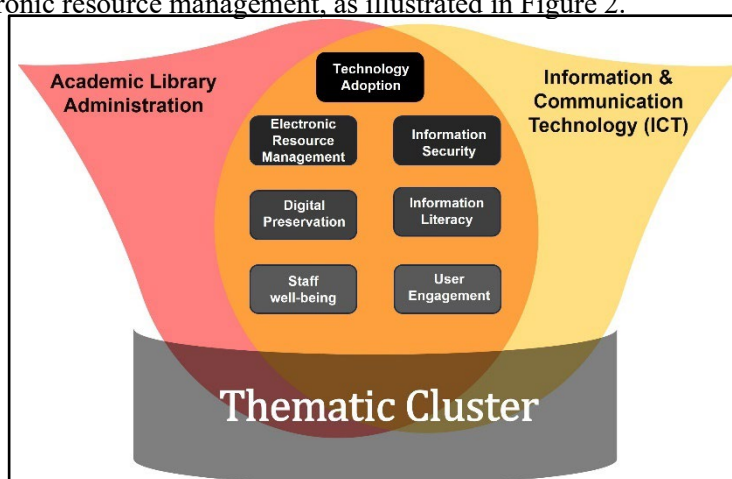
Figure 2: Key Thematic Clusters in ICT's Role Within Academic Library Administration

Notably, the most abundant subset comprised studies focusing on technology adoption (n=11), thereby reflecting an intensified scholarly preoccupation with the intricate challenges and complexities associated with assimilating emerging technologies into academic library infrastructures. Following this, four studies primarily engaged with issues surrounding electronic resource management, underscoring the urgent need for efficacious strategies in this domain. Three studies were dedicated to user engagement, accentuating the ascending imperative to align ICT frameworks with user predilections and anticipatory needs. A duo of studies each explored the critical dimensions of staff well-being, digital preservation, information literacy, and Information Security, thereby gesturing toward nascent academic inquiries in these vital facets of library administration. These scholarly concentrations and their distribution among thematic clusters serve not merely as a synoptic overview of the extant academic discourse but also as an incisive identification of gaps in current research. Consequently, this landscape affords a nuanced and strategic scaffolding for prospective scholarly endeavors. Table 3 meticulously categorises the thematic clusters, providing an exhaustive overview of the manifold roles that ICT serves in the administration of academic libraries, substantiated by rigorous empirical analysis.

Table 3: Comparative Analysis of Key Thematic Clusters in ICT's Role Within Academic Library Administration: A Content Review of Selected Articles

Author(S) & Year	Technology Adoption	User Engagement	Staff Well-Being	Digital Preservation	Information Literacy	Information Security	Electronic Resource Management
(Sulle & Wema, 2023)			✓				
(Otike et al., 2022)	✓						
(Ifijeh & Yusuf, 2020)	✓						
(Mensah & Onyancha, 2021)		✓					
(Kang et al., 2022)							✓
(Chisita et al., 2022)							✓
(Green, 2022)				✓			
(Guo & Huang, 2021)					✓		
(Hussain & Ameen, 2023)	✓						
(Adetayo, 2023)		✓					
(Tella et al., 2020)	✓						
(Ocran et al., 2020)		✓					
(Murgu, 2021)			✓				
(Ahmad & Rafiq, 2022)				✓			
(Asim et al., 2022)	✓						
(Deja et al., 2021)					✓		
(Zubair et al., 2023)	✓						
(Eroğlu & Çakmak, 2020)						✓	

Author(S) & Year	Technology Adoption	User Engagement	Staff Well-Being	Digital Preservation	Information Literacy	Information Security	Electronic Resource Management
(Boczar et al., 2023)							✓
(Bentil et al., 2021)							✓
(Kavak & Odabaş, 2023)						✓	
(Jadhav et al., 2023)	✓						
(Yakubu et al., 2023)	✓						
(Akwang, 2021)	✓						
(He & Huang, 2023)	✓						
(Huang et al., 2023)	✓						

Additionally, to provide a visually engaging summary of the core focus areas in the role of ICT in academic library administration, we encapsulate these key themes through a radar graph depicted in Figure 3. This graphical approach excels in distilling complex data into easily digestible visuals, offering a comprehensive overview of the primary domains that anchor research on ICT in academic libraries. The radar graph not only quantifies the volume of research in each thematic cluster, encompassing technology adoption, user engagement, staff well-being, digital preservation, information literacy, information security, and electronic resource management, but also illuminates the complex interrelationships among them. By highlighting the multifaceted roles and implications of ICT in academic library administration, the radar graph enriches our understanding of both the immediate and strategic significance that this field of inquiry holds.
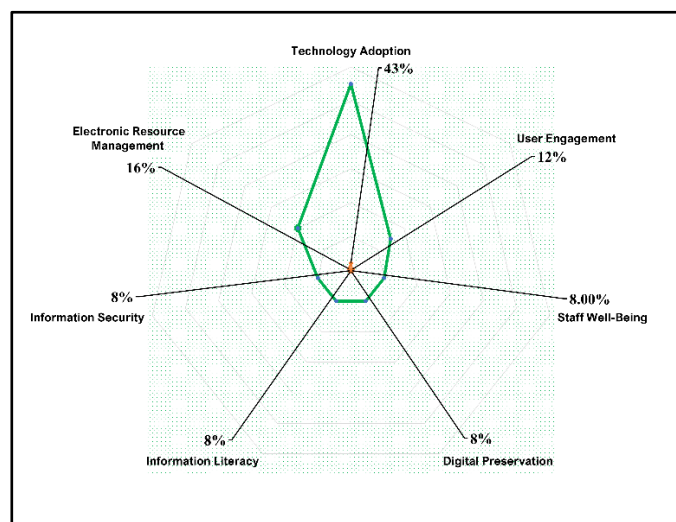

Figure 3: Radar Chart Illustrating The Distribution of Key ICT Themes Within Academic Library Administration

As delineated in Figure 4, the SLR offers a nuanced chronological exploration of scholarly contributions concerning the multifaceted applications of ICT in academic library administration, spanning from 2020 to the third quarter of 2023. We observed a marked temporal fluctuation in the research output, initiating with a modest quartet of publications in 2020, surging to half a dozen in 2021, and maintaining this momentum with another six articles in 2022. The year 2023 has already witnessed ten publications, as of its third quarter. This chronological trajectory may be instructive of underlying research trends and academic imperatives. The incipient stage in 2020 could symbolise an embryonic research focus on ICT in libraries but also coincide with the onset of the COVID-19 pandemic, which

imposed unprecedented challenges and accelerated the imperative for digital transformation in academic libraries. The subsequent rise in publications during 2021 and 2022 may signify an academic response to these emergent complexities, as libraries grappled with the imperatives of remote access, digital services, and virtual engagement amidst the global lockdowns and movement control orders (MCO), as well as the increasing acknowledgment of the critical role ICT plays in library administration. The heightened activity in 2023, despite it being only partial data for the year, could be indicative of a scholarly crescendo, possibly fuelled by an evolving understanding of the pandemic's long-term impact on library administration and perhaps a response to the urgent administrative challenges exacerbated by rapid technological advancements or evolving user demands. This temporal analysis serves not merely as a retrospective gauge but also as a prospective lens, amplifying comprehension of the evolving scholastic terrain while accentuating the ceaseless relevance of ICT's role in the strategic frameworks of academic library administration.
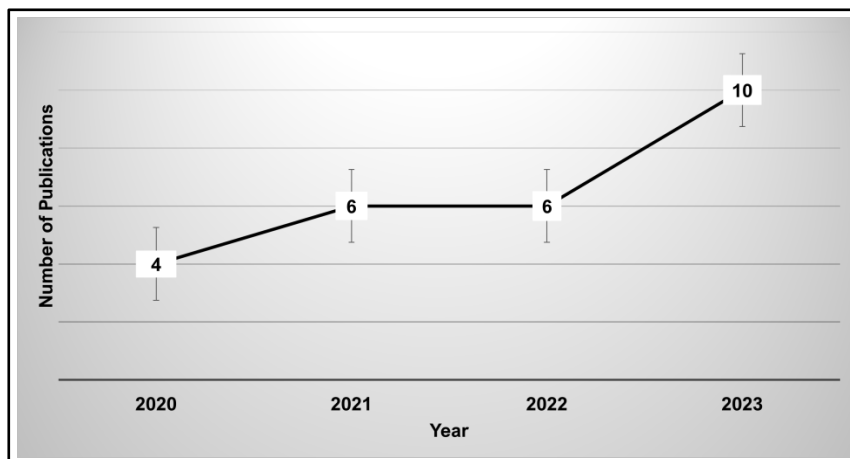

Figure 4: Trend analysis of academic publications on ICT in library administration from 2020 to 2023

Implications of the Study

The implications of this study are manifold and extend across multiple stakeholders, involving scholars, administrators, and each policymaker-with unique but interrelated interests in the efficacious administration of academic libraries. For scholars, this study furnishes a synthesised landscape of the current state of ICT in academic library administration, effectively delineating existing research gaps and fertile grounds for future scholarly investigation. The identification of under-explored thematic areas such as ethical considerations in technology adoption, the role of emerging technologies like Artificial Intelligence, and geographically nuanced ICT applications opens avenues for multi-disciplinary and cross-regional research collaborations. For administrators tasked with the day-to-day operation of academic libraries, the findings offer actionable insights into how ICT can be strategically leveraged for a wide array of functions, from enhancing user engagement to optimizing resource management and even decision-making processes. Challenges like digital divides and security concerns are illuminated, guiding targeted interventions that balance technological innovation with human-centric approaches. This is especially pertinent in a post-COVID landscape, where the pandemic has catalysed a paradigm shift in digital adoption and remote functionalities (Koos et al., 2021; Kosciejew, 2020). For policymakers, the study underscores the necessity of developing focused initiatives that aim to augment digital capacities across academic libraries. This entails not just infrastructural investments but also policies that address staff training, user literacy, and ethical considerations in ICT deployment. The nuanced understanding afforded by this study can be pivotal in shaping policies that are both technologically sound and socially equitable. Additionally, the study serves as a seminal resource for academic library administration as a whole, emphasizing the triad of technological innovation, human engagement, and strategic foresight. It accentuates the need for a symbiotic relationship between these elements, urging a shift towards a more holistic, integrated approach to library administration. In summary, this study does not merely contribute to academic discourse but also has the potential to

significantly influence practical implementations and policy directions in the complex landscape of academic library administration.

Recommendations for Future Study

Despite the extensive body of scholarship elucidating the role of ICT in academic library administration, the present study's systematic literature review has illuminated critical gaps that warrant further academic scrutiny. Notably, there is a conspicuous paucity of research that integrates multidisciplinary approaches, synthesizing insights from fields such as organisational behaviour, psychology, and data science to create a more holistic understanding of ICT adoption and utilisation in libraries. Additionally, longitudinal studies exploring the long-term impact and sustainability of ICT interventions remain remarkably scarce. While the literature abundantly addresses technological implementation, it less frequently interrogates the downstream effects on staff well-being, user engagement, and resource optimisation. Furthermore, there is an evident need for empirical studies that delve into region-specific challenges and opportunities, given that much of the current scholarship is skewed toward Western or developed contexts, thereby limiting its global applicability. Emerging technologies such as blockchain, augmented reality, and machine learning also remain underexplored, despite their potential to revolutionise library services and operations. Equally significant is the relative neglect of ethical considerations, especially surrounding data privacy and digital equity, which are increasingly paramount in an era characterised by pervasive digitalisation. In light of the COVID-19 pandemic, studies that specifically explore the crisis-induced accelerations and disruptions in ICT adoption within academic libraries are urgently needed. Therefore, recommendations for future work include conducting cross-disciplinary research to offer a multifaceted perspective on ICT implementation, carrying out longitudinal studies to evaluate long-term effects, and embarking on region-specific and ethical inquiries to broaden the scope and applicability of existing knowledge. Moreover, future scholarship should aim to experimentally validate the effectiveness of various ICT strategies and tools, ensuring that theoretical frameworks and models are rigorously subjected to empirical substantiation. By addressing these gaps, future research can contribute to a more nuanced, comprehensive, and globally relevant understanding of the transformative and strategic potential of ICT in academic library administration.

Limitations of the Study

Reflecting on the limitations of the study on the role of Information and Communication Technology (ICT) in academic library administration, it is critical to acknowledge the constraints that may have shaped analysis and conclusions of the study. The investigation was primarily limited to literature published between 2020 and 2023. While this timeframe facilitated a targeted examination, it likely omitted earlier seminal works and the latest research breakthroughs, possibly overlooking significant historical contexts or emergent trends in ICT applications in libraries. The geographic distribution of the studies reviewed was not uniform, introducing the possibility of regional bias. This imbalance could skew the interpretation of global advancements in ICT for academic library administration, with certain regions possibly having a disproportionate impact on the present findings presented here. Moreover, the focus on literature published in English may have excluded important contributions in other languages, thereby narrowing the study's view of global practices and innovations in this field. The selection criteria employed could also introduce selection bias, potentially favouring specific research methodologies or perspectives. This might limit the diversity of viewpoints and findings considered, potentially affecting the comprehensiveness of the review. Furthermore, sourcing articles exclusively from academic databases such as ScienceDirect and WoS may have subjected the analysis to publication biases with the dominance of certain journals, which could influence the representation of particular research facets in academic library administration. Additionally, the emphasis on academic literature means that this study might not fully reflect on-the-ground advancements or practical challenges faced by academic libraries in integrating ICT. Innovative practices or real-world challenges in implementing ICT solutions in libraries might not be thoroughly

documented in scholarly articles. Acknowledging these limitations is crucial for accurately situating the findings (obtained here) within the broader discourse on ICT's role in academic library administration. The aforementioned limitations draw attention to the necessity of carefully applying the study's findings in future investigations, the formulation of public policy, and real-world initiatives to raise the efficacy and efficiency of academic libraries through ICT use.

CONCLUSION

This study has undertaken an exhaustive exploration of the intricate roles played by ICT in the ever-evolving landscape of academic library administration. Through the critical analysis of pertinent contemporary literature, this study has identified seven core thematic clusters, including technology adoption, user engagement, staff well-being, digital preservation, information literacy, information security, and electronic resource management, each meriting varying levels of scholarly attention. Temporally, the research output in this domain has seen marked fluctuations from 2020 to 2023, suggesting an evolving scholarly interest that has been significantly influenced by the onset of the COVID-19 pandemic and its subsequent repercussions on the digitisation imperative within academic libraries. The findings obtained have explicated not only the technologies themselves but also the complex interplay between technological platforms, human capital, and strategic imperatives. This intricate nexus has been examined through a multidimensional lens that considers geographical and cultural peculiarities, typified by examples such as the adoption of cloud computing in North-Eastern Nigeria and the utilisation of Artificial Intelligence in libraries in the United Kingdom and mainland China. Despite the diversity of topics and technologies explored, a uniform call resonates across these studies: the need for a judicious and context-specific approach to ICT adoption and management in academic libraries. Yet, this study also shines light on several significant gaps in current scholarship, most notably the absence of multidisciplinary, longitudinal, and region-specific studies, along with the under-examination of emerging technologies and ethical considerations. These gaps open avenues for future research, which, if pursued with academic vigour, have the potential to substantially enrich the understanding of ICT's role in shaping the future of academic libraries. In an era increasingly dictated by digital imperatives and disruptive transformations, this study contributes a consolidated scholarly perspective that encapsulates the multifaceted challenges and opportunities academic libraries face in the integration of ICT. In doing so, it offers both a retrospective gauge and a prospective blueprint for academic library administrators, policy-makers, and future researchers, guiding them in navigating the labyrinthine yet rewarding complexities of integrating technology, human resources, and strategy in the digital age. Therefore, this study serves not merely as an analytical summary of extant literature but as a critical touchstone for the continuing academic discourse on the indelible impact of ICT on academic library administration.

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AUTHORS' CONTRIBUTION

Umar Mallam Bah: Conceptualisation, Curation of Literature, Methodology, Visualisation, and Writing-Original draft preparation; **A'dilah Binti Mustafa**: Supervision, Methodology, Editing, Visualisation, and Proof-reading of the manuscript; **Moh'D Zool**: Supervision, Methodology, Visualisation, Validation, and Proof-reading of the manuscript.

CONFLICT OF INTEREST DECLARATION

We certify that the article is the Authors' original work. The article has not received prior publication and is not under consideration for publication elsewhere. This manuscript has not been submitted for publication nor has it been published in whole or in part elsewhere. We testify to the fact that all Authors have contributed significantly to the work, validity, and legitimacy of the data and its interpretation for submission to Jurnal Intelek.

REFERENCES

Abioye, S. O., Oyedele, L. O., Akanbi, L., Ajayi, A., Davila Delgado, J. M., Bilal, M., Akinade, O. O., & Ahmed, A. (2021). Artificial intelligence in the construction industry: A review of present status, opportunities, and future challenges. *Journal of Building Engineering*, *44*, 103299. https://doi.org/10.1016/J.JOBE.2021.103299

Adaeze, & Nzewi, N. (2020). Global Journal of Library and Information Science. *Global Journal of Library and Information Science*, *3*, 21. https://doi.org/10.28933/GJLIS-2020-02-2405

Adetayo, A. J. (2023). Post COVID-19 pandemic and library users' education: Impact on examination and survey. *The Journal of Academic Librarianship*, *49*(3), 102695. https://doi.org/10.1016/J.ACALIB.2023.102695

Ahmad, R., & Rafiq, M. (2022). Assessing the preparedness of university libraries for digital preservation. *The Journal of Academic Librarianship*, *48*(6), 102617. https://doi.org/10.1016/J.ACALIB.2022.102617

Akwang, N. E. (2021). A study of librarians' perceptions and adoption of Web 2.0 technologies in academic libraries in Akwa Ibom State, Nigeria. *The Journal of Academic Librarianship*, *47*(2), 102299. https://doi.org/10.1016/J.ACALIB.2020.102299

Ashiq, M., Jabeen, F., & Mahmood, K. (2022). Transformation of libraries during COVID-19 pandemic: A systematic review. *The Journal of Academic Librarianship*, *48*(4), 102534. https://doi.org/10.1016/J.ACALIB.2022.102534

Asif, M., & K. Singh, K. (2019). Emerging trends and technologies for digital transformation of libraries. *IP Indian Journal of Library Science and Information Technology*, *4*(2), 41–43. https://doi.org/10.18231/J.IJLSIT.2019.011

Asim, M., Arif, M., & Rafiq, M. (2022). Applications of Internet of Things in university libraries of Pakistan: An empirical investigation. *The Journal of Academic Librarianship*, *48*(6), 102613. https://doi.org/10.1016/J.ACALIB.2022.102613

Bangani, S., & Dube, L. (2022). Birds of a feather: partnerships towards community engagement in South African academic libraries. *The Journal of Academic Librarianship*, *48*(6), 102598. https://doi.org/10.1016/J.ACALIB.2022.102598

Baryshev, R. A., Tsvetochkina, I. A., Babina, O. I., Kasyanchuk, E. N., & Manushkina, M. M. (2020). Transformation of university libraries during the digital era. *Journal of Siberian Federal University - Humanities and Social Sciences*, *13*(7), 1073–1089. https://doi.org/10.17516/1997-1370-0627

Bentil, W., Liew, C. L., & Chawner, B. (2021). An examination of electronic resource management in academic libraries in Ghana through the Techniques of Electronic Resource Management

(TERMS) framework. *The Journal of Academic Librarianship*, *47*(1), 102265. https://doi.org/10.1016/J.ACALIB.2020.102265

Boczar, A., Boczar, J., Mi, X., Schmidt, L. E., & Tolbert, J. (2023). A case study on migrating large digital collections into a consolidated repository. *The Journal of Academic Librarianship*, *49*(3), 102685. https://doi.org/10.1016/J.ACALIB.2023.102685

Chisita, C. T., Chiparausha, B., Tsabetse, V., Olugbara, C. T., & Letseka, M. (2022). Remaking academic library services in Zimbabwe in the wake of COVID-19 pandemic. *The Journal of Academic Librarianship*, *48*(3), 102521. https://doi.org/10.1016/J.ACALIB.2022.102521

Christensen, C. M., McDonald, R., Altman, E. J., & Palmer, J. E. (2018). Disruptive Innovation: An Intellectual History and Directions for Future Research. *Journal of Management Studies*, *55*(7), 1043–1078. https://doi.org/10.1111/JOMS.12349

Corrall, S. (2022). The Social Mission of Academic Libraries in Higher Education. *The Social Future of Academic Libraries*, 109–148. https://doi.org/10.29085/9781783304738.007

Cox, A. M., Kennan, M. A., Lyon, L., Pinfield, S., & Sbaffi, L. (2019). Maturing research data services and the transformation of academic libraries. *Journal of Documentation*, *75*(6), 1432–1462. https://doi.org/10.1108/JD-12-2018-0211/FULL/PDF

Deja, M., Rak, D., & Bell, B. (2021). Digital transformation readiness: perspectives on academia and library outcomes in information literacy. *The Journal of Academic Librarianship*, *47*(5), 102403. https://doi.org/10.1016/J.ACALIB.2021.102403

Eroğlu, Ş., & Çakmak, T. (2020). Personal data perceptions and privacy in Turkish academic libraries: An evaluation for administrations. *The Journal of Academic Librarianship*, *46*(6), 102251. https://doi.org/10.1016/J.ACALIB.2020.102251

Green, A. (2022). Post COVID-19: Expectations for Academic Library Collections, Remote Work, and Resource Description and Discovery Staffing. *The Journal of Academic Librarianship*, *48*(4), 102564. https://doi.org/10.1016/J.ACALIB.2022.102564

Guo, J., & Huang, J. (2021). Information literacy education during the pandemic: The cases of academic libraries in Chinese top universities. *The Journal of Academic Librarianship*, *47*(4), 102363. https://doi.org/10.1016/J.ACALIB.2021.102363

Harris, S. Y. (2018). SWOT analysis of Jamaican academic libraries in higher education. *Library Management*, *39*(3–4), 246–278. https://doi.org/10.1108/LM-07-2017-0068/FULL/XML

He, X., & Huang, Y. (2023). Web Content Management Systems as a Support Service in Academic Library Websites: An Investigation of the World-class Universities in 2012–2022. *The Journal of Academic Librarianship*, *49*(3), 102716. https://doi.org/10.1016/J.ACALIB.2023.102716

Huang, Y., Cox, A. M., & Cox, J. (2023). Artificial Intelligence in academic library strategy in the United Kingdom and the Mainland of China. *The Journal of Academic Librarianship*, *49*(6), 102772. https://doi.org/10.1016/J.ACALIB.2023.102772

Hussain, M., & Ameen, L. (2023). Exploring the Automation Landscape in University Libraries of Khyber Pakhtunkhwa, Pakistan: Status, Problems and Implications. *The Journal of Academic Librarianship*, *49*(6), 102787. https://doi.org/10.1016/J.ACALIB.2023.102787

Ifijeh, G., & Yusuf, F. (2020). COVID–19 pandemic and the future of Nigeria's university system: The quest for libraries' relevance. *The Journal of Academic Librarianship*, *46*(6), 102226. https://doi.org/10.1016/J.ACALIB.2020.102226

Jadhav, D., Shenoy, D., & Mahanty, B. (2023). Measurement model for dynamic capabilities of an academic library (DCAL). *Library & Information Science Research*, *45*(4), 101266. https://doi.org/10.1016/J.LISR.2023.101266

Jewell, T. D., & Mitchell, A. (2021). Electronic Resource Management: The Quest for Systems and Standards. *Growth, Creativity, and Collaboration: Great Visions on a Great Lake*, 137–163. https://doi.org/10.4324/9781315864464-17

Kang, Q., Song, Z., Lu, J., Shi, T., & Yang, J. (2022). COVID-19 impact on the Chinese top academic libraries: Libraries' response to space, collection and services. *The Journal of Academic Librarianship*, *48*(4), 102525. https://doi.org/10.1016/J.ACALIB.2022.102525

Karanja, D. (2017). Influence of Integration of ICT on Human Resource Management in Kenyan Public Universities. *International Journal of Sustainability Management and Information Technologies*, *3*(6), 73. https://doi.org/10.11648/J.IJSMIT.20170306.13

Kaur, G. (2015). The Future and Changing Roles of Academic Libraries in the Digital Age. *Indian Journal of Information Sources and Services*, *5*(1), 29–33. https://doi.org/10.51983/IJISS.2015.5.1.419

Kavak, A., & Odabaş, H. (2023). The impact of information security management guide utilization on technological and institutional information security measures in university libraries in Türkiye. *The Journal of Academic Librarianship*, *49*(6), 102800. https://doi.org/10.1016/J.ACALIB.2023.102800

Koos, J. A., Scheinfeld, L., & Larson, C. (2021). Pandemic-Proofing Your Library: Disaster Response and Lessons Learned from COVID-19. *Medical Reference Services Quarterly*, *40*(1), 67–78. https://doi.org/10.1080/02763869.2021.1873624

Kosciejew, M. (2020). The coronavirus pandemic, libraries and information: a thematic analysis of initial international responses to COVID-19. *Global Knowledge, Memory and Communication*, *70*(4–5), 304–324. https://doi.org/10.1108/GKMC-04-2020-0041/FULL/XML

Lavrik, O. L. (2020). Traditional Academic Library Networks in Digital Culture. *Bibliotekovedenie [Russian Journal of Library Science]*, *68*(6), 567–575. https://doi.org/10.25281/0869-608X-2019-68-6-567-575

Lee, P. C. (2020). Technological innovation in libraries. *Library Hi Tech*, *39*(2), 574–601. https://doi.org/10.1108/LHT-07-2020-0163/FULL/XML

Lee, Y. C., Malcein, L. A., & Kim, S. C. (2021). Information and communications technology (ICT) usage during COVID-19: Motivating factors and implications. *International Journal of Environmental Research and Public Health*, *18*(7), 3571. https://doi.org/10.3390/IJERPH18073571/S1

Lucky, S., & Harkema, C. (2018). Back to basics: Supporting digital humanities and community collaboration using the core strength of the academic library. *Digital Library Perspectives*, *34*(3), 188–199. https://doi.org/10.1108/DLP-03-2018-0009/FULL/XML

Mensah, M., & Onyancha, O. B. (2021). A social media strategy for academic libraries. *The Journal of Academic Librarianship*, *47*(6), 102462. https://doi.org/10.1016/J.ACALIB.2021.102462

Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. *Journal of Clinical Epidemiology*, *62*(10), 1006–1012. https://doi.org/10.1016/J.JCLINEPI.2009.06.005

Murgu, C. (2021). "A modern disease of adaptation…"?: Technostress and academic librarians working in digital scholarship at ARL institutions. *The Journal of Academic Librarianship*, *47*(5), 102400. https://doi.org/10.1016/J.ACALIB.2021.102400

Nour, S. S. O. M. (2018). The Impact of ICT in Public and Private Universities in Sudan. *Journal of the Knowledge Economy*, *9*(4), 1391–1414. https://doi.org/10.1007/S13132-016-0429-X/METRICS

Ocran, T. K., Underwood, E. P. G., & Arthur, P. A. (2020). Strategies for successful implementation of mobile phone library services. *The Journal of Academic Librarianship*, *46*(5), 102174. https://doi.org/10.1016/J.ACALIB.2020.102174

Otike, F., Barát, Á. H., & Kiszl, P. (2022). Innovation strategies in academic libraries using business entrepreneurial theories: Analysis of competing values framework and disruptive innovation theory. *The Journal of Academic Librarianship*, *48*(4), 102537. https://doi.org/10.1016/J.ACALIB.2022.102537

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., … Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *International Journal of Surgery*, *88*, 105906. https://doi.org/10.1016/J.IJSU.2021.105906

Saharkhiz, Y., Valizadeh, M., & Salamat, H. (2017). The Evolution of Academic Libraries in the Age of Technology. *Journal of History Culture and Art Research*, *5*(4), 402. https://doi.org/10.7596/TAKSAD.V5I4.615

Sulle, E. S., & Wema, E. (2023). An Assessment of Students' Knowledge Ambassadors Program in Promoting Usage of e-Resources in the Academic Library at Mzumbe University, Tanzania. *The*

Journal of Academic Librarianship, *49*(6), 102793. https://doi.org/10.1016/J.ACALIB.2023.102793

Susan Mathew, K., & Dr.Baby, M. D. (2011). *Impact of Information Communication Technology (ICT) on Professional Development and Educational Needs of Library Professionals in the Universities of Kerala*. http://dyuthi.cusat.ac.in/xmlui/handle/purl/2362

Tella, A., Ukwoma, S. C., & Adeniyi, I. K. (2020). A two-model modification for determining cloud computing adoption for web-based services in academic libraries in Nigeria. *The Journal of Academic Librarianship*, *46*(6), 102255. https://doi.org/10.1016/J.ACALIB.2020.102255

Yakubu, A. S., Kassim, A. M., & Husin, M. H. (2023). Conceptualizing hybrid model for influencing intention to adopt cloud computing in North-Eastern Nigerian academic libraries. *The Journal of Academic Librarianship*, *49*(4), 102747. https://doi.org/10.1016/J.ACALIB.2023.102747

Zubair, M. S., Ikwe, J. A., & Edet, G. (2023). The Experience of Using Virtua Integrated Library System in Nigerian University Libraries. *The Journal of Academic Librarianship*, *49*(4), 102735. https://doi.org/10.1016/J.ACALIB.2023.102735