

STRATEGIC HRM, OPEN INNOVATION, AND DIGITAL TRANSFORMATION FOR SUSTAINABLE UNIVERSITY PERFORMANCE: A SYSTEMATIC LITERATURE REVIEW

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ABSTRACT

Sustainable development has become a strategic priority for higher education institutions (HEIs) amid rising societal expectations, rapid digital disruption, and global sustainability agendas. While previous studies have examined human resource management (HRM), open Innovation (OI), and digital transformation (DT) in relation to sustainability, their findings are scattered and often discussed separately. This study reviews existing research to explain how HRM contributes to Sustainable University Performance (SUP) and to clarify the enabling roles of OI and DT as organizational mechanisms. Using the PRISMA guideline, this study retrieved 742 records from Scopus (n = 412) and Web of Science (n = 330). After removing 186 duplicates, this study screened 556 records, reviewed 118 full-text articles for eligibility, and selected 54 studies for the thematic synthesis. The findings reveal four dominant themes: (1) strategic HRM as a key foundation that helps develop staff skills and practices for sustainability; (2) OI as a collaborative approach that supports knowledge sharing and stronger engagement with stakeholders; (3) DT as a supporting process that improves digital readiness, flexibility, and coordination of work systems, and (4) SUP as a multidimensional outcome that includes environmental responsibility, social contribution, and effective institutional performance. Evidence also suggests that OI and DT frequently mediate the relationship between HRM and sustainable outcomes, highlighting a process-oriented pathway rather than a purely outcome-based association. This review provides an integrated conceptual framework and identifies research gaps for future empirical testing, thereby supporting hypothesis development to advance sustainable Transformation in HEIs.

Keywords: Strategic HRM, Open Innovation, Digital Transformation, Sustainable University Performance, Higher Education Institutions, Systematic Literature Review

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INTRODUCTION

Sustainable development has become a strategic priority for higher education institutions (HEIs), as stakeholders increasingly expect universities to deliver measurable contributions beyond academic excellence. In addition to producing knowledge and human capital, universities now demonstrate tangible impacts on society and the environment through responsible governance, resource efficiency, Innovation, and stakeholder engagement (Van Weenen, 2000). These expectations have intensified alongside rapid digital disruption, which has fundamentally reshaped how universities operate, collaborate, and create value. As a result, the concept of Sustainable University Performance (SUP) has gained prominence as a multidimensional outcome reflecting not only environmental and social responsibility but also institutional effectiveness and long-term resilience (Alghamdi et al., 2017).

To provide a strong theoretical foundation for understanding how universities achieve sustainability, this study adopts the Resource-Based View (RBV) (Barney, 1991) as its primary conceptual lens. The effective deployment of valuable, rare, inimitable, and non-substitutable resources and capabilities drives RBV and sustains organizational performance. In the context of HEIs, Strategic Human Resource Management (HRM) can be conceptualized as a foundational strategic resource that shapes human capital, organizational culture, and employee alignment with institutional goals. At the same time, Open Innovation (OI) and Digital Transformation (DT) represent higher-order organizational capabilities that enable universities to mobilize internal resources, integrate external knowledge, and adapt to dynamic environments. From this perspective, sustainable university performance is not merely an outcome but the result of a capability-building process in which HRM, OI, and DT interact as an integrated system.

Despite the growing attention to sustainability in higher education, the mechanisms through which universities transform internal resources into sustainable outcomes remain insufficiently understood. Existing research has largely focused on sustainability indicators, rankings, or outcome-based assessments, while offering limited explanation of the underlying organizational processes that drive these outcomes (Alghamdi et al., 2017). In particular, scholars widely recognize HRM as a strategic function that enhances organizational effectiveness. However, researchers have not sufficiently explored its role in driving sustainable university performance, especially in relation to Innovation and digital transformation processes (Armstrong, 2020). Concurrently, universities increasingly rely on open innovation practices—such as knowledge transfer, collaboration, and stakeholder engagement—to enhance societal relevance. At the same time, digital Transformation has become essential for improving digital readiness, agility, and capability development in complex institutional contexts (Chesbrough et al., 2008).

However, the existing literature remains fragmented across these domains. Many studies examine HRM, OI, DT, and sustainability as separate constructs, resulting in a limited understanding of how these elements interact to form a coherent system of value creation (Prokhorova et al., 2024). More importantly, there is a lack of integrative evidence explaining whether OI and DT function as enabling capabilities that mediate or strengthen the relationship between HRM and sustainable outcomes (Chua et al., 2024; Cheng et al., 2025). This gap is particularly critical for HEIs in emerging and developing contexts, where structural constraints, limited resources, and uneven digital readiness may significantly influence the sustainability transformation process (Ayyash & Salah, 2025).

Addressing this gap requires a shift from an outcome-oriented perspective toward a process-oriented understanding of sustainability in higher education. Rather than examining HRM, OI, and DT in isolation, it is necessary to conceptualize these elements as interdependent components within a capability-based framework. Specifically, HRM can be viewed as a foundational resource that enables the development of organizational capabilities, while OI facilitates external knowledge integration and DT enhances internal adaptability and operational

efficiency. Together, these elements form a pathway through which universities translate internal resources into sustainable performance outcomes.

To address these issues, this study conducts a Systematic Literature Review (SLR) to synthesize existing evidence and develop an integrated conceptual framework linking HRM, OI, DT, and SUP in higher education and related organizational contexts. The review follows the PRISMA guidelines to ensure transparency and methodological rigor. By adopting a process-oriented and capability-based perspective grounded in RBV, this study aims to clarify the mechanisms through which HRM contributes to sustainable university performance and to identify key research gaps for future empirical investigation.

LITERATURE REVIEWS

Sustainable University Performance (SUP)

Sustainable University Performance (SUP) reflects the ability of higher education institutions (HEIs) to generate long-term value while balancing academic missions with environmental and social responsibilities. Early conceptual work emphasizes embedding sustainability in institutional governance and operations rather than treating it as peripheral (Van Weenen, 2000). Empirically, SUP is commonly operationalized through multidimensional indicators capturing environmental performance, social impact, and institutional effectiveness (Alghamdi et al., 2017).

From a Resource-Based View (RBV) perspective, however, sustainable performance should not be understood solely as an outcome, but as the result of how internal resources and organizational capabilities are developed, combined, and deployed. This implies that SUP is a dynamic outcome of capability-building processes within HEIs, rather than a static endpoint measured solely by indicators. Nevertheless, much of the literature remains outcome-oriented and focuses on measurement frameworks without sufficiently explaining how organizations achieve sustainability. This creates a theoretical gap in understanding how universities transform strategic resources into sustainable outcomes.

Strategic Human Resource Management (HRM) as a Foundational Resource

Human Resource Management (HRM) has evolved from an administrative function into a strategic system that shapes organizational effectiveness through talent acquisition, development, engagement, and performance management (Armstrong, 2020). Within the RBV framework, scholars conceptualize HRM as a foundational strategic resource that enables organizations to build valuable, inimitable human capital, align employee behavior with institutional goals, and support long-term capability development.

In the context of sustainability, HRM contributes by fostering sustainability-oriented competencies, promoting employee engagement, and cultivating organizational cultures that support long-term performance. Empirical evidence shows that HRM positively relates to sustainable outcomes, particularly when HR practices align with institutional strategy and capability development (Prokhorova et al., 2024). However, scholars should not view HRM as an isolated predictor of performance. Instead, from a capability-based perspective, HRM plays a critical enabling role by shaping the organizational conditions under which other capabilities—such as Innovation and digital Transformation—can emerge and function effectively.

Specifically, HRM supports the development of absorptive capacity, collaborative behaviors, and digital competencies, which are essential for leveraging both internal and external knowledge. This suggests that HRM operates not only as a direct driver of performance but also as a foundational resource that enables higher-order capabilities, particularly Open Innovation (OI) and Digital Transformation (DT).

Open Innovation (OI) as a Collaborative Capability

Open Innovation (OI) refers to the purposive inflow and outflow of knowledge to accelerate Innovation and improve organizational outcomes (Chesbrough et al., 2008). In higher education contexts, researchers commonly manifest OI through university–industry collaboration, knowledge transfer, joint research initiatives, and stakeholder engagement. These activities enhance universities' ability to co-create knowledge and generate broader societal impact, thereby contributing to sustainability outcomes (Pacheco et al., 2024).

From an RBV and capability-based perspective, we conceptualize OI as a boundary-spanning organizational capability that enables HEIs to extend internal resources through external knowledge integration. Importantly, the effectiveness of OI depends on internal organizational readiness, particularly the human and organizational resources shaped by HRM. For instance, HRM practices that promote collaboration, knowledge sharing, and boundary-spanning roles are critical for enabling universities to absorb and utilize external knowledge effectively.

This interdependence suggests that OI is not a standalone mechanism but rather a capability enabled and strengthened by HRM. Furthermore, OI may serve as a mediating mechanism through which HRM influences sustainable performance, enabling institutions to translate internal competencies into broader innovation and sustainability outcomes. Therefore, OI represents a critical link between internal resources and external value creation in the pathway toward Sustainable University Performance.

Digital Transformation (DT) as an Enabling Capability

Digital Transformation (DT) refers to organization-wide changes driven by digital technologies that reshape processes, structures, and capabilities to enhance performance and adaptability. In HEIs, DT has become a strategic necessity for improving operational efficiency, service delivery, learning systems, and institutional resilience. Empirical studies show that digital technologies contribute to sustainability performance by enhancing efficiency, enabling data-driven decision-making, and increasing organizational responsiveness (Tao & Chao, 2024).

Within the Resource-Based View (RBV) framework, digital transformation (DT) can be understood as an enabling organizational capability that allows institutions to reconfigure and leverage their existing resources more effectively. Importantly, DT is not merely about technological adoption but involves the development of digital capabilities, leadership, and organizational culture. In this regard, HRM plays a central role in enabling DT by developing digital competencies, supporting digital leadership, and fostering a culture of continuous learning and Innovation (Chrusciak et al., 2025).

Moreover, emerging evidence suggests that DT frequently mediates the relationship between HRM and sustainable performance. HRM contributes to digital readiness and capability development, which, in turn, enhances sustainability outcomes (Chua et al., 2024; Cheng et al., 2025). This indicates that DT functions as a key mechanism through which human capital is transformed into measurable organizational performance, reinforcing the importance of capability-based pathways in achieving sustainability.

Integrating HRM, OI, and DT toward Sustainable University Performance: A Capability-Based Perspective

Synthesizing the literature reveals two dominant perspectives: outcome-oriented and process-oriented approaches. The outcome-oriented perspective focuses on sustainability as a measurable institutional outcome, emphasizing performance indicators and direct relationships among constructs (Van Weenen, 2000; Alghamdi et al., 2017). In contrast, the process-oriented perspective emphasizes how internal resources and organizational capabilities interact to generate sustainable outcomes over time.

Building on RBV, this study adopts a process-oriented, capability-based perspective, conceptualizing HRM as a foundational strategic resource, and OI and DT as complementary

organizational capabilities. These capabilities interact to form a pathway through which universities transform internal resources into sustainable performance outcomes.

Specifically, HRM enables the development of both OI and DT by fostering collaboration, knowledge sharing, and digital competencies. OI, in turn, enhances external knowledge integration and innovation capacity, while DT strengthens internal processes, agility, and efficiency. Emerging evidence also suggests a sequential relationship in which OI contributes to digital capability development, which subsequently enhances sustainability outcomes (Yang et al., 2024).

Despite these insights, the existing literature still lacks a fully integrated framework that systematically explains the direct, indirect, and sequential relationships among HRM, OI, DT, and SUP in higher education contexts. Addressing this gap is essential for advancing both theoretical understanding and practical application.

Accordingly, this study positions HRM as a foundational resource and conceptualizes OI and DT as enabling capabilities that mediate and extend its impact on sustainable university performance. This integrated perspective provides a robust theoretical foundation for developing a conceptual framework and formulating testable hypotheses in future empirical research (see table 1).

Table 1 Summary of Constructs, Definitions, and Key Indicators

Construct	Definition (in this study)	Key indicators / operational focus (examples)	Notes (optional)
Strategic Human Resource Management (HRM)	A strategic system of HR practices that develops human capital, aligns employee behaviors with institutional goals, and supports capability building for long-term performance.	Recruitment & selection quality; training and development; performance appraisal; rewards/compensation alignment; employee engagement and participation; retention practices; well-being and supportive culture.	Positions HRM as a foundational resource that enables the development of higher-order capabilities, particularly OI and DT, in driving sustainable performance.
Open Innovation (OI)	The use of purposive knowledge inflows and outflows through collaboration with external stakeholders to enhance innovation and value creation in HEIs.	University–industry collaboration; knowledge transfer and commercialization; co-creation with stakeholders; research partnerships/networks; external knowledge sourcing; absorptive capacity for using external ideas.	Emphasizes OI as an externally oriented capability that leverages HRM-enabled conditions to translate internal resources into societal and innovation outcomes.
Digital Transformation (DT)	Organization-wide transformation enabled by digital	Digital readiness; digital capability development; process digitalization; data-	Highlights DT as an enabling capability

Construct	Definition (in this study)	Key indicators / operational focus (examples)	Notes (optional)
	technologies that reshapes processes, structures, and capabilities to improve agility and performance.	driven decision making; technology-enabled service delivery; digital leadership; integration of digital systems with strategy.	shaped by HRM that reconfigures organizational processes and strengthens the pathway toward sustainability.
Sustainable University Performance (SUP)	Multidimensional sustainable outcomes achieved by HEIs through balancing academic missions with environmental, social, and institutional responsibilities.	Environmental performance (resource efficiency, waste reduction); social impact (community engagement, equity); institutional effectiveness (governance, resilience); innovation and long-term competitiveness; stakeholder value creation.	Conceptualizes SUP as a capability-driven outcome resulting from the interaction of internal resources (HRM) and enabling capabilities (OI and DT).

Based on the reviewed literature, Sustainable University Performance (SUP) should be viewed not only as an outcome but also as the result of capability development within higher education institutions. Strategic HRM plays a key role by shaping human capital, organizational culture, and employee alignment toward sustainability-oriented goals. However, HRM alone may not fully explain sustainable outcomes without support from other organizational capabilities. Open Innovation strengthens external collaboration and knowledge sharing, while Digital Transformation enhances digital readiness, agility, and process integration. Therefore, this study proposes an integrated conceptual framework in which HRM influences SUP both directly and indirectly through OI and DT. This framework provides a basis for developing testable hypotheses and guiding future empirical research on sustainable transformation in HEIs.

RESEARCH METHODOLOGY

Research Design

This study uses a Systematic Literature Review (SLR) to examine how Strategic Human Resource Management (HRM) drives Sustainable University Performance (SUP) through Open Innovation (OI) and Digital Transformation (DT). The SLR approach is particularly appropriate for consolidating fragmented evidence across interdisciplinary domains and for developing an integrated conceptual framework grounded in theory.

To ensure methodological rigor, this review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The review adopts the Resource-Based View (RBV) to frame HRM as a strategic resource and open Innovation (OI) and digital Transformation (DT) as higher-order capabilities.

Data Sources and Search Strategy

The researchers conducted a structured literature search using two major academic databases: Scopus and Web of Science (WoS), selected for their comprehensive coverage of high-quality, peer-reviewed research in management, Innovation, sustainability, and higher education.

The search strategy employed Boolean operators across four key construct domains aligned with the study objectives: HRM, OI, DT, and sustainability outcomes. Representative search terms included:

- **Human Resource Management:** "human resource management" OR "strategic HRM" OR "digital HRM" OR "e-HRM."
- **Open Innovation:** "open innovation" OR "knowledge transfer" OR "university–industry collaboration."
- **Digital Transformation:** "digital transformation" OR "digital capability" OR "digital readiness."
- **Sustainability:** "sustainable university" OR "sustainable performance" OR "university sustainability."

The search was limited to studies published between 2020 and 2024, reflecting an intentional focus on the most recent developments in sustainability and digital Transformation. This period captures accelerated digitalization and sustainability-driven changes in higher education, particularly in the post-pandemic context, thereby enhancing the contemporary relevance of the findings.

Identification and Screening Process (PRISMA)

The initial search yielded 742 records (Scopus = 412; Web of Science = 330). After removing 186 duplicates, 556 unique records remained for title and abstract screening. During this stage, the study excluded 438 records due to their limited relevance to higher education contexts, sustainability outcomes, or organizational mechanisms.

The researchers subsequently assessed 118 full-text articles for eligibility and excluded 64 studies for the following reasons:

- 1) focus on technical systems without organizational relevance (n = 27),
- 2) absence of linkage between HRM, OI, DT, and sustainability mechanisms (n = 22), and 3) lack of substantive theoretical or empirical contribution (n = 15).

The final sample consisted of 54 peer-reviewed journal articles included in the thematic synthesis.

The study selection process is summarized using the PRISMA 2020 flow structure (see Figure 2).

Inclusion and Exclusion Criteria

The researchers included studies if they met all of the following criteria:

- 1) Published in peer-reviewed academic journals
- 2) Written in English
- 3) Focused on higher education institutions (HEIs) or closely related organizational contexts
- 4) Examined at least one focal construct (HRM, OI, DT, or sustainability outcomes)
- 5) Provided empirical evidence or substantive theoretical discussion related to organizational processes or capability development

We excluded studies that focused exclusively on technological systems, infrastructure, or sustainability indicators without addressing internal organizational mechanisms.

Data Extraction and Analytical Framework

The researchers applied a structured data extraction protocol to all included studies. Extracted information included research context, theoretical foundation, methodology, key constructs, and the nature of relationships among HRM, OI, DT, and sustainability outcomes.

Guided by the Resource-Based View (RBV), the analysis classified:

HRM as a foundational strategic resource, and
OI and DT as higher-order organizational capabilities

This classification enabled the researchers to interpret how internal resources translate into sustainable performance outcomes.

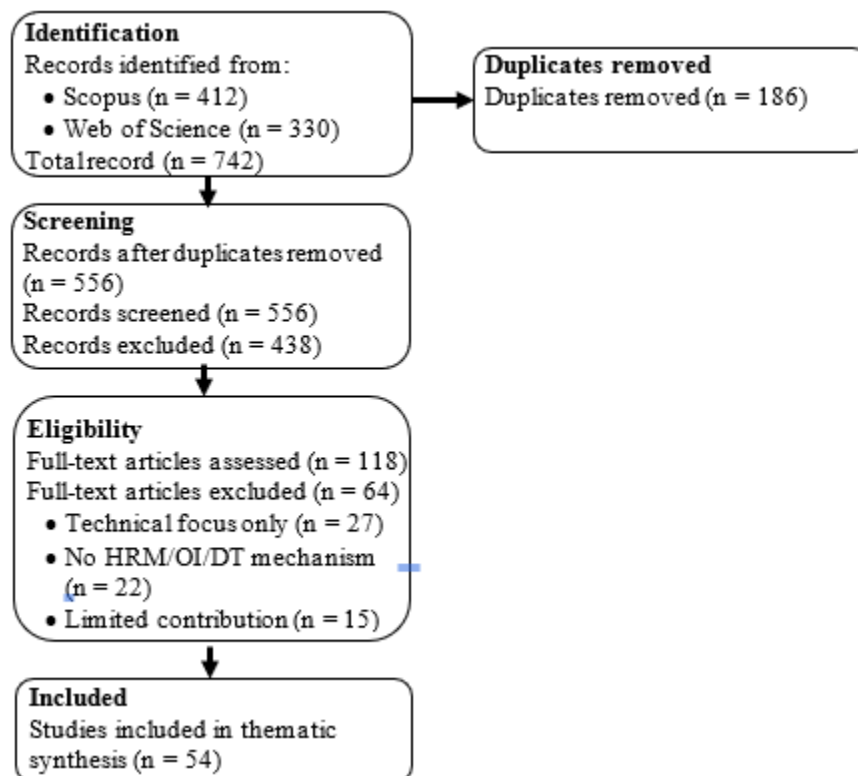


Figure 1 PRISMA 2020 Flow Diagram for Study Selection

Analytical Approach: Thematic Synthesis

To systematically integrate findings across diverse study designs, this review employed thematic synthesis, which is well-suited for combining qualitative, quantitative, and mixed-method evidence.

The analytical process followed a three-stage coding procedure:

Stage 1: Initial Coding (Open Coding)

Key concepts and variables related to HRM, OI, DT, and sustainability were identified and coded from each study. This stage focused on extracting meaningful units of analysis, including constructs, relationships, and research contexts.

Stage 2: Axial Coding (Category Development)

The researchers grouped codes into categories based on conceptual similarities and relationships. This stage emphasized identifying patterns of interaction among constructs, particularly direct, indirect, and sequential relationships.

Stage 3: Selective Coding (Theme Integration)

The researchers developed higher-order themes to explain the progression from internal resources to sustainable outcomes. This process resulted in four dominant themes:

- (1) HRM as a foundational strategic resource,
- (2) OI as a collaborative capability,
- (3) DT as an enabling capability, and
- (4) SUP as a multidimensional outcome.

Reliability and Validity

To enhance the rigor and credibility of the review, we employed several strategies:

- A two-stage screening process (title/abstract and full-text review) based on predefined criteria
- Iterative coding and cross-validation of themes to ensure conceptual consistency
- Resolution of ambiguities through systematic comparison and reviewer discussion

These procedures strengthen the transparency, reliability, and reproducibility of the review.

RESEARCH RESULTS

Overview of the Thematic Synthesis

After the PRISMA-guided screening process, we included 54 studies in the final qualitative and thematic synthesis. The studies reflect a growing interest in sustainability-driven Transformation within higher education institutions (HEIs). The research designs included quantitative surveys (e.g., SEM-based studies), mixed-method approaches, and qualitative case studies. Across the reviewed studies, we commonly treated sustainability as a multidimensional performance outcome, while we treated HRM, OI, and DT as organizational resources and mechanisms that support sustainable change.

To organize the synthesis, we coded all studies according to their research context, key constructs, methods, and research perspective (outcome-oriented vs. process-oriented). This coding enabled thematic clustering and identified dominant patterns in how HRM, OI, and DT contribute to Sustainable University Performance (SUP) (see table 2).

Table 2 Thematic Synthesis of Prior Literature

Theme	Operational Definition	Key Indicators / Sub-dimension	Evidence Pattern (Synthesis)	Representative Studies
T1: HRM as a Foundational Strategic Resource	HRM as an internal strategic resource building competence and change readiness for sustainability.	recruitment, training, performance management, engagement, retention, digital HRM.	Evidence shows that HRM enhances sustainability by developing human capital, fostering engagement, and aligning practices with strategic goals. It also strengthens readiness for innovation and digital transformation, although indirect pathways are less frequently examined.	Armstrong (2020); Chua et al. (2024); Prokhorova et al. (2024).
T2: Open Innovation as a Collaborative Capability	OI as a boundary-spanning capability leveraging external knowledge and partnerships.	U–I collaboration, knowledge transfer, co-creation, stakeholder engagement.	Evidence indicates that OI improves sustainability through knowledge exchange, stakeholder engagement, and expanded innovation capacity, enabling the translation of internal capabilities into societal impact, although often examined independently of HRM.	Chesbrough et al. (2008); Pacheco et al. (2024); Yang et al. (2024).
T3: Digital Transformation as an Enabling Capability	DT as organizational capability involving technology, process, culture, and governance change.	digital readiness, digital capability, digital leadership, process redesign.	Evidence shows that DT enhances sustainability by improving efficiency, data-driven decision-making, and organizational agility. DT is increasingly viewed as a capability shaped by HRM, although many studies still emphasize technology adoption.	Cheng et al. (2025); Tao & Chao (2024); Chrusciak et al. (2025).

Theme	Operational Definition	Key Indicators / Sub-dimension	Evidence Pattern (Synthesis)	Representative Studies
T4: Sustainable University Performance (SUP)	Long-term balanced performance across academic, social, economic, and environmental dimensions.	academic excellence, social impact, economic resilience, environmental responsibility.	Evidence confirms that SUP is a multidimensional outcome encompassing environmental, social, and institutional performance, and is strengthened by internal resources and capabilities, although often assessed through outcome-based measures.	Van Weenen (2000); Alghamdi et al. (2017); United Nations (2015).

Thematic Findings

The thematic synthesis revealed four dominant themes that explain the progression from internal organizational resources to sustainable outcomes in HEIs.

Theme 1: Strategic HRM as a Foundational Resource for Sustainability

A consistent pattern across the studies agrees that HRM is a foundational resource that shapes sustainability-oriented competencies, employee engagement, and institutional alignment. The studies further emphasize that HRM supports sustainable performance when organizations strategically integrate HR practices with institutional objectives and capability development. Rather than being an isolated administrative system, HRM operates as a supportive system that builds human capital and supports organizational change readiness.

Key insight: HRM contributes to sustainability not only through direct performance effects but also by strengthening internal readiness for Innovation and digital Transformation.

Theme 2: Open Innovation as a Collaborative Capability

The second theme highlights that open Innovation (OI) helps universities access external knowledge and resources through collaboration. Studies show that university–industry partnerships, knowledge-sharing activities, and stakeholder engagement strengthen the social and economic dimensions of sustainability by improving relevance, innovation outputs, and societal impact.

Key insight: Studies often present OI as a mechanism through which universities convert internal capabilities into broader sustainability impacts, especially when internal governance and HR alignment support collaboration.

Theme 3: Digital Transformation as an Enabling Capability for Sustainable Performance

The third theme shows that digital transformation (DT) helps universities improve flexibility, coordination processes, and digital readiness. The reviewed studies suggest that digital technologies contribute to sustainability performance by improving efficiency, responsiveness, and data-driven decision-making. Importantly, the reviewed studies increasingly conceptualize DT as an organizational transformation process rather than merely technological adoption.

Key insight: DT functions as a capability-building pathway that supports sustainable outcomes, especially when universities develop digital readiness and leadership as part of transformation efforts.

Theme 4: Sustainable University Performance as a Multidimensional Outcome

The fourth theme shows that studies treat SUP as a multidimensional construct that includes environmental, social, and institutional performance dimensions. The reviewed studies reflect an outcome-oriented focus in measuring sustainability performance through indicators and institutional outcomes. Studies explicitly consider internal mechanisms (HRM, OI, DT).

Key insight: This study interprets SUP as the result of a process that links internal resources and organizational capabilities to support long-term institutional sustainability.

Synthesis of Relationships Among HRM, OI, DT, and SUP

Beyond thematic patterns, the reviewed studies reveal three dominant relationship structures:

- **Direct relationship:** HRM shows a positive link with sustainability outcomes in HEIs when HR systems align with institutional strategy and performance goals.
- **Indirect relationships:** Several studies suggest that HRM influences sustainability outcomes through mechanisms such as digital readiness and digital capability development, indicating that HRM may operate indirectly through DT-related pathways.
- **Sequential relationship:** Evidence also indicates that OI supports digital capability and innovation outcomes, implying a sequential mechanism that strengthens digital readiness and enhances sustainable performance.

Overall, the synthesis supports a process-oriented interpretation: HRM acts as a foundational strategic resource, while OI and DT serve as enabling capabilities that help transform internal resources into sustainable outcomes.

Research Perspective: Outcome-Oriented vs. Process-Oriented Evidence

The synthesis further identifies two research perspectives. The outcome-oriented perspective emphasizes sustainability as an institutional outcome measured through indicators and performance indicators. In contrast, the process-oriented perspective focuses on how internal resources and capabilities interact to generate sustainable outcomes. The reviewed studies suggested that, while outcome measurement is important, sustainable university performance is better explained when capability development and organizational mechanisms (HRM–OI–DT) are taken into account (see table 3).

Table 3 Key Studies Linking HRM, OI, DT, and Sustainability Outcomes

No.	Study	Research context	Key constructs examined	Method / analytical approach	Main evidence (relationships)	Research perspective
1	Van Weenen (2000)	Universities	Sustainability	Conceptual	Sustainability is embedded as an institutional outcome, without explicit linkage to HRM, OI, or DT mechanisms	Outcome-oriented
2	Alghamdi et al. (2017)	Higher education	Sustainability indicators	Mixed methods	Sustainability is measured as a multidimensional outcome; relationships with internal capabilities are not explicitly modeled	Outcome-oriented
3	Armstrong (2020)	Organizations	HRM	Theoretical	HRM → Organizational performance (direct effect), without specifying mediating mechanisms	Isolated predictor
4	Chesbrough et al. (2008)	Organizations / universities	Open innovation	Conceptual	OI → Innovation performance (direct effect), independent of HRM or DT integration	Isolated mechanism
5	Prokhorova et al. (2024)	Universities	HRM, DT, sustainability	Survey	HRM → DT → Sustainable outcomes (partial mediation);	Direct + indirect

No.	Study	Research context	Key constructs examined		Method / analytical approach	Main evidence (relationships)	Research perspective
						HRM also shows a direct effect on sustainability	
6	Chua et al. (2024)	Developing countries	HRM, sustainability	DT,	SEM	HRM → Digital readiness → Sustainable performance (full mediation pathway)	Indirect (mediation)
7	Cheng et al. (2025)	Universities	HRM, sustainability	DT,	SEM	HRM → Digital capability → Sustainable performance (mediated relationship confirming capability-based mechanism)	Indirect (mediation)
8	Yang et al. (2024)	Universities	OI, DT		SEM	OI → Digital capability → Innovation/Sustainability outcomes (sequential pathway); DT acts as mediator	Sequential
9	Tao & Chao (2024)	Higher education	Industry DT, sustainability	4.0,	Quantitative	DT → Sustainability performance (direct effect through efficiency and digitalization)	Direct
10	Chrusciak et al. (2025)	Universities	Digital DT	HRM,	Survey	Digital HRM → DT (HR-enabled transformation pathway), indicating HRM-driven capability development	Process-oriented
11	Pacheco et al. (2024)	Universities	OI, knowledge transfer		Case study	OI → Social and economic sustainability outcomes (direct external collaboration effect)	Direct
12	Ayyash & Salah (2025)	Universities (developing contexts)	HRM, DT		Case study	HRM → DT (weakened by contextual constraints), indicating moderated capability pathway	Context-specific
13	Ly (2025)	Public organizations	Leadership, sustainability	DT,	SEM	Digital leadership → DT → Sustainable performance (indirect pathway via DT)	Indirect

The revised evidence map provides a clearer relational synthesis of prior studies by explicitly identifying direct, indirect, and sequential pathways among HRM, OI, DT, and sustainability outcomes. Unlike prior descriptive summaries, this mapping highlights how organizational

capabilities function as mediating mechanisms, supporting a process-oriented interpretation of sustainable university performance.

DISCUSSION AND CONCLUSION

This systematic literature review synthesizes previous research on how Human Resource Management (HRM) contributes to Sustainable University Performance (SUP) and how Open Innovation (OI) and Digital Transformation (DT) help strengthen this process in higher education institutions (HEIs).

The findings show that treating sustainability not only as a measurable endpoint but also as the result of capability-building processes more comprehensively explains sustainable university outcomes. Overall, the review supports a process-oriented view of sustainability transformation in HEIs, complementing earlier outcome-focused conceptualizations of sustainability in universities (Van Weenen, 2000; Alghamdi et al., 2017).

Key Contributions and How This Review Extends Prior Research

First, the review shows that strategic HRM supports sustainability-oriented capability development rather than functioning as just an isolated predictor of performance. HRM supports sustainability by developing staff skills, shaping organizational culture, and aligning people with institutional goals. This interpretation aligns with previous research that views HRM as a strategic function that enables organizational effectiveness and long-term performance (Armstrong, 2020). Empirical evidence in university settings further suggests that HRM practices are associated with sustainable outcomes when aligned with capability development and institutional strategy (Prokhorova et al., 2024). Overall, this review indicates that HRM functions as an enabling infrastructure for Transformation, particularly in complex institutional environments such as universities.

Second, this review highlights open Innovation as a collaborative capability that enables HEIs to extend their internal resources through knowledge transfer, partnerships, and stakeholder engagement. This supports foundational OI arguments that external collaboration enhances innovation performance and value creation (Chesbrough et al., 2008). In the HEI context, collaboration and knowledge transfer have been shown to strengthen social and economic sustainability outcomes by increasing societal relevance and stakeholder impact (Pacheco et al., 2024). The review extends previous studies by showing that OI should not function as a standalone strategy; rather, it may depend on HRM-enabled conditions, such as incentives, collaborative roles, and a supportive organizational culture.

Third, the findings demonstrate that digital Transformation supports sustainability by enhancing digital readiness, process integration, and organizational agility. This is consistent with evidence that digital technologies can improve sustainability performance through efficiency and responsiveness in higher education contexts (Tao & Chao, 2024). Beyond technology adoption, recent studies increasingly conceptualize DT as a capability-building pathway, where HRM influences sustainability outcomes indirectly through digital readiness and digital capability development (Chua et al., 2024; Cheng et al., 2025). In addition, digital HRM strengthens DT as an organizational process (Chrusciak et al., 2025). Collectively, these insights address a key limitation in previous studies that examined HRM, OI, DT, and sustainability separately. In contrast, the current review proposes an integrated interpretation in which HRM serves as a foundational resource. At the same time, OI and DT operate as complementary capabilities that shape the pathway toward SUP.

Outcome-Oriented Versus Process-Oriented Explanations

The review reveals a clear distinction between outcome-oriented and process-oriented research perspectives. Outcome-oriented studies primarily focus on measuring sustainability and direct associations among constructs, using indicator-based evaluation (Alghamdi et al., 2017). However, the thematic synthesis indicates that such approaches often fail to explain how internal

organizational mechanisms and capability development produce sustainability outcomes. In contrast, process-oriented studies provide richer explanations by emphasizing readiness, Transformation, and collaboration processes, particularly when indirect relationships are considered (Chua et al., 2024; Cheng et al., 2025).

Boundary Conditions and Contextual Constraints

A key implication from the evidence is that sustainability transformation is context-dependent, particularly for HEIs in developing and emerging economies. Constraints such as limited resources, rigid governance systems, and uneven digital readiness may restrict universities' ability to implement DT or sustain OI partnerships effectively (Ayyash & Salah, 2025). Therefore, the HRM–OI–DT–SUP pathway may not operate uniformly across all settings. Future studies should incorporate contextual factors and compare different regions and institutional contexts.

Implications for Conceptual Framework and Hypothesis Development

The integrated evidence supports a framework in which HRM affects SUP both directly and indirectly. The review suggests that OI and DT frequently operate as enabling mechanisms that explain the HRM–SUP relationship, either independently or sequentially through capability development (Chua et al., 2024; Cheng et al., 2025; Yang et al., 2024). These findings provide a strong foundation for hypothesis development in subsequent empirical research, particularly for testing mediation pathways (e.g., $\text{HRM} \rightarrow \text{DT} \rightarrow \text{SUP}$; $\text{HRM} \rightarrow \text{OI} \rightarrow \text{SUP}$) and integrated capability models (e.g., $\text{HRM} \rightarrow \text{OI} \rightarrow \text{DT} \rightarrow \text{SUP}$).

From a theoretical perspective, these findings extend the Resource-Based View (RBV) by incorporating a dynamic capability perspective (Teece, 2007). This study interprets open Innovation and digital Transformation as dynamic capabilities that enable universities to sense, seize, and transform opportunities, highlighting that HRM alone is insufficient unless it translates into higher-order capabilities that drive sustainable outcomes.

CONCLUSION

This study conducted a Systematic Literature Review (SLR) to synthesize how Human Resource Management (HRM) contributes to Sustainable University Performance (SUP) and to clarify the enabling roles of Open Innovation (OI) and Digital Transformation (DT) in higher education institutions (HEIs). The findings indicate that a process-oriented pathway more comprehensively explains sustainability outcomes in universities. HRM serves as a key strategic resource that strengthens organizational readiness and supports staff development. At the same time, OI and DT operate as supporting capabilities that help turn internal resources into measurable, sustainable performance.

The review highlights four dominant themes: strategic HRM as a foundational resource, OI as a collaborative capability, DT as an enabling capability, and SUP as a multidimensional outcome. Overall, the evidence suggests that OI and DT frequently mediate the HRM–SUP relationship, strengthening it.

This integrated perspective goes beyond studying each factor separately. It offers a clearer explanation of how universities can develop sustainability-oriented capabilities in response to digital disruption and rising societal expectations.

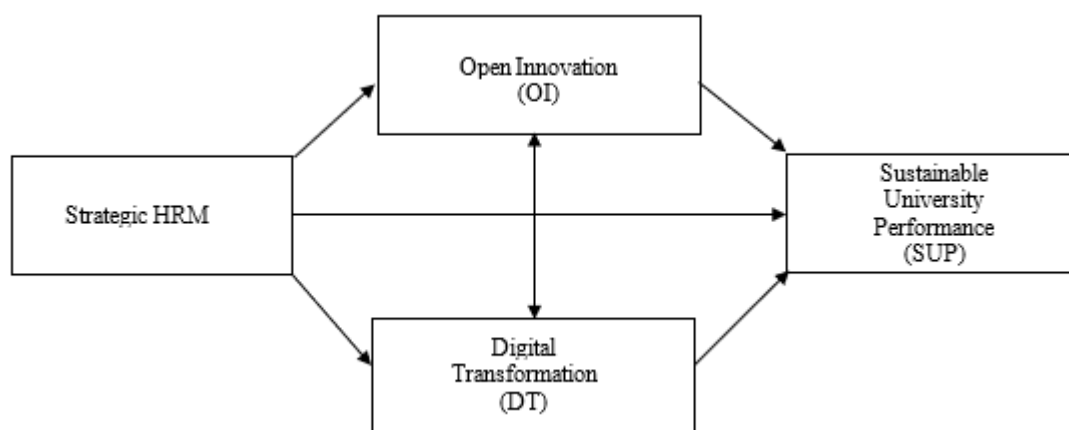


Figure 2 Integrated Conceptual Framework

Figure 2 illustrates the integrated conceptual framework in which Strategic HRM influences Sustainable University Performance both directly and indirectly through Open Innovation and Digital Transformation, including a sequential capability pathway.

Limitations and future research.

The integrated framework developed in this study provides a strong foundation for future empirical research. In particular, it supports the development of testable hypotheses that capture direct, indirect, and sequential relationships among HRM, OI, DT, and SUP.

For example, future studies may examine:

- The mediating role of DT in the HRM–SUP relationship
- The mediating role of OI in translating HRM into sustainability outcomes
- The sequential mediation of OI and DT in shaping sustainable performance

Such empirical validation would strengthen causal explanations and advance the theoretical development of sustainability in higher education

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