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Dynamic Capabilities for Strategic AI Adoption and Institutional Transformation in Higer Education

Dwi Martutiningrum[1*]
[1]Department of Management, Universitas Islam Indonesia, Indonesia

*Corresponding Author: arumdm@uii.ac.id

ABSTRACT

The development and deployment of dynamic capabilities by higher education institutions (HEIs) to navigate artificial intelligence (AI) adoption has become a critical imperative in contemporary digital transformation. Grounded in Dynamic Capabilities theory, this systematic literature review examines how sensing, seizing, reconfiguring, and transforming processes support institutional adaptation amid technological disruption. Using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocol, peer-reviewed articles published between 2020 and January 2026 were identified, screened, and synthesized from Scopus, IEEE, Taylor & Francis, and Wiley Online Library. The Theory Context Construct Method (TCCM) framework is further applied to classify theoretical foundations, research contexts, constructs, and methods. The findings indicate that Dynamic Capabilities theory provides a robust lens for understanding AI readiness, governance, and resource orchestration in HEIs. Leading institutions demonstrate sensing through environmental scanning, AI literacy audits, policy monitoring, and experimental search; seizing through structured pilots, AI governance mechanisms, investment, and staff development; and reconfiguring through redesign of curricula, assessment, library services, micro-credential ecosystems, and administrative routines. However, the literature remains fragmented across single-institution cases, adjacent organizational studies, and inconsistent operationalizations of dynamic capabilities. Significant gaps remain in longitudinal evidence, standardized measurement, cross-national comparison, and responsible AI governance. By integrating PRISMA and TCCM, this review advances a capability-based research agenda and positions dynamic capabilities as a central mechanism for sustainable AI adoption in higher education. The findings will be presented at the ASBN Conference 2026 and submitted for publication in the conference proceedings.

Keywords: HEIs, Dynamic Capabilities, Artificial Intelligence, PRISMA, TCCM.

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Introduction

Artificial intelligence (AI) has moved from a peripheral educational technology to a strategic infrastructure that reshapes higher education institutions (HEIs). Generative AI, learning analytics, intelligent tutoring systems, AI-supported research tools, and automated student services are changing

how universities teach, assess, govern, and create public value. This shift makes AI adoption a complex organizational challenge rather than a simple technology acquisition decision. The central issue is whether HEIs can develop the institutional capabilities required to adopt AI responsibly, inclusively, and sustainably.

Recent studies show that digital transformation succeeds when technological investment is combined with leadership, knowledge practices, data governance, human capability, and reconfigurable routines. Dynamic capabilities provide a strong theoretical basis for this argument because they explain how organizations sense technological opportunities and threats, seize them through strategic action, and reconfigure or transform resources in turbulent environments (Teece, 2007; Teece et al., 1997).In digital transformation research, these mechanisms are associated with digital leadership, intellectual capital, AI maturity, data-driven culture, resilience, and resource orchestration (Ben Sedrine Doghri et al., 2026; Bughin, 2026; Chaudhuri et al., 2024; Kubilay & Celiktas, 2025).

In HEIs, the dynamic capability problem is especially visible. AI adoption affects curricula, academic integrity, assessment design, faculty development, research workflows, library services, micro-credential ecosystems, cybersecurity, and student AI awareness. Emerging HEI-specific evidence shows that AI adoption depends on university administrative capabilities, experimentation, student capability development, resilient infrastructure, and ecosystem collaboration (Abunaser et al., 2025; Bogodistov et al., 2025; Gong et al., 2025; Gupta, 2025; Sidani & Harb, 2025). However, the evidence remains fragmented across institutional case studies, bibliometric work, digital learning studies, and adjacent research from SMEs and corporate digital transformation.

This study responds to that fragmentation by synthesizing literature published between 2020 and January 2026 using PRISMA and TCCM. The guiding research question is: How do HEIs develop and deploy sensing, seizing, reconfiguring, and transforming capabilities in response to AI adoption? The review contributes by consolidating scattered evidence, distinguishing HEI-specific findings from transferable organizational insights, and proposing a capability-based research agenda for responsible AI adoption in higher education.

Literature Review

Dynamic capabilities as the core lens

Dynamic Capabilities theory was developed to explain how organizations renew resources and sustain advantage under change. Its core dimensions are sensing opportunities and threats, seizing opportunities through commitment and resource mobilization, and reconfiguring or transforming structures, routines, and assets (Teece, 2007; Teece et al., 1997). These dimensions are especially relevant to AI adoption because AI changes not only operational tools but also decision rights, knowledge practices, stakeholder expectations, and institutional accountability.

The wider organizational literature clarifies how dynamic capabilities work in digitally turbulent contexts. (Koparan & Aksaray, 2025) show that sensing, seizing, and reconfiguring create different value depending on resource rarity, which is relevant because AI talent, high-quality data, infrastructure, and responsible AI expertise are scarce resources for HEIs. Doghri *et al.*, (2026) show that digital leadership and intellectual capital strengthen dynamic capabilities for digital transformation. Bughin (2026) adds that transformational capabilities and market position shape returns to digital investment. These insights suggest that HEIs cannot rely on AI tools alone; they require leadership, knowledge assets, and capability orchestration.

Recent AI-specific research reinforces this interpretation. (Marhraoui, 2026) identifies technological, organizational, environmental, ethical, and ecological antecedents of AI adoption and links AI adoption to organizational agility and sustainable performance. (Liu et al., 2024) show that AI changes companies' dynamic capabilities through altered sensing, decision-making, and resource reconfiguration. Cetindamar et al., (2024) define AI literacy as a capability bundle comprising technology-related, work-

related, human-machine-related, and learning-related capabilities. For HEIs, AI literacy among students, faculty, librarians, and administrators should therefore be treated as a microfoundation of institutional dynamic capability.

Higher education as a capability-intensive context

HEIs are not ordinary adopters of AI because they must balance innovation with academic integrity, public accountability, inclusiveness, ethical use, and educational quality. (Abunaser et al., 2025) provide direct evidence that university administration's technological dynamic capabilities predict students' awareness and perceived effectiveness of AI tools. (Sidani & Harb, 2025) show that digital transformation strengthened organizational resilience in Lebanese universities by supporting anticipation, coping, and adaptation capabilities during crisis conditions. These studies indicate that AI adoption in HEIs requires administrative agility and institutional learning, not only technical access.

University libraries and micro-credential ecosystems provide more fine-grained evidence. Gupta (2025) shows that the University of Toronto Libraries moved from AI hype to strategy through small-scale experiments, knowledge sharing, collaborative testing, and centralized-decentralized coordination. (Bogodistov et al., 2025) show that collaboration, trust, transparency, risk management, and sharing influence HEIs' willingness to implement micro-credential software ecosystems that enhance sensing, seizing, and resource reconfiguration. Together, these studies show that HEI capability building often begins in subunits before becoming institution-wide transformation.

AI adoption in entrepreneurship education offers direct evidence that dynamic capabilities can become student learning outcomes. (Gong et al., 2025) show that technology-driven, organization-driven, environment-driven, and human-driven AI factors improve student entrepreneurs' sensing, seizing, and reconfiguring capabilities, which then enhance AI-enabled marketing performance. This finding is important for HEIs because it positions AI not only as an administrative or pedagogical tool, but as a mechanism for cultivating adaptive graduates prepared for AI-intensive work environments.

Governance, resilience, and responsible transformation

AI adoption is intertwined with governance and resilience. Organizational maturity research shows significant interdependencies among AI maturity, cybersecurity maturity, and digital transformation maturity, suggesting that AI cannot be governed independently from cybersecurity and digital infrastructure (Kubilay & Celiktas, 2025). Technology management research similarly argues that digital technologies require orchestration capabilities across multiple stakeholders, including universities, suppliers, governments, and users (Cetindamar et al., 2024). For HEIs, this means AI adoption requires data governance, cyber-resilience, policy clarity, and stakeholder coordination.

Adjacent corporate and SME studies strengthen the responsible transformation argument. Digitalization can help firms sense environmental risks, seize opportunities for eco-innovation and compliance, and reconfigure routines to reduce environmental misconduct (Ali et al., 2026a). ESG-digital synergy reduces carbon intensity when digital transformation is aligned with governance and innovation (Sun et al., 2026). Knowledge spillover research shows that digital capabilities and organizational resilience support innovation orientation (Fernandes et al., 2026), while robot adoption research shows that advanced technologies strengthen resilience when supported by innovation and digital strategies (Yu et al., 2025).

Evidence on cost flexibility and green mergers and acquisitions further suggests that digital transformation shapes adaptive resource use and strategic renewal under uncertainty (Luo et al., 2026; Zhao et al., 2026a). Human capability also matters: Industry 5.0 research shows that AI, IoT, big data, and related technologies improve resilience when human adaptability, digital competence, and problem-solving mediate the technology-resilience link (León & Kanat Tiryaki, 2026). These findings are transferable to HEIs because responsible AI adoption requires governance, human agency, and institutional accountability.

The literature also points to the value of industry-university knowledge practices. Secundo et al., (2026) show that industry-university collaboration supports knowledge-based dynamic capabilities for digital transformation. This is particularly relevant for HEIs because universities simultaneously act as adopters, educators, knowledge producers, and ecosystem orchestrators. AI adoption should therefore be examined as a multi-level process in which institutional strategies, faculty practices, student capabilities, libraries, industry partners, and policy actors co-evolve.

Method

Research design

This study used a qualitative systematic literature review to synthesize research on dynamic capabilities and AI adoption in higher education. The review followed PRISMA to make the identification, screening, eligibility, and inclusion process transparent (Page et al., 2021). The TCCM framework was then applied to organize the selected studies according to theory, context, constructs, and methods, enabling both descriptive mapping and theory-building synthesis (Paul et al., 2024; Sharma et al., 2020).

The review focused on peer-reviewed studies published from 2020 to January 2026. This period was selected because AI adoption, digital transformation, and generative AI use in higher education accelerated after the COVID-19 pandemic. Sources included Scopus, IEEE, Taylor & Francis, and Wiley Online Library. Additional full-text articles supplied for this review were included when they were relevant, retrievable, and consistent with the inclusion criteria. Non-retrieved reports were recorded in the PRISMA flow but not synthesized substantively.

Search strategy and selection criteria

The search strategy was structured around four conceptual layers: higher education context, AI and emerging technologies, organizational response or dynamic capabilities, and governance or strategic mediation. Search terms included 'higher education', 'university', 'artificial intelligence', 'generative AI', 'digital transformation', 'dynamic capabilities', 'organizational agility', 'institutional change', 'capability reconfiguration', 'governance', 'policy', 'leadership', and 'strategic management'.

Table 1. Search Strategy and Selection Criteria

Element	Inclusion	Exclusion
Publication period	2020 to January 2026	Before 2020
Language	English	Non-English
Document type	Peer-reviewed journal articles and retrievable full papers	Conference papers when excluded by screening, non-retrieved reports, and documents without sufficient relevance
Context	Higher education, universities, HEI ecosystems, or transferable organizational AI/digital capability evidence	Purely technical AI, medicine, physics, chemistry, agriculture, or unrelated sectoral studies
Subject area	Social sciences; business, management and accounting; decision sciences; economics, econometrics and finance; arts and humanities; multidisciplinary	Computer science-only, engineering-only, mathematics, pharmacology, toxicology, medicine, or unrelated natural sciences

Element	Inclusion	Exclusion
Core relevance	Dynamic capabilities, sensing, seizing, reconfiguring, transforming, resilience, governance, digital leadership, AI adoption	Studies with no organizational adaptation, capability, governance, or AI/digital transformation component

PRISMA flow and data extraction

The PRISMA process identified 176 records from Scopus (n = 138), IEEE (n = 13), Taylor & Francis (n = 13), and Wiley Online Library (n = 12). Four records published before 2020 were removed before screening, leaving 172 records. After subject-area limitation and exclusion of non-English articles and conference papers, 158 reports were sought for retrieval. Twelve reports were not retrieved, and 146 reports were assessed for eligibility. Eighty-six reports focused on dynamic capabilities or closely related organizational adaptation mechanisms, and 60 studies were included because they addressed sensing, seizing, reconfiguring, or transforming processes.

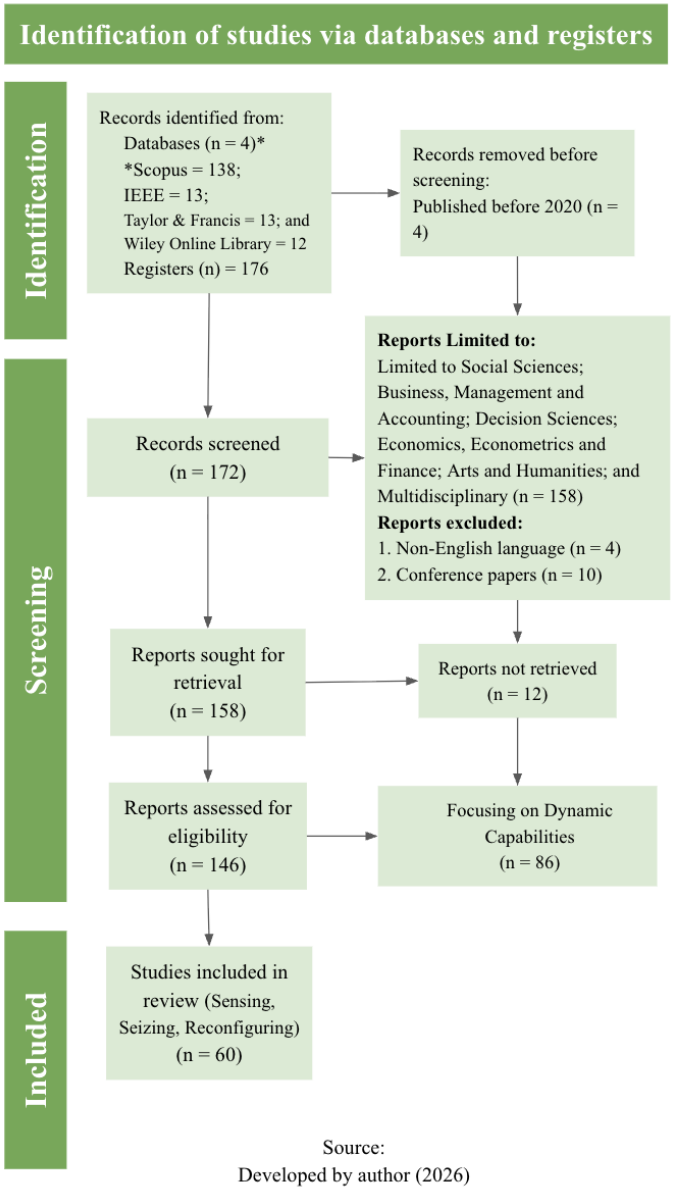


Figure 1. Identification of Studies via Databases and Registers

Data were extracted into a coding matrix covering author, year, source, context, theoretical lens, AI or digital technology focus, dynamic capability dimension, method, and key findings. The coding distinguished between HEI-specific evidence and adjacent organizational evidence. HEI-specific studies included universities, university libraries, student entrepreneurs, micro-credential ecosystems, and university administration. Adjacent studies were retained only when they clarified dynamic capability mechanisms relevant to AI adoption in HEIs.

Analytical rigor was strengthened through iterative coding, clear operational definitions for sensing, seizing, reconfiguring, and transforming, and cross-checking of in-text citations against the reference list. Sensing was coded when studies discussed environmental scanning, opportunity/threat recognition, foresight, awareness, or readiness. Seizing was coded when studies addressed investment, governance, experimentation, mobilization, or strategic commitment. Reconfiguring and transforming were coded when studies discussed redesign of processes, structures, routines, capabilities, ecosystems, or business/educational models.

Results

TCCM synthesis

The TCCM analysis indicates that the literature is theoretically rich but dispersed. Dynamic Capabilities theory is central, but most studies combine it with (Technology Organization Environment) TOE framework, Resource Based View (RBV), knowledge-based view, absorptive capacity, organizational resilience, socio-technical theory, or governance perspectives. HEI-specific research is emerging, but much of the conceptual depth still comes from adjacent organizational settings. Table 2 summarizes the main TCCM patterns.

Table 2. TCCM Synthesis

TCCM element	*Dominant pattern*	*Representative evidence*	*Implication for HEIs*
Theory	Dynamic Capabilities theory dominates, often integrated with TOE, RBV, knowledge-based view, DCV, digital leadership, and resilience perspectives.	(Ben Sedrine Doghri et al., 2026; Koparan & Aksaray, 2025; Marhraoui, 2026; Secundo et al., 2026)	AI adoption should be examined as institutional capability development, not as tool acquisition.
Context	HEI-specific studies cover university administration, libraries, micro-credentials, entrepreneurship education, and crisis resilience; adjacent studies cover firms, SMEs, supply chains, and sustainability.	(Abunaser et al., 2025; Bogodistov et al., 2025; Gong et al., 2025; Gupta, 2025; Sidani & Harb, 2025)	Evidence is relevant but scattered across units and single-institution cases.
Construct	Common constructs include sensing, seizing, reconfiguring, transforming, AI literacy, digital capability, governance,	(Alam et al., n.d.; Cetindamar et al., 2024; Holopainen et al., 2026; Kubilay & Celiktas, 2025)	AI capability in HEIs should include technological, human, ethical, and governance dimensions.

TCCM element	*Dominant pattern*	*Representative evidence*	*Implication for HEIs*
Method	resilience, maturity, agility, flexibility, and resource orchestration. Methods include SLR, bibliometrics, PLS-SEM, fsQCA, survey-based maturity modeling, case studies, interviews, and discrete choice experiments.	(Gong et al., 2025; Gupta, 2025; Marhraoui, 2026; Sidani & Harb, 2025).	Future HEI research needs longitudinal, cross-national, and mixed-method designs.

Sensing capabilities

Sensing capabilities refer to institutional routines for identifying AI opportunities, threats, and stakeholder needs. In HEIs, sensing appears through AI literacy assessment, environmental scanning, policy monitoring, readiness surveys, risk identification, cybersecurity awareness, and experimental search. (Abunaser et al., 2025) show that university administrative technological capabilities influence students' AI awareness, indicating that institutional sensing must include student readiness and faculty support. (Gupta, 2025) shows that library AI experimentation helps librarians distinguish useful tools from market hype.

The adjacent literature reinforces this interpretation. AI adoption research identifies leadership, data management, algorithmic depth, ethical issues, infrastructure, and external pressures as critical antecedents (Marhraoui, 2026). AI maturity research shows that AI, cybersecurity, and digital transformation maturity are interdependent, meaning that HEIs must sense AI opportunity and cyber-risk together (Kubilay & Celiktas, 2025). Corporate foresight and digital leadership studies further show that foresight capabilities allow organizations to anticipate disruptions and prepare strategic responses (Alam et al., n.d.; Jung et al., 2026).

Seizing capabilities

Seizing capabilities involve mobilizing resources and governance mechanisms to convert AI opportunities into institutional action. In HEIs, seizing is visible in AI task forces, pilot projects, staff training, responsible-use policies, ethical review, investments in platforms, and curriculum redesign. The University of Toronto Libraries case shows that seizing can occur through reversible experiments and knowledge sharing rather than immediate full-scale implementation (Gupta, 2025). Micro-credential ecosystem research shows that HEIs seize opportunities more effectively when collaboration, risk management, trust, and transparency are built into the ecosystem design (Bogodistov et al., 2025).

Seizing is also influenced by human and organizational readiness. Gong *et al.*, (2025) show that AI-driven pedagogical factors improve student entrepreneurs' dynamic capabilities and AI-enabled marketing performance. Holopainen *et al.*, (2026) warn that digital ambition can undermine sustainability when it is not supported by real capability and governance, a caution relevant to HEIs tempted to adopt AI rapidly without readiness. (Duan & Zhang (2025)show that digital transformation improves resource allocation through human capital, innovation, and information transparency, suggesting that AI adoption in HEIs must be tied to deliberate allocation of budget, staff expertise, data infrastructure, and governance capacity.

Reconfiguring and transforming capabilities

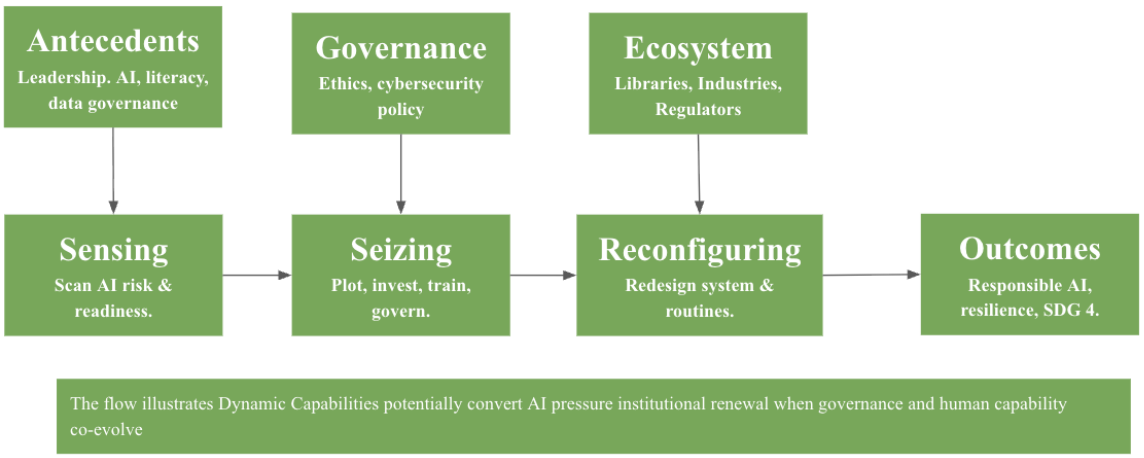
Reconfiguring capabilities are the most visible mechanism in the reviewed literature. In HEIs, AI adoption requires redesigning assessment systems, academic integrity rules, learning management

systems, research support, library services, student advising, administrative analytics, micro-credential platforms, and data governance. Reconfiguration is not merely adaptation after adoption; it is the process through which AI becomes embedded in institutional routines. Sidani & Harb (2025) show that digital transformation supports HEI resilience by facilitating collaboration, resource mobilization, flexible structures, adaptive systems, and agile processes.

Conceptual studies of digitally transformed networks help explain this process. Raha et al., (2025) argue that AI, big data, blockchain, IoT, and cloud computing enable dynamic reconfiguration of resources, structures, routines, strategies, and processes. Dooley et al. (2026) show that reconfiguration creates conditions for architectural and radical innovation, although it raises cost and risk. (Sun et al., 2026) show that ESG-digital integration operates through technological innovation and reduced managerial myopia. In HEIs, these studies imply that responsible AI adoption requires transforming governance, pedagogy, and institutional strategy, not simply adding AI tools to existing processes.

Integrated capability model

Figure 2 integrates the synthesis. AI adoption begins with antecedents such as digital leadership, AI literacy, data governance, infrastructure, and ecosystem collaboration. These antecedents enable sensing, seizing, and reconfiguring capabilities. When governance and human capabilities co-evolve with technological capability, AI adoption can produce responsible learning innovation, institutional resilience, and SDG 4 (ensure inclusive and equitable quality education and promote lifelong learning opportunities for all" by 2030)-aligned transformation.



Source:
Developed by author (2026)

Figure 2. Capability-Based AI Adoption Model

Table 3. Dynamic Capability Mechanisms

Dynamic capabilities	HEI manifestation	Representative Evidence	Expected outcome
Sensing	HEIs identify AI opportunities, risks, and readiness gaps through environmental scanning, policy monitoring, AI-	Direct HEI evidence shows sensing through university administration capabilities, smart-technology adoption, AI-powered learning platforms, academic libraries, teacher-role change, AI-enabled learning,	AI readiness, risk awareness, strategic foresight, responsible experimentation, clearer institutional

Dynamic capabilities	HEI manifestation	Representative Evidence	Expected outcome
	literacy audits, faculty and student readiness assessment, cybersecurity awareness, stakeholder feedback, and experimentation forums. In AI-enabled learning and administration, sensing includes detecting student needs, faculty concerns, labor-market demands, ethical risks, and data-governance vulnerabilities before scaling AI initiatives.	university innovation ecosystems, and HEI digital resilience studies (Abunaser et al., 2025; Gong et al., 2025; Gupta, 2025; Liu et al., 2024; Okulicz-Kozaryn et al., 2026; Qu & Kim, 2022a; Sidani & Harb, 2025; Tantiathimongkhon et al., 2026; Wu et al., 2026). Transferable Dynamic Capability studies further confirm sensing as opportunity recognition, strategic foresight, digital readiness, and ecosystem scanning (Alam et al., n.d.; Ashergawi et al., 2026; Ben Sedrine Doghri et al., 2026; Bughin, 2026; Jung et al., 2026; Koparan & Aksaray, 2025; Kubilay & Celiktas, 2025; Liu et al., 2024; Marhraoui, 2026; Oduro Owusu et al., 2026).12.11.2026 20:23:00	priorities, and reduced hype-driven adoption.
Seizing	HEIs convert AI opportunities into strategic action through AI policies, pilot projects, AI task forces, curriculum redesign, faculty training, student capability-building, data-governance investment, micro-credential development, AI library-service experimentation, and partnerships with industry, government, and technology providers. Seizing also includes allocating resources, legitimizing AI use, and creating governance	Direct HEI evidence highlights AI adoption through curriculum integration, AI-powered platforms, micro-credential ecosystems, smart-campus systems, administrative AI capabilities, and academic-library experimentation(Ali et al., 2026a; Ashergawi et al., 2026; Bughin, 2026; Duan & Zhang, 2025; Holopainen et al., 2026; Marhraoui, 2026; Oduro Owusu et al., 2026; Zhao et al., 2026b) (Secundo et al., n.d.). Transferable evidence from digital transformation and AI-adoption research shows seizing through strategic investment, resource mobilization, governance, experimentation, and capability activation (Ali et al., 2026b; Ashergawi et al., 2026; Bughin, 2026; Duan & Zhang,	Strategic investment, controlled experimentation, AI governance alignment, curriculum innovation, staff capability-building, and stronger institutional commitment.

Dynamic capabilities	HEI manifestation	Representative Evidence	Expected outcome
	mechanisms for ethical and scalable adoption.	2025; Holopainen et al., 2026; Marhraoui, 2026; Oduro Owusu et al., 2026; Secundo et al., 2026; Zhao et al., 2026b).12.11.2026 20:23:00	
Reconfiguring/ transforming	HEIs redesign assessment systems, teaching roles, research support, library workflows, data-governance routines, student services, administrative processes, digital infrastructure, and ecosystem partnerships. Reconfiguring also includes transforming faculty roles from AI users into ethical mediators, learning designers, and AI-enabled pedagogical architects. At the institutional level, it involves embedding AI into core academic and administrative routines rather than treating it as an isolated tool.	Direct HEI evidence shows reconfiguration through university administration transformation, teacher-role redesign, AI-enabled learning, academic-library AI experimentation, micro-credential ecosystems, smart-campus sustainability, and university innovation ecosystems (Abunaser et al., 2025; Bogodistov et al., 2025; Gong et al., 2025; Gupta, 2025; Okulicz-Kozaryn et al., 2026; Phuengrod et al., n.d.; Qu & Kim, 2022b; Sidani & Harb, 2025; Wu et al., 2026)Broader Dynamic Capability evidence supports reconfiguration and transformation through digital leadership, resource orchestration, organizational resilience, ESG–digital integration, AI-enabled business-model innovation, and platform redesign (Dooley et al., 2026; Holopainen et al., 2026; Ji et al., 2026, 2026; Luo et al., 2026; Raha et al., 2025; Sun et al., 2026; Wang et al., 2025; Yesuf & Fields, 2026).	Institutional agility, resilient operations, AI-enabled learning quality, ethical AI governance, sustainable digital transformation, improved student readiness, and long-term HEI competitiveness.
Cross-cutting microfoundations	AI adoption depends on digital leadership, AI literacy, human capital, data-driven culture, cybersecurity maturity, organizational resilience, strategic foresight, strategic agility, strategic flexibility,	Cross-cutting evidence comes from HEI and non-HEI studies on technological dynamic capabilities, AI literacy, AI maturity, organizational resilience, digital leadership, data-driven culture, human factors, Industry 4.0/5.0, ESG–digital synergy, and knowledge-based dynamic capabilities (Alam et al., n.d.; Cetindamar & Phaal, 2023,	Capability coherence, stronger institutional learning, better AI governance, reduced implementation failure, and more sustainable AI adoption.

Dynamic capabilities	HEI manifestation	Representative Evidence	Expected outcome
	stakeholder collaboration, and knowledge-sharing routines. These microfoundations enable sensing, seizing, and reconfiguring to operate as an integrated capability system rather than as isolated activities.	2023; Chaudhuri et al., 2024; Fernandes et al., 2026; Hamdani, 2023; Kubilay & Celiktas, 2025; León & Kanat Tiryaki, 2026; Santos-Arteaga et al., 2026; Secundo et al., 2026; Veiga et al., 2025; Yu et al., 2025).	

Discussion

The synthesis indicates that AI adoption in higher education is not merely a matter of acquiring digital tools, but a strategic capability-building process. HEIs need to develop sensing capabilities to identify AI opportunities, ethical risks, student readiness, infrastructure gaps, and emerging policy demands. This aligns with Dynamic Capabilities Theory, which explains institutional adaptation through sensing, seizing, and reconfiguring processes under technological turbulence (Abunaser et al., 2025; Teece et al., 1997).

The reviewed studies show that seizing occurs when HEIs translate AI awareness into structured experimentation, governance mechanisms, curriculum redesign, faculty development, and student capability-building. Evidence from university libraries and entrepreneurship education suggests that AI adoption becomes more effective when institutions encourage experimentation, knowledge sharing, collaboration, and responsible use rather than relying on isolated or hype-driven adoption (Gong et al., 2025; Gupta, 2025). This highlights that successful AI adoption depends on the alignment of technological readiness, leadership commitment, human capability, and institutional strategy.

Reconfiguring emerges as the most critical capability because sustainable AI adoption requires HEIs to redesign routines, roles, assessment systems, data governance, learning support, and administrative processes. Studies on university administration and organizational resilience show that technological dynamic capabilities, digital leadership, and resilient capabilities strengthen institutional responsiveness and student AI awareness (Abunaser et al., 2025; Sidani & Harb, 2025). Therefore, HEIs that pursue AI adoption through dynamic capabilities are more likely to move beyond fragmented experimentation toward responsible, inclusive, and sustainable institutional transformation.

Implications

Theoretical implications

The findings confirm that Dynamic Capabilities theory offers a coherent explanation for why AI adoption outcomes differ across HEIs. Institutions that treat AI as a tool may adopt quickly but remain vulnerable to fragmented use, ethical ambiguity, uneven student access, weak data governance, and low faculty readiness. Institutions that approach AI through dynamic capabilities are more likely to build repeatable routines for sensing AI-related change, seizing opportunities through governance and experimentation, and reconfiguring systems for long-term learning quality.

The review extends Dynamic Capabilities theory in three ways. First, it positions AI literacy, data governance, and cybersecurity maturity as microfoundations of sensing and responsible seizing in HEIs. Second, it shows that subunits such as libraries, entrepreneurship programs, and micro-credential

ecosystems can operate as laboratories for capability development before institutional scaling. Third, it emphasizes that reconfiguration in higher education is not a purely technical process; it involves pedagogical redesign, ethical governance, role change, and ecosystem coordination.

The synthesis also clarifies the value of TCCM for AI adoption research. Theory is dominated by Dynamic Capabilities theory but enriched by TOE, RBV, knowledge-based view, and resilience perspectives. Context is still uneven, with corporate and SME studies providing conceptual depth while HEI-specific evidence remains less abundant. Constructs are expanding from technology adoption toward AI literacy, maturity, governance, resilience, and transformation. Methods remain diverse but underdeveloped longitudinally, especially for tracking institutional capability evolution over time.

Practical implications for HEIs

HEI leaders should formalize sensing mechanisms before scaling AI adoption. Practical mechanisms include AI observatories, AI literacy audits, student and faculty readiness surveys, academic integrity monitoring, ethics committees, and cybersecurity-risk assessments. These mechanisms allow universities to anticipate risks and opportunities before implementation becomes costly or politically sensitive.

Seizing should be structured through controlled experimentation. HEIs can learn from library and micro-credential cases by starting with reversible pilots, documenting learning outcomes, evaluating ethical risks, and sharing evidence across units. AI task forces should include academic, administrative, legal, technical, student, and library representatives so that decisions reflect educational quality, compliance, equity, and usability.

Reconfiguring requires institutional redesign. Universities should update assessment policies, curriculum frameworks, faculty development programs, library workflows, research support services, data governance, and student support systems. AI adoption should also be linked to SDG 4 by prioritizing inclusive access, responsible use, quality learning, and digital equity. Without this alignment, AI can widen capability gaps between students, faculties, departments, and institutions.

Research agenda

The review identifies four gaps that should guide future research. First, longitudinal studies are needed to examine how HEIs develop dynamic capabilities before, during, and after AI adoption. Second, validated measurement instruments are needed for sensing, seizing, reconfiguring, and transforming capabilities in HEI contexts. Third, cross-national research is needed because AI governance, funding, culture, and regulation differ across regions. Fourth, future studies should integrate responsible AI, cybersecurity maturity, and AI literacy into dynamic capability models rather than treating them as separate topics.

Integrative propositions for future theory testing

To move the literature from descriptive synthesis toward cumulative theory testing, the review offers four propositions. These propositions are not claims of statistical causality; they are theory-building statements derived from the reviewed evidence and intended for future empirical validation.

Proposition 1. HEIs with stronger AI sensing routines are more likely to identify ethical, pedagogical, operational, and strategic risks before AI adoption is scaled.

Proposition 2. Governance coherence strengthens the relationship between sensing and seizing by converting dispersed AI awareness into prioritized, funded, and accountable institutional initiatives.

Proposition 3. Experimentation and data veracity jointly strengthen seizing because reversible pilots reduce implementation risk while trustworthy data increases confidence in AI-enabled decision-making.

Proposition 4. HEIs achieve sustainable AI adoption when reconfiguring and transforming capabilities redesign not only digital infrastructure, but also teaching roles, assessment routines, administrative processes, and ecosystem relationships.

Table 4. Integrative Propositions for Future Theory Testing

Gap	*Future research direction*	*Illustrative research question*
Limited longitudinal evidence	Conduct longitudinal studies of AI capability development from pilot adoption to institutionalization.	How do HEIs move from AI experimentation to sustainable AI governance over time?
Weak construct standardization	Develop validated institutional-level scales for AI sensing, seizing, reconfiguring, transforming, and governance maturity.	Which indicators best measure dynamic capabilities for AI adoption in universities?
Underdeveloped governance mechanisms	Integrate DCT with AI governance, data governance, institutional theory, and responsible innovation.	How do governance architectures enable or constrain AI capability orchestration?
Limited cross-national comparison	Compare public/private universities, Global North/South contexts, and different policy regimes.	How do national policy environments shape HEI dynamic capabilities for AI adoption?
Limited multilevel analysis	Examine the interaction among individual, departmental, institutional, and ecosystem capabilities.	How do teacher, department, university, and ecosystem capabilities interact during AI transformation?
Insufficient performance outcomes	Link dynamic capabilities to resilience, quality assurance, inclusion, sustainability, and SDG 4 outcomes.	Which AI capability configurations improve educational quality and institutional resilience?

Limitations

This review has limitations that should guide future work. First, the evidence base is uneven because some studies use DCT explicitly while others use DCT-compatible constructs. The review addresses this by distinguishing direct, adjacent, and supporting evidence, but future empirical work should test the proposed capability model more directly. Second, the review relies on peer-reviewed publications from selected databases and may not fully capture institutional policy documents, internal governance frameworks, or unpublished AI strategies. Third, the absence of standardized measurement limits direct comparison across studies. Fourth, because many included studies are cross-sectional, this review cannot determine how AI dynamic capabilities evolve causally over time. These limitations reinforce the need for longitudinal, cross-national, and mixed-method research.

Conclusion

This systematic literature review shows that AI adoption in higher education is best understood as a dynamic capability process. HEIs must sense AI-driven opportunities and risks, seize them through strategic governance and experimentation, and reconfigure institutional systems to embed AI into teaching, research, administration, and student support. The reviewed evidence demonstrates that successful AI adoption depends on leadership, data governance, AI literacy, human capability, experimentation, and ecosystem collaboration.

The study contributes by integrating PRISMA and TCCM into a coherent synthesis of AI adoption and dynamic capabilities in higher education. It also clarifies how HEI-specific evidence can be

strengthened by carefully using adjacent organizational studies on AI adoption, digital transformation, resilience, sustainability, and dynamic capabilities. The resulting framework positions dynamic capabilities as a central mechanism for responsible, sustainable, and innovation-oriented AI adoption in HEIs.

Recommendations

Universities should establish responsible AI governance structures that combine academic, technical, legal, and student perspectives. They should also invest in faculty and student AI literacy, not only software procurement. Institutional leaders should treat AI pilots as learning mechanisms, document evidence from experimentation, and scale only tools that demonstrate educational, ethical, and operational value.

Researchers should prioritize longitudinal, mixed-method, and cross-national designs. Future empirical work should test whether sensing, seizing, and reconfiguring mediate the relationship between AI readiness and institutional outcomes such as learning quality, resilience, inclusion, research productivity, and administrative effectiveness. This would move the field beyond descriptive AI adoption research toward cumulative theory development.

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