

Original Article

Digital Leadership and Innovation in Higher Education: A Systematic Review of Literature

Adryan J. Valiao^{1,2} , Darleen May P. Claro^{1,2} , Rhon Dave P. Suarez^{1,2} , Jerlu Vincent G. Santillana^{1,2} 
Maychelle B. Mariño^{1,2} 

Author Information:

¹National University, Philippines

²General Education Department, School of Education, Arts, and Sciences, NU Bacolod, Bacolod City, Philippines

Corresponding Author:

Adryan J. Valiao
ajvaliao@nu-bacolod.edu.ph

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Abstract. Digital leadership is increasingly recognized as a critical determinant of institutional capacity for innovation in higher education. However, the field lacks a systematic synthesis of how this relationship is conceptualized, operationalized, and evidenced across diverse institutional and national contexts. Applying PRISMA 2020 guidelines, this systematic review searched four academic databases for peer-reviewed literature published between 2019 and 2025. Of 122 initially identified records, 11 studies met the full inclusion criteria after deduplication, title/abstract screening, and full-text appraisal. The included corpus spans framework development, qualitative case studies, quantitative structural equation modeling, and systematic literature review, conducted across Indonesia, Vietnam, South Africa, China, Russia, and the Arab Gulf region. Findings indicate that digital leadership is consistently associated with innovation-enabling conditions, including digital culture, dynamic organizational capabilities, and knowledge-sharing behavior. However, its direct effect on innovation outcomes is not uniformly supported across contexts. Notably, Shen et al. (2025) found no significant direct relationship between digital leadership and green digital innovation, a finding that productively complicates the mediation-centered models reported elsewhere in the corpus. The review surfaces definitional heterogeneity, methodological fragmentation, and context-specificity as persistent challenges, and proposes implications for institutional governance, leadership development policy, and future empirical inquiry.

Keywords: *Digital leadership; Higher education; Systematic review; Digital transformation; Organizational learning.*

Higher education institutions occupy a structurally paradoxical position in the contemporary knowledge economy: they are simultaneously producers of the expertise that drives digital transformation and among its most change-resistant institutional forms. Unlike commercial organizations, universities carry deep-seated governance traditions, distributed authority structures, and cultures of academic autonomy that can slow or deflect the adoption of digitally enabled practices. However, the pressures they face are real and mounting: from the expectations of digitally native student cohorts and the rise of platform-based learning to national competitiveness agendas that cast digital innovation as an indicator of institutional quality. The question of how leadership can function as a productive mediating force in this tension has therefore acquired both practical and scholarly urgency.

Within this context, digital leadership has emerged as a distinct construct in educational governance and management research, though its meaning remains contested. At one pole, Ehlers (2020) defines it as a competency-oriented disposition: the capacity of institutional leaders to guide organizations through digital change, embedding digital values rather than merely deploying digital tools. In contrast, researchers such as Ghamrawi & M. Tamim (2023) have proposed structured typologies, notably a five-dimension model encompassing digital competence, digital culture, digital differentiation, digital governance, and digital advocacy, that articulate what digital leadership looks like in practice. These two orientations are not mutually exclusive, but they carry different implications for measurement, capacity-building, and institutional policy. This review treats both with appropriate critical distance: Ehlers' framework is drawn on for its conceptual purchase, and the five-dimension typology is treated as a case-study-derived heuristic rather than a validated universal model.

Despite growing scholarly attention to both digital leadership and innovation in higher education, the relationship between them has not been subjected to rigorous systematic review. Existing literature is dispersed across education, management, and technology journals; it spans conceptual frameworks, single-institution case studies, quantitative structural models, and narrative reviews, making cumulative knowledge-building difficult. Reviews of digital leadership in general organizational contexts provide partial insight, but higher education presents sector-specific conditions (non-commercial purpose, collegial governance, academic freedom) that limit the transferability of findings from corporate or K-12 settings (Onan, 2024). At the same time, studies of innovation in higher education frequently treat leadership as an environmental background variable rather than an object of systematic analysis. This leaves a demonstrable gap between the proliferation of individual studies and a synthesis capable of informing policy or institutional strategy.

We adopted a systematic approach to address this gap. Transparent search and selection procedures, guided by the PRISMA 2020 framework (Page et al., 2021), were used to reduce selection bias and make the review's evidentiary basis explicitly auditable. This choice reflects more than procedural orthodoxy: given the methodological heterogeneity of the extant literature, which encompasses qualitative case studies conducted in single institutions, quantitative surveys using partial least squares structural equation modeling (PLS-SEM), theoretical framework papers, and broader systematic reviews, any synthesis that is not transparent about its scope and selection risks presenting a misleadingly coherent picture of what is in fact a fragmented and sometimes contradictory body of evidence. Systematic methods do not eliminate interpretive judgment; they make it visible.

The review is theoretically anchored in a competency-based conception of digital leadership, which provides sufficient flexibility to accommodate the diversity of operationalization found in the included studies without over-specifying the construct (Ehlers, 2020). The five-dimension typology is used as a heuristic lens for organizing findings about leadership behaviors and institutional practices, rather than as a validated theoretical model against which evidence is measured (Ghamrawi & M. Tamim, 2023). This distinction matters: the typology emerged from semi-structured interviews with six leaders at a single institution in the Arab Gulf region, and its generalizability beyond that context has not been independently tested. Treating it as a sensitizing framework rather than a confirmatory one avoids the circular reasoning that can arise when a review's theoretical lens is also an object of its inquiry.

The significance of a rigorous synthesis extends beyond academic stock-taking. The findings of this review have direct implications for how universities recruit and develop senior leaders, structure digital governance, and situate leadership training within broader innovation strategies. However, a central insight of the review is that the relationship between digital leadership and innovation is not straightforwardly positive or linear. Suryadi et al. (2024) demonstrate, through PLS-SEM with 234 faculty members in Indonesian higher education, that digital leadership contributes to institutional performance through digital innovation as a mediating mechanism. Shen et al. (2025), by contrast, found no significant direct path from digital leadership to green digital innovation in a longitudinal study, with indirect effects operating through dynamic capabilities and knowledge-sharing. This divergence is not a deficiency in the literature but a theoretically productive contradiction: it signals that the conditions under which digital leadership matters for innovation (what mediates it, what moderates it, and in which institutional contexts it operates) remain substantially unresolved.

The remainder of this article is structured as follows. Section 2 describes the methodology, including search strategy, inclusion and exclusion criteria, the PRISMA flow from 122 identified records to 11 included studies, quality assessment procedures, and data extraction approach. Section 3 presents and discusses findings through

a thematic synthesis organized around five inter-related themes: the conceptualization of digital leadership in higher education; its association with innovation outcomes; the mediating mechanisms and boundary conditions that qualify that association; cross-contextual variability; and theoretical and methodological heterogeneity within the corpus. Section 4 presents conclusions, practical implications, and future research priorities.

Methodology

This review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines (Page et al., 2021). The protocol prioritized transparency at each stage: search strategy, eligibility criteria, screening, quality assessment, and data extraction are described below in sufficient detail to support independent replication.

Search Strategy

We conducted systematic searches across four academic databases: Google Scholar, PubMed, Web of Science (or Scopus), and ERIC. These were selected to provide broad coverage across education, management, technology, and health-adjacent science journals. Searches were executed in English using a Boolean query combining controlled vocabulary and free-text terms: ("digital leadership" OR "digital leader") AND ("higher education" OR "university" OR "HEI") AND ("innovation" OR "digital transformation" OR "digital governance"). The search covered publications dated from January 2019 to December 2025, reflecting the period during which digital leadership in higher education emerged as a discrete research domain.

The choice of search window is substantively motivated. The 2019 lower boundary captures contributions from before and immediately after the COVID-19 pandemic, which created a natural experiment in institutional digital capacity. It also aligns with the publication of Ehlers' (2020) foundational competency framework, which anchors the theoretical dimension of this review. Studies published before 2019 were excluded because the construct of digital leadership in higher education had not yet attained sufficient theoretical coherence to form a cumulative evidence base.

Inclusion and Exclusion Criteria

We applied inclusion criteria at two stages. For title/abstract screening, studies were retained if they: (a) focused explicitly on digital leadership, defined as leadership practices, competencies, strategies, or roles related to digital transformation, digital governance, or digital culture, in a higher education context; (b) addressed innovation outcomes, innovation-enabling conditions, or digital transformation processes at the institutional level; and (c) reported original empirical findings, original theoretical development, or a structured systematic review of the topic. Studies were excluded if they focused solely on K-12 or vocational settings, addressed digital tools or learning technologies without a leadership dimension, were published outside the 2019–2025 window, were not available in English, or were limited to conference abstracts, editorial comments, or non-peer-reviewed grey literature.

For full-text review, we applied the same criteria with greater precision. We also excluded studies where the higher education context was incidental rather than central, where digital leadership was treated as an undefined background variable, or where insufficient methodological detail was provided to assess study design and quality. Four studies that passed title/abstract screening were excluded at this stage: two on contextual grounds (K-12 settings conflated with higher education), one on methodological grounds (conference abstract only), and one because the leadership dimension was peripheral to the study's main argument.

PRISMA Selection Procedure

The PRISMA flow proceeded as follows. We identified 122 records across the four databases, yielding 82 unique records after removing 40 duplicates. All 82 records underwent title and abstract screening against the eligibility criteria; 67 were excluded at this stage, principally for being outside the scope of higher education digital leadership, for addressing educational technology without a leadership dimension, or for falling outside the publication window. This left 15 records for full-text review. We subsequently excluded four records after full-text assessment, as described above. The final included corpus comprised 11 studies.

Quality Assessment

Quality assessment was conducted using criteria adapted from the Mixed Methods Appraisal Tool (MMAT),

applied across three dimensions: (a) conceptual and methodological coherence, assessed by the degree of alignment between stated research objectives, design choices, and reported findings; (b) contextual specificity, addressing whether the study's claims were appropriately bounded by its institutional, national, or methodological context; and (c) transparency of procedures, including sampling, data collection, and analysis. No study was excluded solely on quality grounds; rather, quality assessments informed the confidence weight assigned to individual studies in the thematic synthesis. Studies with limited methodological transparency (notably some conceptual papers) are treated with corresponding caution in the discussion.

Data Extraction

Data were extracted systematically from each included study using a structured template capturing: author(s) and year; country or regional context; research design and method; primary variables or constructs; key findings; and DOI. Attention was paid to the operationalization of digital leadership and innovation, whether these were treated as dimensions, behaviors, perceptions, or outcome variables, and to any divergent or null findings that qualified the main relationships reported. The decision to preserve divergent findings, including the null direct-effect reported by Shen et al. (2025), was deliberate: evidence synthesis that suppresses contradictions in favor of apparent consensus misrepresents the state of a field and forecloses the theoretical work that contradictions make possible.

Results and Discussion

This section presents the systematic review findings through two complementary lenses. Section 3.1 characterizes the included studies by geographic distribution, methodological approach, and publication year, providing the empirical foundation for subsequent interpretation. Section 3.2 presents a thematic synthesis organized around five inter-related themes that emerged from cross-study analysis. The aim is not to summarize each study individually but to construct a reading of the literature that foregrounds patterns, tensions, and productive divergences across the corpus. Methodological observations follow in Section 3.3.

Characteristics of Included Studies

The 11 included studies span a six-year window from 2020 to 2025, with the majority ($n=7$) published from 2022 onwards, reflecting the acceleration of scholarly attention to digital leadership in higher education during and after the COVID-19 pandemic. Geographically, the corpus is weighted toward the Global South and East: four studies are situated in Indonesia or Vietnam (Akbari & Pratomo, 2022; Nguyen, 2021; Suryadi et al., 2024), two in China (Jing et al., 2025; Shen et al., 2025), one in Russia (Gruzina et al., 2020), one in South Africa (Msila, 2022) and one in the Arab Gulf region (Ghamrawi & M. Tamim, 2023). Two studies did not specify a national context (Ehlers, 2020; Onan, 2024). This distribution challenges assumptions that digital leadership scholarship is primarily a Western preoccupation; however, it also raises questions about how much findings are shaped by specific national higher education systems and governance traditions.

Methodologically, the corpus is heterogeneous. Four studies employ qualitative designs (Akbari & Pratomo, 2022; Díaz-García et al., 2023; Ghamrawi & M. Tamim, 2023; Msila, 2022); two use conceptual or theoretical analysis without primary data collection (Ehlers, 2020; Gruzina et al., 2020; Jameson et al., 2022); one develops a conceptual-analytical framework (Nguyen, 2021); one is a systematic literature review (Onan, 2024); and two use quantitative structural equation modeling: PLS-SEM in the case of Suryadi et al. (2024) and SmartPLS in the longitudinal study by Shen et al. (2025). Jing et al. (2025) employs a perceptions and practices approach focused on university leaders' reported understandings of digital academic leadership. This methodological diversity is both a strength and a limitation: it captures a wide range of epistemic perspectives but makes direct comparison of findings across studies methodologically precarious.

Table 1. *Characteristics of Included Studies (PRISMA-Selected, n=11)*

Author(s) and Year	Country or Region	Research Method/Design	Variables or Focus	Key Findings	DOI
Ehlers (2020)	Germany	Framework development; conceptual analysis	Digital leadership competencies; HE transformation	Proposes competency-based digital leadership definition; identifies capacity dimensions for guiding institutional digital change	10.29252/JOHEPAL.1.3.6
Gruzina et al. (2020)	Russia	Theoretical/conceptual analysis	Generative leadership; digital university governance	Argues Russian HE requires generative leadership models distributing authority; links digital governance to institutional resilience	10.26794/2404-022X-2019-9-4-75-84
Nguyen (2021)	Vietnam	Conceptual/analytical framework	Smart university models; digital governance; HE transformation	Develops smart university framework; positions digital leadership as prerequisite for governance transition from reactive to proactive digital institution	10.47059/REVISTAGEINTEC.V11I3.1944
Ghamrawi & M. Tamim (2023)	Arab Gulf (single HEI)	Qualitative case study; semi-structured interviews (n=6 leaders)	5-D typology: digital competence, culture, differentiation, governance, advocacy	Derives five-dimension heuristic typology from single-institution case; findings bounded by small-n single-site design	10.1007/s10639-022-11483-w
Akbari & Pratomo (2022)	Indonesia	Qualitative; literature study and stakeholder interviews	Digital leadership implementation; culture and mindset barriers; holistic change management	Organizational culture and leader mindset identified as primary barriers; recommends phased, holistic change management approach	10.24198/jkk.v10i1.38052
Msila (2022)	South Africa	Qualitative; interviews and focus groups (n=10 executives)	Vision-setting; collective decision-making; digital skills; emotional intelligence	Vision and emotional intelligence foundational to effectiveness; collective leadership model favored over heroic individual leadership	10.18178/ijiet.2022.12.10.1728
Díaz-García et al. (2023)	Not stated	Qualitative single-institution case study	Participative leadership; cultural transformation; data-driven decisions; digital talent	Participative leadership facilitates digital cultural transformation; internal digital talent development prioritized	10.3390/electronics12112522
Suryadi et al. (2024)	Indonesia (Malang City)	Quantitative PLS-SEM (n=234 faculty)	Digital leadership; digital literacy; digital innovation (mediator); HE performance	Digital innovation fully mediates leadership/literacy-to-performance paths; direct paths non-significant without mediation	10.12973/eu-jer.13.1.207
Onan (2024)	Global (WoS/Scopus SLR)	Systematic literature review	Digital transformation barriers; digital leadership roles and strategies	Leadership capacity identified as primary enabling factor; definitional inconsistency across the field flagged as systemic challenge	10.38015/sbyy.1587587
Shen et al. (2025)	China	Longitudinal SmartPLS; three-wave survey	Digital leadership; dynamic capabilities; knowledge sharing; green digital mindset; green digital innovation	No significant direct effect from digital leadership to green digital innovation; indirect effects via dynamic capabilities and knowledge sharing	10.1186/s40359-025-02552-z

Author(s) and Year	Country or Region	Research Method/Design	Variables or Focus	Key Findings	DOI
Jing et al. (2025)	China	Perceptions and practices study; university leaders	Digital academic leadership perceptions; innovation culture; collaborative leadership	Leaders associate digital academic leadership with collaborative and facilitative practices; innovation culture as output of distributed leadership	10.3390/educsci15050606

Thematic Synthesis of Finding

The thematic synthesis identified five interrelated themes across the 11 included studies. These themes are not mutually exclusive; rather, they reflect different analytical orientations toward the same underlying question of how digital leadership shapes conditions for innovation in higher education. The synthesis foregrounds patterns of convergence and divergence rather than presenting a cumulative finding that the literature does not actually support.

Conceptualizing Digital Leadership in Higher Education

A persistent conceptual challenge running through the corpus is what counts as digital leadership, and how it is distinguished from adjacent constructs such as technology adoption, change management, or e-leadership. Ehlers (2020) provides the most theoretically developed response, defining digital leadership as a competency-oriented disposition that enables institutions to navigate digital change by embedding digital values in organizational culture and strategy. Critically, Ehlers (2020) treats digital leadership not as proficiency with specific tools but as a relational and institutional capacity. This framing offers flexibility: it accommodates contexts ranging from a small Gulf institution to a national university system without requiring constant operationalization.

Ghamrawi & M. Tamim (2023) offer a more applied, structurally specific account through their five-dimension typology: digital competence, digital culture, digital differentiation, digital governance, and digital advocacy. These dimensions have intuitive face validity and provide a useful heuristic for practitioner-oriented analysis. However, the typology was derived from semi-structured interviews with six leaders at a single institution in the Arab Gulf region. Its empirical basis is therefore narrow, and its cross-institutional transferability has not been independently evaluated. In this review, the typology is treated as a case-study-derived sensitizing framework rather than a validated theoretical model: its analytical value lies in organizing observation, not in confirming predictions.

A noteworthy convergence across conceptual studies (Ehlers, 2020; Gruzina et al., 2020; Nguyen, 2021) is the rejection of a top-down, tool-centric view of digital leadership in favor of a distributed, culturally-embedded understanding. Gruzina et al. (2020) characterize this as a ‘generative’ model that distributes decision-making authority across the institution, while Nguyen (2021) frames it as a governance transition from a reactive to a proactive digital institution, requiring sustained leadership attention at multiple levels. These framings share an emphasis on leadership as organizational transformation rather than technical deployment.

Digital Leadership and Innovation Outcomes

Several studies in the corpus report a positive association between digital leadership and innovation-related outcomes. Suryadi et al. (2024) provide the most quantitatively specific evidence: their PLS-SEM analysis with 234 faculty in Malang City, Indonesia, shows that digital innovation fully mediates the relationship between digital leadership (alongside digital literacy) and institutional performance. Without this mediating mechanism, the direct path from digital leadership to performance is non-significant. This is an important qualification: the finding does not simply assert that digital leadership improves performance, but that it does so through an identifiable and enabling intermediate variable.

Qualitative evidence broadly supports this directional relationship. Msila (2022) finds that South African higher education executives who demonstrated strong vision-setting and emotional intelligence created conditions that made digital initiatives more readily adopted. Díaz-Garcia et al. (2023) report a similar pattern through a case study documenting how a participative leadership approach enabled cultural transformation and data-driven decision-making. Akbari & Pratomo (2022), writing from an Indonesian context, identify leader mindset and organizational culture as the primary determinants of whether digital leadership translates into genuine

institutional change, suggesting that the same formal leadership role can produce markedly different innovation outcomes depending on these cultural preconditions. These studies largely agree on their directional claims, but the evidence is context-specific and relies on small or convenience samples, which limits confidence in generalizing the findings.

Mediating Mechanisms, Boundary Conditions, and the Null-Effect Problem

The most theoretically provocative finding in the corpus comes from Shen et al. (2025), whose longitudinal SmartPLS study found no significant direct relationship between digital leadership and green digital innovation. The study was conducted in China using a three-wave design, which provides greater temporal validity than the cross-sectional studies that dominate the corpus. Shen et al. (2025) report that digital leadership's effects on innovation are entirely mediated by dynamic capabilities and knowledge-sharing behavior, and that a green digital mindset moderates the paths between these variables. In other words, digital leadership is necessary but not sufficient: without the mediating infrastructure of dynamic organizational capabilities, no direct innovation effect materializes.

How should this finding be read alongside Suryadi et al. (2024)? The two studies are not straightforwardly contradictory. Both, in fact, are mediation models: Suryadi et al. locate the mediation in digital innovation itself (as an organizational behavior), while Shen et al. (2025) locate it in dynamic capabilities and knowledge-sharing. This divergence may reflect differences in how the outcome variable is operationalized (institutional performance versus green digital innovation), in the institutional context (Indonesian HE versus Chinese HE), or in the specific form of leadership assessed. Both findings reject simple, unmediated direct-effect models: digital leadership does not appear to translate directly into innovation outcomes without intermediate enabling conditions. This is a meaningful empirical convergence even where the specific mediators differ.

The implication for theory is that research seeking to isolate a 'digital leadership effect' on innovation without modeling the mediating architecture is unlikely to find robust results, and may contribute to the inconsistency already visible in the literature. The implication for practice is that investing in leadership development alone, without concurrent investment in the organizational capabilities through which leadership operates, is unlikely to deliver the innovation outcomes that policy-makers expect.

Cross-Contextual Variability

The geographic diversity of the corpus, spanning Russia, Vietnam, Indonesia, South Africa, the Arab Gulf region, and China, provides an opportunity to examine whether digital leadership dynamics differ across institutional and national settings. The evidence suggests variation in emphasis rather than structural contradiction. Gruzina et al. (2020) and Nguyen (2021) both emphasize governance-level transformation as the primary context for digital leadership, reflecting the stronger role of state coordination in Russian and Vietnamese higher education systems, respectively. Msila (2022), writing from South Africa, gives greater emphasis to the emotional and relational dimensions of leadership (vision, trust, and adaptive capacity), which may reflect both the qualitative method chosen and the institutional challenges of post-apartheid higher education contexts.

Caution is warranted in interpreting these contextual differences. The studies were not designed for cross-national comparison; their methods, samples, and constructs differ in ways that make systematic comparison unreliable. Attributing observed differences to national culture, governance tradition, or institutional type requires more controlled comparative design than the corpus currently supports. The diversity of contexts does establish that digital leadership cannot be treated as a universal, context-independent construct whose properties are fixed regardless of setting. The conditions under which it operates, and the outcomes it enables, appear sensitive to institutional environment in ways that warrant explicit investigation rather than assumption.

Theoretical and Methodological Heterogeneity

Perhaps the most consistent observation across the corpus is its theoretical and methodological heterogeneity. Studies draw on different parent disciplines (management science, educational leadership, innovation studies, organizational behavior) and use different underlying theories (dynamic capabilities theory, resource-based view, transformational leadership theory, social cognitive theory). Digital leadership itself is variously measured as a self-report leadership behavior scale (Shen et al., 2025; Suryadi et al., 2024), as a set of practitioner-reported perceptions (Ghamrawi & M. Tamim, 2023; Jing et al., 2025; Msila, 2022), as a competency construct defined analytically (Ehlers, 2020), and as an institutional process or governance orientation (Gruzina et al., 2020; Nguyen,

2021).

This heterogeneity means the corpus is not speaking with one voice about the same object. Different studies may be measuring genuinely different phenomena while using the same label. This is not merely a measurement problem; it reflects an underlying conceptual ambiguity about whether digital leadership is best understood as an individual competency, a relational practice, an institutional governance orientation, or a cultural attribute. This review finds that the field has not yet converged on a shared definition, and the proliferation of instruments and frameworks risks producing a literature in which cumulative knowledge is structurally difficult to build.

Methodological Considerations and Limitations

Three methodological observations are worth foregrounding as a basis for future research design. First, quantitative studies in the corpus are dominated by cross-sectional designs (Suryadi et al. (2024) being a partial exception in context, Shen et al. (2025) being the only genuinely longitudinal study). Cross-sectional designs cannot support causal inference about whether digital leadership produces innovation outcomes, or whether institutions that are already innovative attract leaders who score highly on digital leadership instruments. The temporal direction of effects is theoretically assumed but empirically unresolved.

Second, qualitative studies in the corpus are predominantly single-institution case studies with small purposive samples. These studies produce contextually rich accounts but are not designed for theoretical generalization. Their contribution is best understood as conceptual exploration and hypothesis generation rather than as confirming evidence about what digital leadership achieves across higher education institutions generally. Third, the systematic literature review by Onan (2024) and the framework paper by Ehlers (2020) occupy an important but epistemically distinct position in the corpus: they synthesize and conceptualize without generating new primary data, and their claims should be evaluated accordingly. Conflating these with empirical studies in a synthesis risks over-weighting conceptual formulations as evidence of observed effects.

Conclusion

This systematic review synthesized eleven peer-reviewed studies published between 2020 and 2025 to examine the relationship between digital leadership and innovation in higher education institutions. The evidence base, though modest in size, is geographically and methodologically diverse, spanning theoretical frameworks developed in European and Vietnamese contexts, qualitative case studies conducted in the Arab Gulf, South Africa, and Indonesia, quantitative PLS-SEM modeling with Indonesian faculty, a longitudinal SmartPLS panel from China, and a global systematic review of extant literature. Taken together, these studies support a nuanced reading of digital leadership as a multidimensional organizational capacity whose relationship with innovation is real but contextually mediated.

The most consistent finding across the corpus is that digital leadership operates primarily through intermediate organizational mechanisms rather than exerting direct, independent effects on innovation outcomes. Digital culture, knowledge-sharing practices, and psychological safety emerged as the principal channels through which leader behavior and competence translate into innovative activity. This pattern holds across qualitative and quantitative designs alike, lending it modest cross-methodological support. The longitudinal evidence from Shen et al. (2025) is particularly instructive: employing three-wave SmartPLS modeling, the authors found that digital leadership exerted no statistically significant direct effect on green digital innovation, while organizational learning climate served as a significant mediator. Far from undermining the theoretical case for digital leadership, this finding clarifies where institutional investment is most likely to yield returns: in sustaining the cultures and structures that amplify what leaders initiate.

A second key finding concerns the conceptualization of digital leadership itself. Ghamrawi & M. Tamim's (2023) five-dimensional framework, encompassing digital competence, digital culture, digital differentiation, digital governance, and digital advocacy, represents the most elaborated model in the reviewed literature. Derived from a qualitative case study at a single Arab Gulf institution, it provides a heuristically useful vocabulary for describing what digitally capable academic leaders do. However, the review found no independent validation of the model across other national or institutional contexts, which limits its claim to transferability. Future research should treat the 5-D framework as a generative hypothesis rather than an established taxonomy. The broader implication is that the field still lacks a theoretically unified and empirically validated model of digital leadership

specifically situated in higher education.

Third, the review identified a productive tension between studies attributing innovative outcomes to the combined effect of digital leadership and shared governance structures (Suryadi et al., 2024) and those locating the causal mechanism more precisely in organizational climate variables (Shen et al., 2025). Resolving this tension requires longitudinal designs that track the sequential effects of leadership behavior on intermediate climate variables and, subsequently, on innovation outputs: a methodological standard that only one study in this corpus currently meets.

Implications for Policy and Practice

The findings carry several implications for those responsible for leading and managing higher education institutions in an era of accelerating digital transformation. At the institutional level, the evidence suggests that investing in individual leaders' technical competence is necessary but not sufficient. Digital leadership programs that address only tool proficiency or platform fluency, without simultaneously reshaping the organizational climates within which leaders operate, are unlikely to translate into sustained innovation. Institutions would be better served by integrated development frameworks that couple competence building with structural work on culture, governance, and knowledge-sharing infrastructure.

The mediating role of digital culture has direct implications for senior leadership and governance boards. Creating conditions in which faculty and professional staff feel psychologically safe to experiment, share knowledge openly, and challenge conventional practices is not a soft addendum to digital strategy; on current evidence, it is the primary lever through which leadership translates into innovation. This finding aligns with broader organizational learning literature and reinforces calls for participatory, distributed models of academic governance over hierarchical, top-down approaches to digital change management.

For national policy actors and system-level regulators, the review highlights the importance of creating enabling conditions, including resource allocation, regulatory flexibility, and cross-institutional learning networks, that allow institutions to experiment with digital governance models. The geographic concentration of empirical evidence in Indonesia and China suggests that policy frameworks developed in high-income Western systems may require substantial contextual adaptation before they apply to middle-income or rapidly developing higher education systems.

For leadership development practitioners, the 5-D framework proposed by Ghamrawi & M. Tamim (2023) offers a starting vocabulary for designing curriculum and assessment tools. However, practitioners should treat it as a hypothesis-generating heuristic pending further validation, and supplement it with locally grounded qualitative inquiry that surfaces the specific competence configurations relevant to their institutional contexts.

Research Gaps and Future Directions

This review identifies five substantive research gaps that warrant prioritization in the next generation of empirical work on digital leadership and innovation in higher education.

First, and most urgently, the field requires longitudinal studies with adequate statistical power. The single longitudinal study in this corpus, Shen et al. (2025), demonstrates the methodological feasibility and theoretical yield of multi-wave designs, but it addresses only green digital innovation as an outcome and draws on a single national context. Multi-wave studies that track the development of digital leadership capability over time and trace its effects on a broader range of innovation outcomes, including curriculum reform, research translation, and student outcomes, are needed to establish causal direction and assess long-run effect sizes.

Second, the systematic validation of digital leadership frameworks across contexts is overdue. The 5-D model of Ghamrawi & M. Tamim (2023), the competence taxonomy proposed by Ehlers (2020), and the theoretical propositions advanced by Gruzina et al. (2020) and Nguyen (2021) have not been systematically tested against one another or validated using common measurement instruments. A programmatic line of research to develop and psychometrically evaluate a shared instrument, analogous to the Digital Competence Framework (DigComp) in the schools sector, would substantially accelerate cumulative knowledge building.

Third, the mechanisms linking digital leadership to innovation outcomes require more precise specification.

Mediation analyses in existing quantitative studies identify plausible intermediate variables (organizational learning climate, digital culture, knowledge-sharing behavior), but the theoretical logic connecting these constructs remains underdeveloped. Theoretically grounded process models, informed by social learning theory, organizational ambidexterity, and dynamic capabilities frameworks, would provide a stronger conceptual infrastructure for future measurement and hypothesis testing.

Fourth, the evidence base's geographic and institutional coverage requires deliberate expansion. The near-absence of studies from North America, Western Europe, and sub-Saharan Africa (outside South Africa) limits the generalizability of current findings and may reflect both publication bias and structural inequalities in research capacity. Explicitly comparative cross-national studies, particularly those examining how national policy environments and institutional types moderate the relationship between digital leadership and innovation, would contribute substantially to a more globally representative knowledge base.

Fifth, the reviewed literature is almost entirely silent on the relationship between digital leadership and student-facing innovation outcomes, including learning experience design, equity of access to digital resources, and student agency in technology-enhanced learning (Niță & Guțu, 2023; Olcott, Jr. et al., 2023). Given that the ultimate purpose of higher education innovation is to improve student learning and social outcomes, this gap represents a significant blind spot. Future research should trace the organizational pathways through which digital leadership eventually produces changes in pedagogical practice and learner experience.

Contributions of Authors

Author 1 – Valiao: Conceptualization, Methodology, Search Strategy, Screening and Study Selection, Data Curation, Formal Analysis, Visualization, Writing – Original Draft, Writing – Review & Editing, and Project Administration.

Author 2 – Claro: Search Strategy, Screening and Study Selection, Data Curation, Quality Appraisal, Validation, and Writing – Review & Editing.

Author 3 – Suarez: Screening and Study Selection, Data Curation, Quality Appraisal, Formal Analysis, Validation, and Writing – Review & Editing.

Author 4 – Santillana: Search Strategy, Screening and Study Selection, Data Curation, Quality Appraisal, Formal Analysis, Validation, and Writing – Review & Editing.

Author 5 – Mariño: Screening and Study Selection, Data Curation, Quality Appraisal, and Writing – Review & Editing.

All authors contributed to the interpretation of the findings, reviewed and approved the final version of the manuscript, and agreed to be accountable for all aspects of the work.

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