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Digital Wisdom: AI and Business Strategies for Sustainable Libraries and Beyond: Cultivating Critical Thinking in a Generative World

Jayashree Sriramulu Saroja

IQAC Co-Coordinator, Western College of Commerce & Business Management, Sanpada, Navi Mumbai, Maharashtra, India

jayashree.sriramulu@wccbm.ac.in

ABSTRACT

The incorporation of generative artificial intelligence into library services signifies a significant shift that requires strategic approaches to balance innovation with fundamental institutional principles. This paper explores "digital wisdom" as a crucial framework for libraries as they navigate the generative AI environment. Drawing on recent surveys, collaborative infrastructure models, and new educational frameworks, it contends that sustainable library strategies should emphasise fostering critical thinking while embracing technology. The paper delves into four main areas: the pressing need for institutional AI strategies, collaborative infrastructure as an alternative to corporate exploitation, the changing nature of critical evaluation in generative settings, and the environmental and equity considerations that should guide business model choices. It concludes that the future relevance of libraries hinges not on competing with AI capabilities but on nurturing the uniquely human ability for wisdom within their communities.

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KEYWORDS: digital wisdom, generative AI, library strategy, critical thinking, sustainability, cooperative infrastructure, information literacy

INTRODUCTION

We stand at a confluence of transformations. As Zhang and Liang (2023) observe in their foundational exploration of intelligent knowledge services, "We are in the midst of a reshaping intersection of the knowledge ecosystem and knowledge technology systems."(Hao et al., 2024) The emergence of generative AI—epitomized by technologies that can produce human-like text, synthesize research, and even generate academic peer reviews—has fundamentally altered the landscape in which libraries operate.(Kim, 2025) Yet this technological revolution arrives

freighted with paradox: tools that promise to democratize knowledge also threaten to undermine the very critical capacities that knowledge institutions exist to cultivate.(Kim, 2025)
This paper advances the concept of "digital wisdom" as the organizing framework for library responses to generative AI. Coined originally to describe the intersection of human judgment and digital fluency, digital wisdom here denotes something more specific: the institutional and individual capacity to deploy generative AI tools not as substitutes for thinking but as catalysts for deeper engagement. (Chanpradit, 2025)It encompasses the strategic wisdom to select appropriate technologies, the pedagogical wisdom to foster critical consumption of AI outputs, and the ethical wisdom to recognize when technological capability outruns human values.
The urgency of this framework becomes evident when examining current institutional readiness. A recent survey by the National Information Standards Organization (NISO) poses an "urgent yet troubling question: Do academic library leaders have strategies for dealing with artificial intelligence in the library technology and publishing ecosystem?" (NISO, 2025).

The consequences of strategic absence are severe: erosion of patron trust, degradation of student research skills, widening equity gaps, and unintended environmental harm. Libraries without coherent AI strategies risk becoming complicit in what Heather Ford describes as the "enormous environmental toll" and "widescale theft of copyrighted works by genAI companies" that characterize the current AI boom (Aksoy & Kursun, 2024;).
This paper argues that cultivating critical thinking in a generative world requires libraries to simultaneously pursue strategic imperatives that collectively constitute the practice of digital wisdom. The introduction establishes the foundational premise that libraries must move beyond passive technology adoption toward active, values-driven engagement with AI systems.

OBJECTIVES

This research paper is guided by the following objectives:

- ✓ To Examine the Strategic Imperatives for Library AI Adoption
- ✓ To Analyze Cooperative Infrastructure Models as Alternatives to Corporate AI Extraction
- ✓ To Propose Frameworks for Cultivating Critical Thinking in Generative AI Contexts

LITERATURE REVIEW

Theoretical Foundations of Digital Wisdom

The concept of digital wisdom has evolved significantly since its initial articulation. Zhang and Liang (2023) provide the most comprehensive theoretical framework in their exploration of intelligent knowledge services, arguing that "knowledge is towards being wisdom, wisdom needs to be scenario-based, and intelligence can be ubiquitously embedded." Their triadic framework distinguishes between knowledge (accumulated information), wisdom (contextualized understanding), and intelligence (ubiquitous computational capability).(Bachmann et al., 2017; Basak et al., 2024) This distinction proves essential for

understanding libraries' role in an AI-saturated environment: libraries must not merely provide access to knowledge or deploy intelligent systems but cultivate the wisdom to use both effectively.(Diseiye et al., 2023; How et al., 2020)

The authors further propose that intelligent knowledge services must be "knowledge and data dually-driven," integrating computational analysis with human reasoning in ways that leverage each for its distinctive strengths.(Cassimatis, 2006) This dual-driven approach anticipates the central challenge of generative AI: maintaining human judgment while harnessing machine capabilities. Their vision of "inclusive accessibility of smart knowledge services" establishes equity as a foundational value that must inform all library AI strategies.(Hesami, 2025)

CURRENT STATE OF LIBRARY AI STRATEGIES

The NISO (2025) survey of academic library leaders reveals a troubling gap between technological development and institutional preparedness. (Anusi et al., 2025)The survey asks whether libraries have strategies for dealing with AI in the library technology and publishing ecosystem, finding that most institutions are operating without coherent frameworks. This strategic absence carries multiple risks: libraries may inadvertently adopt systems that undermine their educational missions, erode patron trust through unreliable outputs, or support technologies that conflict with sustainability commitments.(Ghosh et al., 2024)

The survey identifies essential components of effective library AI strategies: policy frameworks clarifying whether institutional collections may train AI models; AI literacy programs enabling rigorous tool use without undermining research skills; ethical guidelines addressing transparency, accuracy, fairness, and environmental impact; collaborative negotiations with publishers ensuring AI features serve educational rather than commercial values; and cross-institutional cooperation to prevent AI adoption from deepening resource disparities.(Alali & Wardat, 2024)

Cox (cited in ALIA, 2025) frames these challenges as "opportunity-challenges," identifying four interrelated tasks for libraries: empowering users through generative AI while controlling information quality problems; prompting reflection about AI's impact on skills; stimulating debate about AI's societal effects; and assisting institutions in responding strategically to complex, rapidly changing AI systems.(Boateng, 2025) This framing recognizes that libraries cannot simply resist or embrace AI but must navigate nuanced responses that vary by context and community.(Yang et al., 2022)

Cooperative Infrastructure Models

Romein et al. (2026) provide detailed analysis of the READ-COOP cooperative, which maintains and develops the Transkribus platform for automated text recognition of historical documents. (Nockels et al., 2022)Their examination of the cooperative's guiding principle—"as open as possible, as closed as necessary"—offers a compelling alternative to corporate AI extraction models. This principle emerged originally from GDPR compliance but has evolved to address the

existential challenges facing cultural heritage institutions in an era of predatory AI scraping.(Goldsteen et al., 2021)

The cooperative faces genuine constraints requiring selective closure: GDPR mandates careful stewardship of personal data; the business model depends on protecting proprietary algorithms and extensive training datasets developed through significant public investment. (Granata et al., 2024)Without such protection, "larger technology providers could appropriate these resources, threatening the cooperative's viability and its ability to serve its community."(Ng & Ahmed, 2024) The reality of "illegal scraping of cultural heritage content" by major AI platforms renders complete openness untenable for sustainable infrastructure.(Robinson, 2020)

Yet READ-COOP simultaneously maintains deep commitment to accessibility through free monthly credits, a Scholarship Programme supporting students from 73 countries, user ownership of data, open format exports, and 300 licensed AI models for community use. The cooperative structure itself embodies openness through democratic governance, enabling meaningful member input into platform development and strategic decisions. Romein et al. conclude that "responsible ML/AI development necessitates pragmatic balance rather than absolutist positions," offering libraries an alternative framework for AI infrastructure.

Critical Thinking and Information Literacy in the AI Era

The transformation of critical thinking pedagogy for generative AI contexts has received increasing scholarly attention. Texas Wesleyan University's West Library (2026) examines the limitations of traditional evaluation frameworks like the CRAAP Test (Currency, Relevance, Authority, Accuracy, Purpose), noting that "currently, there are no AI tools that can fully and autonomously apply the entire CRAAP test with the critical judgment and nuance of a human researcher.(Rana et al., 2025)" This observation carries dual implications: it affirms the continuing irreplaceability of human judgment while simultaneously highlighting the need to rethink how that judgment is cultivated.(Costa & Murphy, 2025)

Upson (cited in ALIA, 2025) articulates the pedagogical challenge: "We've always spent a lot of time as librarians working to teach students how to critically evaluate any information they encounter, and while GenAI offers some new and potentially frightening twists on source evaluation, we know that this skill, this disposition, remains more important than ever." He emphasizes that applying traditional evaluation approaches in generative contexts requires adaptation—skepticism must be institutionalized, cross-referencing becomes existential necessity, and source verification must penetrate beyond AI summaries.

Ford (cited in ALIA, 2025) poses the fundamental question: "There are many kinds of AI literacy being proposed by various sectors. What kind of AI literacy could or should the library enable?" This question recognizes that AI literacy is not singular but multiple, and libraries must determine which forms align with their missions and communities.(Ndungu, 2024)

Sustainability and Environmental Dimensions

Heinz and Liebschner (2026) address the environmental dimensions of AI through their "Frugal AI: The Green Model Router" project, developed at the CloudFest Hackathon. The project responds to the problem of "wasteful AI defaults: developers use powerful models for simple tasks that smaller models handle equally well." Their solution functions as "an open-source proxy layer that sits between your application and AI providers," analyzing requests and routing them to the most resource-appropriate model.(Khan et al., 2023)

The Frugal AI architecture includes a Request Analyzer classifying task complexity, a Model Efficiency Index ranking models by performance-per-watt, a Smart Router directing requests to the most efficient capable model, and a Dashboard visualizing energy savings, cost reduction, and carbon impact. (Rao, 2021)This technical innovation addresses the sustainability challenge Ford identifies: the "enormous environmental toll" of generative AI, including energy consumption, water usage for data center cooling, and carbon emissions.(Manikandan et al., 2024)
The NISO (2025) survey explicitly links AI strategy to environmental accountability: "Without carefully considered choices, libraries may inadvertently support discovery systems that increase carbon emissions, undermining their own sustainability commitments." This connection transforms AI procurement from purely technical decision into ethical choice requiring evaluation of environmental impact alongside functional capability.(Manda et al., 2024)

Equity and Access Considerations

Oklahoma State University Library (2025) explores emerging tensions around AI-powered academic searching, noting that "publishers' optimism about resource visibility may not translate into more convenient access; instead, users may become aware they cannot access certain resources, potentially widening the gap between well-funded and under- resourced institutions.(Valdivieso & González, 2025)" When AI features become "the next 'must-have' functionality, packaged into subscription bundles," libraries face impossible choices between pedagogical relevance and fiscal responsibility.(Shi et al., 2024)
The NISO survey recommends cross-institutional cooperation to "share resources, expertise, and advocacy—preventing AI adoption from deepening the divide between resource-rich and resource-poor campuses." This recommendation recognizes that equity cannot be achieved through individual institutional action alone but requires coordinated responses across the library community.(Jaeger et al., 2015)

DISCUSSION

Integrating Strategic Imperatives: The Digital Wisdom Framework

The literature reveals four interconnected dimensions requiring integration into a coherent digital wisdom framework. First, strategic preparedness requires libraries to develop comprehensive AI policies addressing collection usage, literacy programs, ethical guidelines, publisher negotiations, and cross-institutional cooperation. Without such frameworks, libraries risk reactive adoption that serves commercial rather than educational interests.

Second, infrastructure choices determine whether AI serves community or extraction interests. The READ- COOP model demonstrates that cooperative governance, democratic decision-making, and shared ownership can protect cultural heritage assets while maximizing accessibility. The principle of "as open as possible, as closed as necessary" offers pragmatic guidance for navigating tensions between openness and sustainability.

Third, pedagogical transformation must reconceive information literacy for generative contexts. Traditional evaluation frameworks remain relevant but insufficient; they must be supplemented by metacognitive approaches emphasizing reflection on human-machine interaction, detection of fabricated authority, and questioning whether AI-generated answers address authentic human questions.

Fourth, sustainability and equity must inform every business decision about AI. Environmental impact assessment must join functionality and cost as procurement criteria. Equity considerations must guide negotiations with publishers and investments in cooperative alternatives. Cross-institutional cooperation must prevent AI adoption from deepening resource disparities.

Tensions and Trade-offs in Digital Wisdom Practice

The digital wisdom framework reveals inherent tensions requiring nuanced navigation. The tension between openness and protection emerges clearly in the READ- COOP experience: protecting community assets from extraction requires boundaries that earlier open-access advocates might have found uncomfortable. Yet these boundaries enable sustainability that ultimately serves accessibility more effectively than uncompromising openness would.

The tension between AI capability and human judgment requires constant recalibration as generative systems evolve. When machines can produce publication-ready research, the question of what remains distinctly human in knowledge work becomes urgent. Libraries must cultivate capacities—critical judgment, ethical reasoning, contextual understanding—that AI cannot replicate, rather than competing with AI on its own terms.

The tension between innovation and sustainability demands careful evaluation of AI's environmental footprint. Libraries committed to environmental responsibility cannot adopt AI tools without considering their carbon impact. Technical innovations like Frugal AI offer pathways to align AI adoption with sustainability commitments, but they require institutional awareness and intentional implementation.

Implications for Library Practice

These discussions carry concrete implications for library practice. Collection development policies must address whether institutional holdings may train AI models, and under what conditions. Reference services must evolve to help patrons navigate AI-generated information while maintaining critical distance. Instruction programs must integrate AI literacy throughout

curricula rather than treating it as add-on content. Administrative decisions must evaluate AI tools against sustainability and equity criteria alongside functional capability.

The cooperative infrastructure model suggests that libraries should invest in and contribute to community- governed AI alternatives rather than defaulting to commercial products. This may require reallocating resources from subscriptions to cooperative memberships, participating in governance structures, and contributing training data to shared repositories. Such investments build long-term capacity rather than purchasing short-term functionality.

The pedagogical implications demand that libraries move beyond tool-focused instruction toward metacognitive literacy development. Students must learn not merely how to use AI tools but how to reflect on their own cognitive processes in interaction with machine capabilities. They must develop the capacity to recognize when AI-generated answers address different questions than they intended to ask, and to persist in questioning beyond superficially plausible responses.

FUTURE SUGGESTIONS

Research Directions

Future research should empirically examine the effectiveness of different library AI strategies across institutional contexts. Comparative studies of institutions with and without comprehensive AI policies could identify which strategic elements most strongly correlate with positive outcomes in patron satisfaction, learning gains, and institutional sustainability.

Longitudinal research should track how information literacy evolves as generative AI capabilities advance. Studies following student cohorts through their academic careers could reveal whether current pedagogical approaches successfully cultivate critical thinking capacities that persist as AI systems become more sophisticated.

Research should also investigate the scalability of cooperative infrastructure models. The READ-COOP experience offers valuable lessons, but questions remain about whether similar models can succeed in other domains and whether they can achieve sufficient scale to compete with commercial alternatives.

Policy Development

Libraries should advocate for policy frameworks at institutional, consortial, and governmental levels that protect community interests in AI development. This includes copyright policies addressing training data usage, environmental regulations requiring transparency about AI's carbon footprint, and funding programs supporting cooperative infrastructure development.

Professional organizations should develop guidelines for ethical AI adoption in libraries, addressing transparency, accuracy, fairness, environmental impact, and community accountability. These guidelines should be regularly updated as technology evolves and experience accumulates.

Pedagogical Innovation

Libraries should experiment with pedagogical approaches that integrate AI literacy throughout information literacy instruction. This includes developing assessment methods that evaluate students' capacity to critically engage with AI-generated content, creating learning activities that explicitly address human-machine interaction in research processes, and building faculty partnerships to embed AI literacy across curricula.

Collaborative development of open educational resources for AI literacy could accelerate pedagogical innovation while reducing redundant effort across institutions.

These resources should be adaptable to different institutional contexts and regularly updated as AI capabilities evolve.

Infrastructure Investment

Libraries should invest in cooperative AI infrastructure through membership fees, governance participation, and contribution of training data to shared repositories. Such investments build long-term capacity and ensure that community interests shape AI development rather than being shaped by commercial imperatives.

Technical experiments like the Frugal AI project should be piloted in library contexts to assess their effectiveness in reducing environmental impact while maintaining service quality. Successful pilots could scale across consortia, multiplying sustainability benefits.

Cross-Sectoral Collaboration

Libraries should extend collaboration beyond the library sector to include museums, archives, educational institutions, and civil society organizations facing similar AI challenges. Cross-sectoral partnerships could share expertise, pool resources, and amplify advocacy for policies serving public rather than commercial interests.

International collaboration should address equity dimensions of AI adoption, ensuring that developments in well-resourced institutions do not widen global information disparities. Cooperative models should explicitly address how they serve institutions across economic contexts, not merely those able to afford membership fees.

CONCLUSION

This paper has argued that cultivating critical thinking in a generative world requires libraries to practice digital wisdom across multiple dimensions: strategic, infrastructural, pedagogical, and ethical. The concept names not a fixed destination but an ongoing orientation—the capacity to navigate between technological possibility and human values, between openness and protection, between innovation and sustainability.

The path forward demands that libraries move beyond passive technology adoption toward active shaping of AI ecosystems. This means developing institutional strategies that articulate how AI will be evaluated, adopted, and governed. It means embracing cooperative infrastructure

models that protect community assets while maximizing accessibility. It means reimagining information literacy for contexts where machines can simulate research but cannot replicate judgment. It means embedding environmental and equity considerations into every business decision about AI.

Cox's framing of AI as presenting "opportunity- challenges" captures the essential duality. The opportunities are real: AI tools can accelerate research, expand access, and enhance services in ways previously unimaginable. The challenges are equally real: they can undermine critical thinking, concentrate power, and damage the environment. Navigating this duality requires precisely the wisdom that libraries exist to cultivate.

Zhang and Liang's vision of "intelligent knowledge services" that "effectively support the inclusive accessibility of smart knowledge services" ultimately depends on institutions willing to exercise that wisdom. The future relevance of libraries in a generative world rests not on competing with AI capabilities—an unwinnable contest—but on cultivating the distinctly human capacities for critical judgment, ethical reasoning, and wise action that AI, for all its power, cannot replicate. This is the digital wisdom libraries must practice and teach.

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