Khizanah al-Hikmah : Jurnal Ilmu Perpustakaan, Informasi, & Kearsipan
p-ISSN: 2354-9629
e-ISSN: 2549-1334
Volume 14 Issue 1, March 2026

Indonesia Public Libraries in the Age of AI Disruption: Building Dynamic Capabilities

Dyah Puspitasari Srirahayu[1] & Esti Putri Anugrah[2]

[1,2]Universitas Airlangga Surabaya, Indonesia
Correspondence email: dyah.srirahayu@vokasi.unair.ac.id

Notes

Submitted: 12-02-2026
Revised: 15-03-2026
Accepted: 24-03-2026

How to cite: Srirahayu, D. P., & Anugrah, E. P. (2026). Indonesia Public Libraries in the Age of AI Disruption: Building Dynamic Capabilities. Khizanah Al-Hikmah : Jurnal Ilmu Perpustakaan, Informasi, Dan Kearsipan, 14(1). https://doi.org/10.24252/kah.v14i1a7

DOI: 10.24252/kah.v14i1a7

Copyright 2026 © the Author(s)

This work is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License.

ABSTRACT

Background: The disruption caused by artificial intelligence (AI) extends beyond profit-oriented sectors, fundamentally altering the operational landscape of non-profit institutions, including public libraries. To navigate this volatile environment, libraries must leverage Dynamic Capabilities (DC), the ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments.
Purpose: This study explores how public libraries in Indonesia develop and deploy dynamic capabilities to address the challenges and opportunities presented by AI disruption.
Methods: Adopting a multiple-case study design, research was conducted across seven public libraries in East Java (East Java Provincial, Malang, Jember, Probolinggo, Tulungagung, Pamekasan, and Kediri). Data were gathered through semi-structured interviews with 14 key informants, including library directors and senior librarians, to capture a comprehensive view of institutional responses.
Findings: The study indicates that Indonesian public libraries have successfully activated Sensing capabilities to detect AI-related threats and shifts. Furthermore, these institutions demonstrated diverse Seizing capabilities through creative and adaptive strategic responses. Finally, Transforming capabilities were evidenced through structural organizational reconfiguration, human resource capacity building, strategic budget reallocation, and the reformulation of institutional policies.
Originality/Value: This study provides empirical evidence that the Dynamic Capabilities framework is a vital tool for non-profit survival in the AI era. It offers a blueprint for library administrators to move beyond traditional roles, emphasizing that institutional agility and policy flexibility are essential for maintaining relevance in a digitally disrupted society.

Keywords: Public library; Dynamic capabilities; AI disruption; Artificial intelligence

1. INTRODUCTION

The presence of AI brings libraries into a new era where there is a radical change where old systems are replaced with new systems, old technology with new technology (Concha et al., 2024; Harisanty et al., 2025; Mwantimwa & Msoffe, 2025). AI produces effectiveness and

efficiency in helping the process of people's lives, but on the other hand it also causes problems, especially for parties who cannot follow the changes (Chemulwo & Sirorei, 2020; Omame & Alex-Nmecha, 2020; Wang, 2019). The influence of the AI disruption not only affects profit-oriented business companies, but non-profit organizations such as libraries are also affected by the radical changes in the AI disruption era. If the library is not ready to face all the changes that occur, then the library could disappear and be replaced by technology and the internet (Jabeen, 2025). Libraries stand in the midst of an ever-changing environment, so public libraries should not just stand still. Therefore, the library needs to redefine its role in a digital environment, the influence of libraries on the social environment, and the needs of users that will be met by the library (Islam & Agarwal, 2015). One of the jobs that will become extinct is in the library (Kasali, 2017) if nothing is done. Therefore, the library must have the ability to face a rapidly changing environment.

Globally, libraries' response to AI disruption is still in its infancy (Ayinde, Ebiefung, & Oladokun, 2026; Boateng, 2025; Li and Yang, 2024; Zheng, Dai, & Abubakar, 2025). Some academic libraries in developed countries have begun exploring AI applications such as chatbots for reference services, machine learning-based recommendation systems, and automated cataloging using AI (Cox, 2024; Hervieux & Wheatley, 2021). In the public library realm, examples of AI applications are even rarer (Breeding, 2023). Public libraries are libraries that have more library users compared to other types of libraries. Public library users consist of various segments of society regardless of age, gender, income, race, political views or religion. Public libraries are tasked with providing services and resources to meet the needs of their users (Huysmans & Oomes, 2013). Public libraries have an important role in the development and maintenance of society by providing free access to various information and the latest scientific developments (Munchen, 2001). Not only that, public libraries are also responsible for the literacy skills of the community, public libraries help people find, use, and interpret information and open up opportunities for lifelong learning. Therefore, public libraries have great potential to contribute to the development of social capital among the community (Varheim, 2007; Hart, 2007). From the nature of public libraries that are "open to all", public libraries are also used as universal public spaces where each individual from the community can meet, network, exchange knowledge and experience.

Despite this inclusive and socially significant role of public libraries, the realization of such ideals remains challenging in many contexts. Public libraries in Indonesia still face fundamental challenges that have not been resolved: budget constraints, inadequate human resource qualifications, the digital divide between urban and rural areas, and the low level of public appreciation for libraries (Harisanty et al., 2023). The internet and AI are external challenges faced by libraries. Children use information sources on the internet to search for academic information and their hobbies, for example information about music, images or videos, they are already familiar with search engines. For adults to the elderly, although not all of them use the internet as a source of information, some of them use the internet to search for information about entertainment, health and religion. From the many internet users, the internet has become a competitor for libraries as information institutions. The internet provides 24/7 access to information, while access to libraries is very limited. Google and the internet are considered macro information sources that display much more information than imagined (Zimerman, 2012), while libraries are considered unable to provide information according to their needs (Rowlands, et.al, 2008). Whereas on the other hand, the internet and AI are unable to evaluate the quality of the information contained therein.

To understand how public libraries build organizational capabilities to navigate rapidly changing environments, an appropriate theoretical lens is required. The Dynamic Capabilities (DC) theory, developed by Teece, Pisano, and Shuen (1997) and further elaborated by Teece (2007), offers a highly relevant analytical framework. It defines dynamic capabilities as an organization's ability to sense opportunities and threats, seize these opportunities, and transform resources and organizational structure to remain competitive in a dynamic environment. This sensing-seizing-transforming framework has proven powerful in explaining how organizations respond to technological disruption across various sectors (Teece, 2018). Although DC theory was originally developed for the context of private companies, several researchers have successfully adapted it to the public sector, demonstrating that public organizations also need and are capable of building dynamic capabilities to cope with environmental change (Kattel and Mazzucato, 2018).

Given that DCs are effective and efficient in navigating a constantly changing environment, no previous studies have addressed the adoption of DCs in library readiness for AI disruption. Based on this gap, this study aims to explore how public libraries in Indonesia are building dynamic capabilities to address AI disruption.

AI Disruption and Library Transformation

AI is massively revolutionizing library systems globally, transforming cataloging, classification, user services, and resource management (Jabeen, 2025; Bridges et al., 2024). Previous studies have successfully identified the transformation of AI in libraries. The study conducted by Pinar and Cox (2025) emphasized the transformative effect of AI on cataloging and classification, while Cox (2023) contextualized its impact on professional competencies, redefining librarian responsibilities. Engel et al. (2025) asserted that artificial intelligence in cataloging has shifted from an experimental initiative to standard practice. Subsequent studies of AI in libraries have focused on AI in driving service innovation (Safadel, Hwang, & Perrin, 2023; Sanji, Behzadi, & Gomroki, 2022). Previous studies have concluded that AI technology plays a significant role in improving user services in libraries (Adesina & Zubairu, 2024; Chen & Zhang, 2020; De Sarkar, 2023; Noh & Hong, 2022).

The emergence of generative AI technologies, such as Large Language Models (LLMs) in 2022-2023, marked a dramatic acceleration in AI disruption to information institutions (Gmiterek and Kotuła, 2025). Lund and Wang (2023) argue that generative AI poses a distinct threat from previous digital technologies: while search engines help users find information, generative AI is capable of synthesizing, analyzing, and even creating new information, becoming a core competency for libraries and librarians (Gmiterek and Kotuła, 2025). While digital competencies have long been core to librarianship, the emergence of AI technologies has increased the demand for advanced professional preparedness (Kavak and Gultekin, 2026). Given all this, in this digital age, libraries must navigate the opportunities and challenges of AI integration while ensuring equitable access, privacy protection, and user-centered services.

Overview Public Library in Indonesia

One type of library is a public library, which is a library organized by the provincial government, district/city government, sub-district, and village, and can be organized by the community (Community Reading Park), so that funds for organizing public libraries come from government funds and tax payments. Data from the National Library of the Republic of Indonesia states that the number of public libraries has reached 23,611 libraries spread throughout Indonesia. Public libraries are libraries that have more library users compared to

other types of libraries. Public library users consist of various segments of society regardless of age, gender, income, race, political views or religion. Public libraries are usually located in the city center so that they can be easily accessed by the community, and are often used as a place to meet friends (Aabø, Audunson, Varheim, 2010). Public libraries are spread across provinces and cities/regencies in Indonesia so that 1 district/city has at least one public library. Public libraries are one of the organizations in the public sector regulated by the government, so the implementation of public libraries in each region follows the regulations and policies in the region in accordance with regional autonomy regulations. As a result of the structuring of government organizations, it is more directed at rightsizing efforts, namely efforts to simplify government bureaucracy which are directed at developing more proportional and transparent organizations, so that these efforts are expected that regional apparatus organizations will not be too large in accordance with the spirit of renewing government functions (reinventing government) in order to support the realization of good local government. Organizational structuring can be interpreted as structuring existing tasks and functions without adding new units, even if necessary, units that are no longer effective and efficient can be removed. Such is the policy that has been issued by the central government, namely Government Regulation Number 18 of 2016 concerning regional apparatus, in Article 18 paragraphs (3) and (4). This Government Regulation in principle provides clear direction and guidelines to regions in organizing efficient, effective, rational and budget-saving organizations according to the needs and capabilities of each region as well as coordination, integration, synchronization and simplification as well as institutional communication between the centers and regions.

Based on this policy, the library service and the archives service are combined into one, while in the central realm the library and archives sector is differentiated, namely the National Library (PNRI) and the National Archives (ANRI). Theoretically, archives and libraries may be part of one group of information sciences, but archives and libraries are two different branches of science. Both can be harmonized in terms of information management, especially those related to the use of facilities, socialization and development of collections or treasures.

Competitive Dynamic Theory

The study of competitive dynamics is conducted to understand the actions of companies when they face rivals. It examines measurable actions in real market contexts and examines interactions between competitors, focusing not only on actions but also on responses to those actions. Competitive strategy is identified by a company's repertoire of actions and reactions rather than Porter's generic strategies (Chen and Miller, 2012). Numerous studies have examined competitive dynamics, particularly for profit-oriented companies. Competitive dynamics are used as a management strategy by companies (Yang & Meyer, 2015; Ketchen, Snow, Hooven, 2004). Research conducted by Barker, et.al. (2021) revealed that competitive dynamics provide managerial offerings for decision-making in providing a company's services. Research by Kolev, et.al. (2021) revealed that the presence of competitive dynamics impacts the performance of female CEOs in a company. The presence of female CEOs in a company has a positive effect on the complexity and volume of the company's competitive movements, and a negative effect on the heterogeneity of the company's competitive actions.

Teece (2007) explicitly categorizes dynamic capabilities into three interrelated capability clusters. First, sensing, an organization's ability to continuously scan the external environment to identify opportunities and threats. In the library context, sensing encompasses the ability to detect technological changes (including AI), understand shifts in user needs and behavior,

and recognize the competitive dynamics of alternative information platforms. Second, seizing, the ability to seize detected opportunities through investment, innovation, and the development of new service models. For libraries, seizing can include adopting digital technology, creating innovative services, and developing programs that respond to user needs in the digital age. Third, transforming, the ability to fundamentally reconfigure assets, organizational structures, and operational routines to maintain organizational relevance in a changing environment. For libraries, transforming encompasses organizational restructuring, developing new competencies for human resources, reformulating policies, and shifting service models across the board (Teece, 2007; 2018). Based on the role and impact of competitive dynamics, this study aims to examine the context of a public library that is oriented towards non-profits but has competitors.

2. METHODS

This study uses case study to answer the research objectives, namely to understand public libraries in Indonesia are building dynamic capabilities to address AI disruption. The case study research method was chosen because the case study method is used to emphasize events or symptoms that are ongoing (present) in the context of real life and to obtain a complete and in-depth picture of how building dynamic capabilities to address AI disruption. This research was conducted in seven public libraries, namely the East Java Public Library, Malang Public Library, Jember Public Library, Probolinggo Public Library, Tulungagung Public Library, Pamekasan Public Library and Kediri Public Library. The participants in this study were seven chiefs of public libraries, and seven librarians in public libraries.

This study adhered to research ethics and writing guidelines coordinated by the Institute for Research and Community Service (LPPM), Universitas Airlangga, and relevant legal regulations. Ethical approval was granted under Rector Decree No. 929/UN3/2021 and Faculty Research Committee Permit No. 4735/UN3.1.14/TU/2021. Participants received and signed an informed consent form before the interviews.

There are various data sources that can be used as evidence through interviews, field visits, and documentation or archival records. The data collection method in this study through semi-structured interviews with librarians as the main informants to explore information related to the social sustainability strategy for supporting libraries based on social inclusion. The interviews were conducted either face-to-face. After the interview, WhatsApp was also used to follow-up on some answers. For face-to-face interviews, recordings were made using a smartphone.

After the data were collected, participants were asked to confirm the data collected to ensure accuracy. The collected data were then transcribed and analyzed using thematic analysis to capture terms or patterns of meaning, involving several steps: (1) familiarizing with the raw data, (2) coding the data, (3) identifying themes, (4) reviewing themes, (5) defining themes, and finally analyzing the themes. The themes generated answered the research question regarding the social sustainability strategy for supporting libraries based on social inclusion.

Table 1. Demography of participant

Participant ID	Gender	Public Library	Position
P01	Female	East Java Public Library	Head of Library
P02	Male	East Java Public Library	Librarian
P03	Female	Malang Public Library	Head of Library
P04	Male	Malang Public Library	Librarian
P05	Male	Tulungagung Public Library	Head of Library
P06	Female	Tulungagung Public Library	Librarian
P07	Male	Pamekasan Public Library	Head of Library
P08	Female	Pamekasan Public Library	Librarian
P09	Male	Jember Public Library	Head of Library
P10	Female	Jember Public Library	Librarian
P11	Male	Probolinggo Public Library	Head of Library
P12	Female	Probolinggo Public Library	Librarian
P13	Male	Kediri Public Library	Head of Library
P14	Female	Kediri Public Library	Librarian

3. RESULTS AND DISCUSSION

Table 2. The following are the results of efforts to build dynamic capabilities to address AI disruption.

Table 2. Coding Result

1st Order	2nd Order	Aggregate
Libraries follow technological developments including AI (Kediri, Tulungagung, Malang, Pamekasan)	Environmental Scanning & Threat Detection	Sensing Capabilities
Recognizing that AI, internet, gadgets, and online games are competitors (All sites)		
Awareness that technology development is increasingly massive (Malang, Probolinggo, Jember)		
Understanding that media technology is more attractive than print media (Kediri)		
Identifying that search engines have become important programs in daily life (Probolinggo)		
AI's speed and instant access identified as competitive advantage to match (Pamekasan)		
Recognizing library user groups and their diverse needs (Malang, Pamekasan, Jember)	User Needs Sensing	
Users as indicators of the success of library services (All sites)		
Users as determinants of library services provided (All sites)		
Conducting user satisfaction surveys and needs assessment via questionnaires (Pamekasan, Jember)		
Survey of book needs distributed via WhatsApp Group/Google Form (Pamekasan)		
Understanding that not all communities can afford books and need credible information (Tulungagung)		
AI Disruption era demands library transformation (Tulungagung, Pamekasan, Jember)	Disruption Awareness & Opportunity Recognition	
Millennials and young people prefer instant, fast digital access (Pamekasan)		
Decreased utilization of physical collections among young users (Pamekasan)		
Society increasingly relies on AI for information		

without considering accuracy (Tulungagung, Kediri) Recognizing digital divide - users have limited data packages for online access (Malang, Tulungagung) Understanding that libraries must adapt or be left behind (Malang, Pamekasan)		
Digital library based on mobile phone applications – E-Pusda, Malang Cilin, i-Probolinggo (Kediri, Malang, Probolinggo) Online book ordering via WhatsApp - *JANGAN MANISA* (Probolinggo, Kediri) Online member registration - TANGGO VANILA (Probolinggo) Inlislite Application Program for OPAC automation (Kediri, Jember) SIPalapa application for library services (Pamekasan) SLIMS-based IT library management system (Pamekasan)	Technology Adoption & Digital Service Innovation	Seizing Capabilities
Training for society: cooking, language, souvenirs (Kediri, Tulungagung) Makerspace - a place for people to be creative (Kediri) Training and mentoring for village/school libraries (All sites) Writing training programs (Kediri, Tulungagung) Mobile library reaching remote areas without internet (Pamekasan, Jember, Kediri) Reading corner on Car Free Day (Kediri)	Community Empowerment & Inclusion Programs	
Providing hybrid services - combining physical and digital (Tulungagung, Malang, Probolinggo) Providing free Wi-Fi 24 hours to attract visitors (Pamekasan) Social media engagement: Instagram, Facebook, YouTube, WhatsApp (All sites) Online storytelling services - DOREMI (Tulungagung) E-book collection development accessible via app stores (Probolinggo, Jember) Excellent/prima service with 5-minute maximum cut-off time (Malang)	Service Redesign & Accessibility Enhancement	
Carrying out library transformation from conventional to digital (Tulungagung, Pamekasan, Probolinggo) Large-scale changes in service management and book management (Pamekasan) Comprehensive planning to transform from conventional to digital library system (Probolinggo) Formulation includes: policy, strategic planning, standardization, infrastructure, access methods, funding, collaboration (Probolinggo) Reallocation of budget from printed materials to electronic/digital collections (Probolinggo, Kediri)	Organizational Reconfiguration & Digital Transformation	Transforming Capabilities
Training potential staff in digital literacy competencies (Pamekasan) Annual capacity building program for librarians funded by APBD (Pamekasan) Participating in training, workshops, seminars for competency development (Kediri, Probolinggo, Jember) Mandatory webinar participation from Perpusnas and bi-monthly knowledge sharing (Pamekasan) Performance evaluation every 6 months/3 months for sustainability (Pamekasan)	Human Resource Reconfiguration & Capability Building	

Establishing Standard Operating Procedures (SOP) for digital era (Pamekasan, Probolinggo) Issuance of Regent Regulation on literacy movement (Pamekasan) Service standard established through Head of Agency Decree (Pamekasan) 5-year roadmap for library development to face competitors (Pamekasan) Collaboration with Disdukcapil for user tracking system (Probolinggo) Strategic partnerships with publishers and content providers (Jember, Kediri)	Institutional & Policy Reconfiguration

Analysis of interview data from seven public libraries in East Java yielded a data structure consisting of 51 first-order codes, 9 second-order themes, and three aggregate dimensions aligned with Teece's (2007) sensing, seizing, and transforming framework, to building dynamic capabilities. Findings are presented sequentially for each dimension, followed by a critical analysis of the AI readiness gap as the central finding of this study.

Sensing Capabilities

All informants from the seven libraries demonstrated a strong awareness of the threat of technological disruption to library sustainability. AI, the internet, gadgets, and online games were consistently identified as the library's main competitors. An informant from Kediri Public Library explicitly stated:

"*AI, the internet, gadgets, online games... all are competitors to the library*" *(P14).*

A significant finding is that AI was mentioned as one of the competitors, but not specifically distinguished from other digital threats. Informants treated AI as part of a broader wave of digital disruption, rather than as a phenomenon requiring a separate strategic response. This indicates that sensing AI remains generic and indefinite.

An informant from Pamekasan Public Library demonstrated a keen understanding of the speed dimension as a competitive advantage for digital platforms:

> "*Users really prefer speed... what our competitors have most is speed, which is hard for us to compete with.*" *(P07)*

An informant from Probolinggo Public Library identified search engines as a major disruptor:

> "*Search engines seem to have become essential programs in everyday life. Users can easily use them with just one click.*" *(P12)*

Libraries demonstrated active sensing of user needs through formal and informal mechanisms:

> "*Every year there's a book needs survey. We distribute questionnaires to users... it's used as a basis for book procurement (P07)*

The Malang Public Library demonstrated a more segmented sensing:

> "We first identify our user groups... of course, the people of Malang City will be different from *those of Malang Regency.*" *(P03)*

An informant from Tulungagung Public Library emphasized the central position of users:

> "*Users are the lifeblood of the library.*" *(P06)*

Several informants recognized the unique advantages libraries offer that digital and AI competitors lack:

> "*What Google and AI don't have that we have is direct communication with users, a heart-to-heart approach.*" *(P07)*

An informant from East Java Public Library highlighted libraries as providers of validated information:

> "*On the internet and in AI, biases come from everywhere. Sometimes people don't even understand whether the information is true or false.*" *(P02)*

In the sensing dimension, libraries actively scan their environment and identify digital competitors. However, AI is only recognized as a generic competitor; there is no systematic monitoring of AI developments (ChatGPT, generative AI, AI-powered search) or assessment of how AI specifically changes people's information-seeking behavior.

Seizing Capabilities

In the seizing dimension, the seven libraries demonstrated a significant innovation capacity. Various mobile-based digital library applications have been developed: E-Pusda (Kediri), Malang Cilin (Malang), i-Probolinggo (Probolinggo), and D'Jatim (East Java). The most prominent innovation from Malang Public Library:

> "*It's almost the same as GoFood and GrabFood, their menu options are fried rice, while our menu options are books*" *(P04)*

Probolinggo Public Library demonstrates creativity through WhatsApp-based service innovations:

> "*Loan Extensions via WhatsApp (JANGAN MANISA), Ready to Take Home Books (NASI WALANGKU)*" *(P12)*

Pamekasan Public Library develops an integrated library information system:

> "*We already use IT-based SLIMS for book management... recently we added an information system-based service application*" *(P08)*

Of the seven public libraries, only the East Java Public Library has adopted AI, namely an Artificial Intelligence (AI)-based library materials processing system by 2024. This innovation is designed to modernize the way librarians work, shifting from time-consuming manual methods to more accurate automated systems. There has been no AI adoption focused on service innovation.

> "*The AI-based processing system being developed aims to accelerate the provision of new books in libraries,*" *(P02).*

Seizing capabilities are also demonstrated through community empowerment programs. Pamekasan Public Library reaches remote areas:

> "*We reach remote areas without internet access using motorcycles (halo pemustakan) and mobile libraries*" *(P08).*

Malang Public Library provides inclusive services:

"*We provide a BRAILE CORNER service so they can also read here*" *(P04)*.

Libraries are actively developing hybrid service models:

"*We even have a hybrid library*" *(P06)*.

Malang Public Library implements excellent service standards:

"*The cut-off time for each service is a maximum of 5 minutes. No more*" *(P04)*.

However, a critical finding from this seizing dimension states that not a single library has implemented AI-based innovations. There were no chatbots, machine learning-based recommendation systems, AI-assisted reference services, or AI literacy programs for the community. All innovations remain within the realm of conventional digitalization, not AI-driven.

Transforming Capabilities

Probolinggo Public Library exhibits the most comprehensive transforming capabilities:

> "*The formulation in question is the existence of comprehensive planning... policy formulation, strategic planning, standardization, network infrastructure, access methods, funding, collaboration*" *(INF-PRB)*

Pamekasan is making major changes:

> "*Make major changes in service management and book management*" *(P08)*

Several libraries are demonstrating budget reallocation:

> "*Diverting funds from purchasing printed library materials to electronic (digital) libraries*" *(P12)*

Pamekasan Public Library demonstrates the most systematic approach to human resource development:

> "*Every year, we train all librarians and library staff working in the library to increase their capacity*" *(P08)*

However, the training content still focuses on general digital literacy, there is no training specifically targeting AI competencies. Librarians are trained in automation systems and social media, but have not yet been introduced to the concepts and uses of AI.

Pamekasan Public Library successfully pushed for the issuance of a Regent's Regulation:

> "*The issuance of the Regent's Regulation on the Pamekasan Regency literacy movement... includes a reading curriculum in the Education Office*" *(P07)*

> "*We have a roadmap for library planning for the next five years*" *(P07)*

Probolinggo Public Library is building cross-institutional collaboration:

> "*Collaborating with the Population and Civil Registration Office to facilitate user tracking*" *(P12)*

While these policies demonstrate fairly advanced transformative capabilities, none of the policies or roadmaps explicitly incorporate an AI agenda, whether in the form of adopting AI tools, developing AI-based services, or promoting AI literacy for librarians and the public.

DISCUSSION

The findings of this study confirm that the three aspects of DC (sensing, seizing, and transforming) can be empirically identified in Indonesian public libraries, albeit with characteristics that differ from those of previously studied private and public sector organizations (Pablo et al., 2007; Piening, 2013).

Specifically, these findings enrich the understanding of DC in the public sector in three ways. First, sensing capabilities in public libraries are more reactive than proactive; libraries detect digital threats after their impact is felt, rather than through systematic and structured environmental scanning. This differs from sensing capabilities in private organizations, which tend to be more deliberative (Teece, 2007), and is consistent with Piening's (2013) finding that public organizations have limited autonomy and strategic initiative. Second, seizing capabilities in public libraries are strongly influenced by local creativity and individual leadership agency; innovations such as Mobillib (Malang) and *JANGAN MANISA* (Probolinggo) stem from personal initiative, not from a formulated organizational strategy. This implies that in resource-constrained contexts, seizing relies more on entrepreneurial leadership than on structured organizational capacity. In an organization, innovation ideas can emerge from both top-down and bottom-up management. Top-down ideas mean that innovations are created by certain parties, including various leaders/superiors, and implemented by their subordinates. Bottom-up, on the other hand, are innovation ideas that originate from subordinates and are implemented as an effort to improve the organization's quality. Therefore, the idea library can be determined by superiors, which will then be processed into a policy, or determined by colleagues to provide alternatives that facilitate problem-solving. Third, transforming capabilities was the weakest and most unequal dimension across the seven cases, suggesting that fundamental reconfiguration requires conditions that are more difficult to achieve in the public sector, including political support, adequate budgets, and long-term leadership vision (Kattel and Mazzucato, 2018).

A systematic gap exists between libraries' capabilities in responding to digital disruption in general and their specific readiness for AI disruption. This finding has important theoretical implications because it demonstrates that dynamic capabilities are domain-specific, not generic. A library that has successfully developed a DC for one type of disruption (digital) does not automatically have a DC for a different type of disruption (AI), even though both fall within the same spectrum.

This finding extends the understanding proposed by Helfat and Peteraf (2009) regarding the dynamic capabilities lifecycle. While Helfat and Peteraf argued that library systems evolve through stages from formation to maturity, this study adds a new dimension: library systems also need to evolve laterally, from one disruptive domain to another emerging one. Libraries in East Java demonstrate that they are at a stage where library systems are mature enough for AI disruption. This is evident among seven public libraries, only the East Java public library has adopted AI, even if only for back-office functions. This lateral evolution process, how organizations shift and expand existing library systems to new challenges, is an underexplored area in the library literature.

These findings also provide empirical nuance to the arguments of Lund and Wang (2023) about the threat of AI to libraries. While Nguyen and Lund discuss the threat of AI conceptually, this study provides the first empirical evidence of how libraries in the field are actually responding to it.

In a global context, the findings of this study indicate that public libraries in Indonesia find themselves in a paradoxical position. On the one hand, several digital innovations, such as e-commerce-style book delivery services (Malang), integrated WhatsApp services (Probolinggo), and hybrid libraries (Tulungagung), demonstrate seizing capabilities that are no less creative than digital initiatives by public libraries in developed countries. On the other hand, Indonesian libraries are still far from optimal in terms of AI readiness.

4. CONCLUSION

Public libraries in Indonesia have demonstrated active sensing capabilities in detecting threats of digital disruption, identifying competitors (including AI, the internet, gadgets, and online games), understanding changing user needs, and identifying unique library advantages not available on digital platforms. However, sensing for AI remains generic; AI is not understood as a transformative phenomenon requiring a distinct strategic response. Public libraries have demonstrated quite creative and diverse seizing capabilities in responding to digital disruption, ranging from the development of mobile-based digital library applications, WhatsApp-based services, e-commerce-style book delivery models, to hybrid libraries and community empowerment programs. However, there has been no AI-based innovation in library services. Transforming capabilities have been found in the form of organizational reconfiguration, human resource capacity development, budget reallocation, and policy reformulation.

This study has several limitations that should be acknowledged. First, it was limited to seven public libraries in one province (East Java), making the findings statistically infeasible to all public libraries in Indonesia. Although the multiple case study design allows for analytical generalization, the data were collected at a time when generative AI disruption (ChatGPT and similar) was still relatively new in Indonesia, especially among regional public libraries. The findings regarding low AI awareness and readiness may reflect this early phase and could change as AI penetration increases in Indonesia. However, precisely for this reason, this study captures important points about the state of public libraries in the era of AI disruption as a baseline for future longitudinal studies. For further research, a large-scale quantitative approach measuring the level of AI readiness of public libraries nationwide, using indicators derived from this study's DC framework (sensing, seizing, transforming towards AI), would complement the qualitative insights provided by this study with statistically representative data.

AUTHORS' CONTRIBUTIONS

Dyah Puspitasari Srirahayu: Writing oiginal draft preparation. Ideas; formulation or evolution of overarching research goals and aims.
Esti Putri Anugrah: formulation or evolution of overarching research goals and aims.

CONFLICT OF INTERESTS

We state that there are no known conflicts of interest linked with this publication, and that there has been no significant financial assistance for this work that could have influenced its outcome.

REFERENCES

Aabø, S., Audunson, R., & Vårheim, A. (2010). How do public libraries function as meeting places?. Library & Information Science Research. 32. 16–26. 10.1016/j.lisr.2009.07.008.

Adesina A. S., Zubairu A. N. (2024). Contemporary library and artificial intelligence technology. Alexandria The Journal of National and International Library and Information Issues, 33(1–3), 18–30.

Alam, M. & Alam, S. (2023). AI and its application in libraries. Library Philosophy and Practice. https://digitalcommons.unl.edu/libphilprac/7828/

Ayinde, L., Ebiefung, R., & Oladokun, B. D. (2026). Adoption of artificial intelligence in academic libraries: A systematic review of current practices, challenges, and research opportunities. The Journal of Academic Librarianship, 52(1), 103185. https://doi.org/10.1016/j.acalib.2025.103185

Boateng, F. (2025). The transformative potential of generative AI in academic library access services: Opportunities and challenges. Information Services & Use, 45(1–2), 140–147. https://doi.org/10.1177/18758789251332800

Breeding, M. (2023). Artificial intelligence in library technology. Smart Libraries Newsletter.

Bridges, L. M., McElroy, K., & Welhouse, Z. (2024). Generative artificial intelligence: 8 critical questions for libraries. Journal of Library Administration, 64(1), 66–79. https://doi.org/10.1080/01930826.2024.2292484

Chemulwo, M. J., & Sirorei, E. C. (2020). Managing and adapting library information services for future users: Applying artificial intelligence in libraries. Hershey, PA: IGI Global. https://doi.org/10.4018/978-1-7998-1116-9.ch009

Chen M., Zhang W. (2020). WeChat knowledge service system of university library based on SoLoMo: A holistic design framework. Journal of Information Science, 46(5), 616–629

Chen, Ming-Jer, & Miller, Danny. (1994). Competitive attack, retaliation and performance: An expectancy-valence framework. Strategic Management Journal, 15(2), 85-102.

Chen, Ming-Jer, & Miller, Danny. (2012). Competitive Dynamics: Themes, Trends, and a Prospective Research Platform. The Academy of Management Annals, 6(1), 135-210.

Chen, Ming-Jer, Su, Kuo-hsien, & Tsai, Wenpin. (2007). Competitive tension: the awareness-motivation-capability perspective. Academy of Management Journal, 50(1), 101-118.

Chen, Ming-Jer. (1996). Competitor analysis and interfirm rivalry: toward a theoretical integration. Academy of Management Review, 21(1), 100-134.

Concha, K. M., Zenteno, F. P., & Alfaro, J. T. (2024). Use of artificial intelligence in libraries: A systematic review, 2019-2023. South African Journal of Libraries and Information Science, 90(2), 1–13.

Cox, A. (2024). Artificial Intelligence and the academic library. The Journal of Academic Librarianship, 50(6). https://doi.org/10.1016/j.acalib.2024.102965

De Sarkar T. (2023). Implementing robotics in library services. Library Hi Tech News, 40(1), 8–12

Engel, J. Y., Do, D. T., Salem, B., & Cunningham, T. A. (2025). Artificial intelligence in library cataloging: A review of literature. Journal of Library Metadata, 1–16.

Gmiterek, G., & Kotuła, S. D. (2025). Generative artificial intelligence in the activities of academic libraries of public universities in Poland. The Journal of Academic Librarianship, 51(3), Article 103043.

Gültekin, V. & Kavak, A. (2026). An assessment of artificial intelligence anxieties of academic librarians in Türkiye. The Journal of Academic Librarianship, 51(3), https://doi.org/10.1016/j.acalib.2025.103058.

Harisanty, D., Anna, N. E. V., Putri, T. E., Firdaus, A. A., & Noor Azizi, N. A. (2024). Leaders, practitioners and scientists' awareness of artificial intelligence in libraries: a pilot study. Library Hi Tech, 42(3), 809–825. https://doi.org/10.1108/LHT-10-2021- 0356

Hart, G. (2007). Social capital: a fresh vision for public libraries in South Africa. South African Journal of Libraries and Information Science, 73(1), 14-24.

Helfat, C. E., & Peteraf, M. A. (2009). Understanding dynamic capabilities: progress along a developmental path. Strategic Organization, 7(1), 91-102. https://doi.org/10.1177/1476127008100133

Hervieux, S., & Wheatley, A. (2021). Perceptions of artificial intelligence in academic libraries: A Canadian perspective. College & Research Libraries, 82(5), 741–758.

Huysmans, F. & Oomes, M. (2013). Measuring the public library's societal value: A methodological research program. International Federation of Library Associations and Institutions, 39(2), 168–177. DOI: 10.1177/0340035213486412

Islam, M. A. & Agarwal, N. K. (2015). Knowledge management implementation in a library: mapping tools and technologies to phases of the KM cycle. VINE: The Journal of Information and Knowledge Management System, 44(3), 322--344.

Jabeen, M. (2025). Assessing the readiness for the adoption of artificial intelligence and related technologies in academic libraries of Pakistan. The Journal of Academic Librarianship, 51(6), 103161. https://doi.org/10.1016/j.acalib.2025.103161.

Kasali, R. (2017). Disruption. Jakarta: Gramedia Pustaka.

Kattel, R., Mazzucato, M., (2018). Mission-oriented innovation policy and dynamic capabilities in the public sector, Industrial and Corporate Change, 25(7). 787–801. https://doi.org/10.1093/icc/dty032

Kavak, A., & Gültekin, V. (2026) Examining the relationship between digital competencies and artificial intelligence literacy of academic librarians in Türkiye. *The Journal of Academic Librarianship*, 52(1). https://doi.org/10.1016/j.acalib.2025.103191.

Ketchen, D. J., Jr., Snow, C. C., & Hoover, V. L. (2004). Research on competitive dynamics: Recent accomplishments and future challenges. Journal of Management, 30(6), 779–804. https://doi.org/10.1016/j.jm.2004.06.002

Kiran, K., & Diljit, S. (2011) Antecedents of customer loyalty: Does service quality suffice? Malaysian Journal of Library & Information Science. 16(2), 95–113.

Kolev, K., Morgan, M. G., & Rehbein, K. (2021). The Role of Female Directors in the Boardroom: Examining Their Impact on Competitive Dynamics. *Business & Society*. https://doi.org/10.1177/0007650319847477

Li, M., & Yang, B. (2024). From generative artificial intelligence to artificial general intelligence: Enabling innovation models in library knowledge services. Journal of Library and Information Science in Agriculture, 36(6), 50–61. https://doi.org/10.13998/j.cnki.issn1002-1248.24-0464

Lund BD, Wang T (2023). Chatting about ChatGPT: how may AI and GPT impact academia and libraries?. Library Hi Tech News, 40(3), 26–29, doi: https://doi.org/10.1108/LHTN-01-2023-0009

Munchen, S. (2001). The Public Library Service. New York: IFLA. 26. Johnson, C. A., & Griffis, M. R. (2014). The effect of public library use on the social capital of rural communities. Journal of Librarianship and Information Science, 46(3), 179–190

Mwantimwa, K., & Msoffe, G. (2025). Application of generative artificial intelligence in library operations and service delivery: A scoping review. Technical Services Quarterly, 42(2), 139–168.

Noh Y., Hong H.-J. (2022). A study on the relationship between library service and digital competence. Journal of Librarianship and Information Science, 54(2), 264–283

Omame, I. M., & Alex-Nmecha, J. C. (2020). Artificial intelligence in libraries. In N. E. Osuigwe (Ed.), Managing and adapting library information Services for Future Users. IGI Global: Hershey, PA.

Pablo, A., Reay, T., Dewald, J., & Casebeer, A. (2007). Identifying, Enabling and Managing Dynamic Capabilities in the Public Sector. *Journal of Management Studies*. https://doi.org/10.1111/j.1467-6486.2006.00675

Piening, E. P. (2013). Dynamic Capabilities in Public Organizations: A literature review and research agenda. Public Management Review, 15(2), 209–245. https://doi.org/10.1080/14719037.2012.708358

Pınar, A., & Cox, A. (2025). An Analysis of Artificial Intelligence (AI) Capability in Libraries and Archives. Cataloging & Classification Quarterly. 63. 1-34. 10.1080/01639374.2025.253979.

Rowlands, I., et.al. (2008). The Google generation: The information behaviour of the researcher of the future. Aslib Proceedings. 60. 290-310. DOI. 10.1108/00012530810887953.

Safadel, P., Hwang, S. N., & Perrin, J. M. (2023). User acceptance of a virtual librarian Chatbot: An implementation method using IBM Watson natural language processing in virtual immersive environment. TechTrends, 67(6), 891–902.

Sanji, M., Behzadi, H., & Gomroki, G. (2022). Chatbot: An intelligent tool for libraries. Library Hi Tech News, 39(3), 17–20. https://doi.org/10.1108/LHTN-01-2021-0002

Teece, D. J. (2018). Business Models and Dynamic Capabilities. Long Range Planning, 51, 40-49. https://doi.org/10.1016/j.lrp.2017.06.007

Teece, D.J. (2007). Explicating dynamic capabilities. SMJ.

Teece, D.J., Pisano, G. and Shuen, A. (1997), Dynamic capabilities and strategic management. Strat. Mgmt. J., 18: 509-533. https://doi.org/10.1002/(SICI)1097-0266(199708)18:7<509::AID-SMJ882>3.0.CO;2-Z

Tsai, W. H., et.al. (2011). A comprehensive study of the relationship between enterprise resource planning selection criteria and enterprise resource planning system success. Information Management.

Varheim, A. (2014). Trust in libraries and trust in most people: Social capital creation in the public library. The Library Quarterly: Information, Community, Policy, 83(3), 258- 277.

Wang, L. (2019). From intelligence science to intelligent manufacturing. Engineering, 5 (4), 615–618.

Zheng, S., Dai, Q., & Abubakar, R. (2025). Artificial intelligence and the future of library services in China and the world: Opportunities, challenges, and policy directions in the context of sustainable development. Research Journal. https://doi.org/10.65281/661371

Zimerman, M. (2012). Digital natives, searching behavior and the library. New Library World, 113(3/4), 174-201.