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RESEARCH PAPER

Human-Centered Digital Leadership as a Catalyst for Sustainable Transformation in Higher Education: A Strategic Framework

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ABSTRACT

This study investigates how digital leadership (DL) drives sustainable performance (SP) in public higher education institutions (HEIs) in Pakistan, focusing specifically on the mediating roles of knowledge sharing (KS) and digital empathy (DE). The digitalization of HEIs necessitates leadership styles that integrate both technological and human-centric capabilities. Prior research has largely overlooked the simultaneous cognitive and emotional mechanisms through which DL influences institutional performance. A quantitative, cross-sectional design was employed, surveying 315 academic professionals across public HEIs using Partial Least Squares Structural Equation Modeling (PLS-SEM). DL significantly enhances SP directly and indirectly via KS and DE. Among the mediators, DE exerted a stronger influence, indicating the importance of emotional intelligence in virtual academic environments. The dual-pathway model confirms the role of both knowledge-based and emotional mechanisms in digital leadership effectiveness. HEIs should implement leadership development programs that integrate digital acumen with emotional competencies and foster cultures of knowledge sharing to support sustainable, innovation-driven academic ecosystems.

Keywords: Digital Leadership, Sustainable Performance, Knowledge Sharing, Digital Empathy, Digital Readiness, Higher Education

Introduction

The post-pandemic surge in digitalization has not only accelerated the adoption of technology across higher education institutions (HEIs) but has also transformed the strategic discourse surrounding institutional sustainability, engagement, and talent development. In an era characterized by rapid change and heightened global competition, digital transformation is no longer optional—it is a strategic imperative for institutional survival and advancement. Within this shift, Digital Leadership (DL) has emerged as a critical driver of innovation, strategic alignment, and organizational agility, equipping HEIs to navigate complex challenges and meet evolving stakeholder expectations (Pitelis, Teece, & Yang, 2023). However, the traditional emphasis on technical proficiency as the sole determinant of leadership efficacy is being increasingly questioned. Emerging literature highlights the importance of integrating emotional intelligence, inclusive communication, and psychological safety into digital leadership frameworks to foster resilience and well-being in digitally mediated academic environments (Alabdali et al., 2024; Wang, Wang, & Yang, 2022). Particularly in contexts marked by uncertainty, virtual collaboration, and digital fatigue, emotionally intelligent leadership is indispensable for sustaining performance and engagement. This paradigm shift necessitates a broader conceptualization of DL—one that unites technological

competence with relational sensitivity to support sustainable transformation in higher education.

Although previous studies have reported a positive correlation between DL and SP in HEIs, there is lack of adequate theorizing and experimental evaluation in understanding and explaining the nature of these relationship on the capabilities of HEIs. Structural and cognitive enablers have become the most common concepts within the existing structures (Mollah et al., 2023; Shahzad et al., 2020), with the following most common: KS and Organizational Learning (Ali & Amin, 2025). Though extremely important in institutional learning and innovation, such mechanisms do not take into significant consideration the affective aspects of digital transformation, especially the relational and emotional competencies that leaders should have as academic settings are gradually becoming virtualized. The role played by Digital Empathy (DE) which is a leader ability to notice, understand and adequately react to emotional signals of others in the context of digital environments has become the focus of new research as it is considered a key factor of leadership success in higher education institutions in the post-pandemic era (Belanche et al., 2021; Spagnolli et al., 2023; Wang et al., 2022). DE has been found to alleviate digital fatigue, minimize emotional distancing, evoke trust, and psychological safety, those being key drivers of a prolonged engagement, cooperation, and organizational resilience in hybrid or fully digital learning settings. Therefore, by integrating DE into the leadership frameworks, one can get a holistic and more people-friendly prospective to learn how DL can develop sustainable performance in the modern higher education system.

To fill the theoretical and practical research gap of current digital leadership study, this paper presents a conceptual model, revising it in a way that proposals Digital Empathy (DE) as a new mediating variable between Digital Leadership (DL) and Sustainable Performance (SP). The integration should not be regarded as a superficial change, as a paradigm shift, rather as the shift beyond the prevailing cognitive and structural mechanism determinants, in the direction of a more human and more psychologically competent concept of digital transformation. The given model is theoretically grounded in Dynamic Capabilities Theory (DCT), which theorizes DL as a second-order strategic capability to assist organizations to sense, seize, and reconfigure solutions to environmental volatility (Teece, 2018). Thus, to make this framework richer, the research also refers to the Digital Mindfulness Theory (DMT), as emotional awareness, purposeful behaviour, and consideration of human presence in digital interactions are its key focus (Spagnolli et al., 2023; Vanden Abeele et al., 2021). Not only does this hybrid theoretical approach amplify conceptual richness but it also fits well with the realities of how those who work at higher education institutions experience life in the post-pandemic world: emotional exhaustion, virtual overload and disengagement issues have become a challenge. The model enhanced by DE provides a more comprehensive and contextually specific answer to the question of how leadership practices lead to sustainable institutional outcomes as it reflected the affective aspects of the digital leadership phenomenon to a larger extent.

Such investigation is particularly relevant to the situations of the emerging economies like Pakistan because, most of the time, the higher education institutions (HEIs) tend to be restricted by the atrophies of digital infrastructural development, fractured policy landscape, and ingrained hierarchy practices. Digital Leadership (DL) adopted in this environment, with its entire focus on technical efficiency but the acknowledgement of emotional intelligence, can marginalize the stakeholders platform (among whom faculty, students and administrative staff are paramount) by subjecting

them to the constant issues of digital access, motivation, and lasting engagement (Mok et al., 2021; Khan et al., 2024). The leadership reaction to inequality issues may have inadequate response associated with the lack of empathy. The combination of KS and DE in the framework of this research contributes to a more comprehensive, context-specific framework of the study of how DL can be used to develop Sustainable Performance (SP) in resource-constrained academic settings. This is a two-pathway model representing a selective attempt to get the maximum coverage of human and informational processes of digitally transforming HEIs. Empirical validation of the model is done in the form of cross-sectional survey of academic professionals directly engaged in the process of digitalization. Partial Least Squares Structural Equation Modeling (PLS-SEM) was used to analyze the data that would help determine direct and indirect effects enabling reliable testing of the proposed mediating mechanisms and their impact on institutional sustainability.

Summing up the work, the research makes three significant contributions to the knowledge corpus on the issue of digital transformation in higher education. One, it builds upon the contemporary theoretical frameworks by offering Digital Empathy (DE), a new and empirically supported mediating construct, to go along with the hitherto established structural routes. Second, it has provided a dual-pathway model, which integrates cognitive (Knowledge Sharing), and affective (Digital Empathy) enablers so as to reflect the multi-modal portrait of how Digital Leadership (DL) impacts Achievement in higher education establishments. Third, it helps in the growing literature of human-centered digital leadership as it empirically shows that the emotional intelligent leadership practices are not marginal or secondary, but core to institutional resistance and transformation. By choosing the factor of empathy as a core of study, this research reinforces the contemporary technological prejudice in leadership studies and introduces emotional intelligence, as a strategic toolbox in the digital era. The given model is of great practical and policy implications which can suggest the importance of designing leadership development programs that would incorporate digital and emotional skills, on the one hand, and be relevant to those regions where digital equity and mental well-being are highly topical issues, on the other hand. All in all, by pushing empathy to the fore in digital leadership discourse, the study provides a more visionary, sustainable, and contextually oriented model on how to navigate the complexity of higher education transformation within the context of a digital disruption era.

Literature Review

Digital Leadership and Sustainable Performance

Digital Leadership (DL) is emanating as a strategic ability to help higher education institutions (HEIs) adjust, create and maintain productivity in an ultra-swift technological environment and a perilous world (Teece, 2018). The alignment of pedagogical innovation, the coherence of policy, and engagement on the digital infrastructural level results in the improvement of agility and resilience of the institution and the value creation in the long run (Muljani et al., 2025; Ali & Amin, 2025). In contrast to conventional leadership paradigms, DL also focuses on systems thinking, emotional intelligence and development of digitally interconnected cultures. Using empirical data, it has been established that institutions with digitally competent managers show a higher degree of digital maturity, trust and interaction of stakeholders, which are essential to Sustainable Performance (SP) (Khaw et al., 2023; Han & Hwang, 2022; Ali & Amin, 2025). The scope of SP in HEIs does not only involve operational efficiency but also entails adaptability, inclusion, innovation and digital responsiveness (Jasim et al., 2024).

However, in contrast to the well-documented overall effect, there is a lack of investigation of the mechanisms through which DL affects SP. The current frameworks revolve more around the structural drivers like knowledge systems, and the depth of the crevice is shallow due to the lack of affective dimensions like empathy and psychological safety. To bridge this gap, the current study proposes a dual-pathway model in which Knowledge Sharing (KS) and Digital Empathy (DE) mediate the DL–SP relationship, offering a holistic view of how cognitive and emotional leadership capacities jointly shape sustainable institutional outcomes in digitally evolving HEIs.

Knowledge Sharing as a Cognitive Enabler

Knowledge Sharing (KS) has been established as one of the most essential processes in which an organization can share knowledge, provide innovations and create intellectual capital (Deng et al., 2023). In HEIs, KS can play a role in curriculum improvement, inter disciplinary studies and reformation of pedagogy all of which are essential cornerstones of a lasting scholarly influence. In terms of capabilities, KS strengthens the responsiveness of institutions to external shocks due to ensuring the diffusion of critical knowledge that is not siloed within teams, departments, or decision-making units (Fait et al., 2023; Ali & Amin, 2025). By establishing psychologically safe conditions, encouraging teamwork, and deploying the use of digital devices to enhance knowledge sharing, DL can be used to greatly affect the KS behaviors (Saraih & Anwar, 2024; Ali & Amin, 2025). Leaders who strategically integrate communication platforms, learning management systems, and collaborative networks foster a culture of transparency and mutual learning. Prior studies show that KS mediates the DL–performance relationship by enabling continuous adaptation and organizational learning (Mollah et al., 2023; Ali & Amin, 2025). However, cognitive processes like KS alone may be insufficient in contexts where emotional disconnection or digital fatigue undermine engagement, highlighting the need for emotionally grounded mediators.

Digital Empathy: A Novel Affective Mediator

In digitally mediated academic environments, emotional intelligence has emerged as a vital leadership competency, with Digital Empathy (DE) gaining recognition as a key determinant of leadership effectiveness and organizational well-being. DE is the ability to interpret and adequately respond to the emotional states of other people in virtual contexts, which have since recently the COVID-19 pandemic become ever more crucial (Belanche et al., 2021). Students, faculty, and staff suffered through social isolation, emotional burnout, and reduced human connections in person, and hearing such issues, the significance of compassionate leadership became more evident. Digital experience shows that a leader with empathy due to digital distance can greatly minimize burnout, development of interpersonal trust, and intrinsic motivation in distributed and hybrid teamwork (Sivanathan et al., 2024; Lin et al., 2023). In theory, DE considers Digital Mindfulness Theory (DMT), the theory that focuses on paying attention, emotional awareness, and conscious participation in online interactions via a compassionate digital connection (Spagnolli et al., 2023). Located in practices of leadership, DE can be seen as a type of soft infrastructure that can improve the sentimental and interpersonal character of digital intercourse instead of complementing technical tools and systems. Nevertheless, DE is a significant tool that helps establish inclusive discourse, avoid creating a culture of exclusivity and provide psychological safety in the learning environment that becomes increasingly asynchronic and tech-mediated. However, even though DE does apply in such insights, to date, it is understudied as part of empirical studies that connect Digital Leadership (DL) to

Sustainable Performance (SP); a glaring theoretical and practical gap that this study aims to fill.

Sustainable Performance in Higher Education

Sustainable Performance (SP) of HEIs goes beyond untraditional indicators of academic performance. It contains environmental adaptability, digital agility, human well-being, satisfaction of stakeholders, and long-term resilience (Teece, 2018; Akhtar, Anwar, & Ali, 2023). Subsequently, in the scope of growing digitalization, SP indicates institutional integration of technological change into the proverbial strategic DNA and maintenance of the inclusive, equitable, and emotionally intelligent organizational culture (Jasim et al., 2024; Ali & Amin, 2025). The SP is also determined by the degree in which an institution promotes not only cognitive mechanisms (KS) but also emotional mechanisms (DE) to deal with change. Whereas the KS shortens the time rate of spreading innovation and making flexibility in the decision making, DE makes sure of the lasting psychological involvement and communal ability. Companies where ethical context and perceived organizational support is put in the first place, especially in their dynamics or the evolving environment of digital transformation, have an advantage of increasing employee dedication, innovation, and sustainable results (Watto, Monium, Ali, & Ijaz, 2020). Effective digital leadership is key to a successful and sustainable post-pandemic institutional performance management relying on the dynamic balanced interrelation of these mechanisms (Ali & Amin, 2025).

Theoretical Model

Suitable hybrid theoretical foundation As it can be attested during the scoping exercise, the multidimensional relationship between DL and SP in HEIs remains elusive and complex to achieve in a traditional theoretical framework. This study is anchored on a hybrid theoretical framework that incorporates DCT and DMT to help elaborate the complex relationship between DL and SP in HEIs. As DCT notes, DL acts as a meta-capability that enables institutions to intuit new opportunities, capture digital innovations and reorganize internal resources with the aim of responding to environmental uncertainty (Teece, 2018). DL reinforces structural and emotional elasticity toward resiliency in an organization through the mediation of the processes involving Knowledge Sharing (KS) and Digital Empathy (DE). In addition to this, DMT emphasises the need to regulate emotions, exist in a state of attention and engage in meaningful experiences in digitally mediated realities (Spagnolli et al., 2023). In this perspective, DE is a continuation of DCT with the addition of affective capabilities that are essential in maintaining psyche welfare and the sense of trust in online learning procedures in academic settings. Cumulatively, the theories provide an all-encompassing prism through which DL will be understood not only as a creator of technical efficiency but also as change agent that is human-centric.

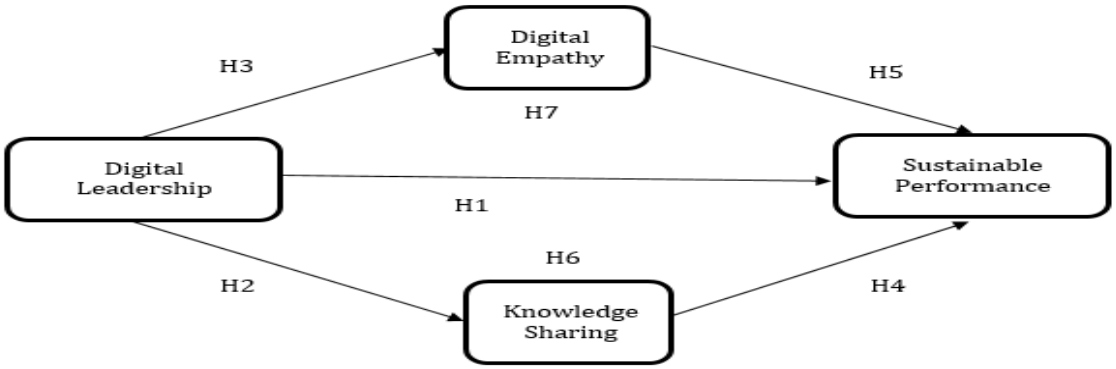

Figure 1: Conceptual Framework

This system of integration gives credence to emotional intelligence, especially those of DE in enquiring into the concept of sustainability of institutional performance in the face of digital acceleration. It is also an initiative on a theoretical basis of the inquiry into the dual mediating potential of KS and DE on the formation of the DL--SP nexus in the sphere of digitally oriented HEIs. Figure 1 is a summary of the relationships among these factors in terms of theory hence enabling the researchers to show an excellent concept map.

Hypotheses Development

The Effect of Digital Leadership on Sustainable Performance

Digital Leadership (DL) paradigm is a cornerstone in the alignment of the technological capability with the institutional strategy that places higher education institutions (HEIs) on the pathway to agile response to external disruptive changes with innovation and long-term survival. Even resource-constrained contexts with a high sensitivity to corporate-level upheavals and transformions, as is the case with organisations operating in an environment of digital turbulence, as is standard with public-sector universities in emerging economies like Pakistan, DL not only helps in the sustenance of operations but also in strategic transformation. Digital-first leaders who are also inclusive of the human-centric approaches, including empathy and inclusion, are more capable of creating adaptive cultures and innovating performance to sustain it in turbulent environments (Khaw et al., 2023; Teece, 2018). DL promotes institutional learning and the optimization of digital infrastructure and the development of stakeholder trust, which are essential towards sustainable performance in HEIs in the modern-day world. As a transformation agent in the strategic and operational levels, an immediate antecedent of sustainable institutional outcomes is posited to be DL. As a result, such a hypothesis is put forward:

H1: Digital leadership positively affects sustainable performance.

The Effect of Digital Leadership on Knowledge Sharing

Digital Leadership (DL) is central to designing cultural expectations and technological models that enable proper knowledge flows across and within the academic and administrative spaces. Helping to drive transparency, being open, and collaborative, DL ensures that creating such a psychologically safe medium encourages a facilitation of knowledge sharing as an institutional norm, not an individual one. By harnessing digital tools, like shared workspaces, learning platforms, and live messaging

tools, digital leaders facilitate smooth information distribution with no boundaries in the fields or across the chain of command (Deng et al., 2023). This kind of leader-led ecosystem of continuous learning facilitated by the continuous learning pedagogy in relation to teaching, research and governance functions in digitally mature HEIs can sustain innovation and inspired decision-making. Further, DL promotes a culture whereby both tacit and explicit knowledge are systematically harnessed in the quest to improve and enhance institutional survival power. Considering this digital leadership-collaborative knowledge-sharing infrastructure alignment, the below hypothesis is put forward:

H2: Digital leadership positively influences knowledge sharing.

The Effect of Digital Leadership on Digital Empathy

With educational settings becoming more and more digitalized at an amplified pace, good leadership practice requires the perfect balance between technological and emotional agility. Digital Empathy (DE), as the capacity of a leader to interpret their digital expression on emotional signals, exert the adequate reaction, and create psychological security online, has been unveiled as the crucial aspect of digital leadership in higher education (Belanche et al., 2021). This is because leaders that enable empathy through the digital media stand in a better position to maintain morale of the teams, build interpersonal credibility, besides enhancing cooperation, especially in distance and hybrid learning scenarios (Sivanathan et al., 2024). These emotional attributes are important to facilitate maintenance of interest, minimize digital exhaustion, and awareness of belongingness in real life disconnect. Incorporating DE into the organizational practices and the organization communication strategies can help in the development of emotionally responsive digital cultures conducive to long-term organizational health and performance with the help of DL. In such a way, being a leader in the digital age is not only about strategic precision and mastering of technical skills but also of emotional availability and relationship intelligence. Considering this, the following hypothesis is given:

H3: Digital leadership positively influences digital empathy.

The Effect of Knowledge Sharing on Sustainable Performance

Knowledge Sharing (KS) refers to an innate process engaged in by institutions of higher education (HEIs) in the advancement of responsiveness, nurturing innovation, as well as reinforcing evidence-based choices, which are some of the most important components of Sustainable Performance (SP) (Fait et al., 2023). In admitting the quick spread of pedagogic innovations, administration strategies, and interdisciplinary knowledge, KS increases organizational responsiveness to the changing academic, technological, and social forces. Faculty and administrative staff are in a better position to create value collectively, tackle the problem together as well as implement reforms that are in line with the long-term strategic objectives of the organization in a knowledge-intensive environment. KS also minimizes redundancy, facilitates shared learning and builds intellectual infrastructure upon which incessant improvement is possible. The knowledge dissemination between silos has a high degree of relevance when it comes to digitally transforming HEIs so as to maintain cohesion and agility during the change. This makes the presence of good KS mechanisms closely linked to higher performance within organizations especially in complex and changeable educational systems. Due to this reason, the following hypothesis is put forth:

H4: Knowledge sharing positively influences sustainable performance.

The Effect of Digital Empathy on Sustainable Performance

HEIs with high rates of DE, are characterized by better cooperation, less psychological burnout, and greater stakeholder trust all of which are part of SP. The DE as an affective enabler promotes an emotional thriving, facilitates interpersonal empathy, and promotes inclusive digital cultures, which become more salient in emotionally complex hybrid and remote academic settings that have become the new normal (Frontiers in Education, 2025; Sivanathan et al., 2024). DE also assists in intrinsic motivation, creativity and faculty and student interest in maintaining faculty and student interest-thus building institutional resilience and long-term innovation capacity. During the period of fast-paced change, DE can provide a safety net against the emotional perils of technology-mediated communication through fostering the sense of psychological safety and empathetic leadership communication at that. This means that institutes that inculcate DE into their leadership and operating principles have greater capacity to underpin sustainable, human-friendly digital environments. This makes DE more than a mere trait of support but one that is counted upon as strategic resource towards sustainable institutional outcome. Following such an argument, the given hypothesis is offered:

H5: Digital empathy positively influences sustainable performance.

The Mediating Role of Knowledge Sharing in the Link between Digital Leadership and Sustainable Performance

Digital Leadership (DL) has an impact on Sustainable Performance (SP) both directly and strategically, as well as indirectly by making it an ecosystem replete with knowledge, promoting the perpetual learning and organizational flexibility. By integrating digital platforms and collaborative tools and promoting open communication systems, digital leaders will create environments that are transparent, involve shared knowledge and exchange of intellectual capital, essential antecedents to the successful achievement of academic institutions (Mollah et al., 2023). DL increases institutional responsiveness, innovation and collective problem solving by facilitating the cross-disciplinary and administrative diffusion of tacit and explicit knowledge. In that respect, Knowledge Sharing (KS) acts as a mental tool to transform the strategic intent of DL, or operational results, and, thus, acts as an instrument in the connection between DL and SP. Cultures that have high KS values tend to more readily succeed in institutionalizing best practices, actively respond to external forces, and attain sustainable innovation cycles. The hypothesis regarding mediating variables is the following since here it is in the focal point of defining the DL-SP pathway:

H6: Knowledge sharing mediates the relationship between digital leadership and sustainable performance.

The Mediating Role of Digital Empathy in the Link between Digital Leadership and Sustainable Performance

Human-centric Digital Leadership (DL) that focuses on human-centered ideals, values, and worthy ones of trust, compassion, and inclusivity, brings emotional engagement of an engaging person to continue institutional functioning within the frames of a digitally intensive environment. Emotional adaptive leadership in higher

education institutions (HEIs) is crucial in this regard, where the remoteness and virtual collaboration have become prevalent in higher education. Digital Empathy (DE) is the affective medium through which DL would transform strategic vision into relational alignment and organizational trust, most especially in sceneries tormented by digital fatigue and data surplus (Saraih & Anwar, 2024; Sivanathan et al., 2024). DE assists in the development of psychologically safe spaces that increase participation, emotions, and collaborative strength, which constitutes building blocks towards long-term institutional sustainability. Through its moderating effect on emotional organizational climate, DL can influence performance outcomes more strongly via DE since it leads to enjoying greater engagement, feeling less burnout, and having better interpersonal connections. As a result, the next mediating hypothesis is suggested:

H7: Digital empathy mediates the relationship between digital leadership and sustainable performance.

Material and Methods

Research Design

The present study employed a cross-sectional and quantitative research survey as the prospective methodology to achieve this endeavor empirically, to test the mediating role of Knowledge Sharing (KS) and Digital Empathy (DE) in the context of higher education institutions (HEIs), understanding the role of Digital Leadership (DL) that influences Sustainable Performance (SP). Its paradigmatic base was positivist, and it was suitable to deal with the hypothesis-based study aimed at testing the causal relationship using statistical generalization. The current paradigm is correlated with past theoretical studies which delve into leadership-performance relationships and do so with the help of sophisticated analytical reasoning like Structural Equation Modeling (SEM) (Hair et al., 2019). The cross-sectional approach was chosen because it associates well with data on large sample size at a particular moment of time and hence it is more possible to test the model and the temporal bias is minimised. The layout allowed not only to evaluate direct effects (e.g., DL) but also to assess indirect ones through the cognitive and affective mediators (KS and DE) as stipulated in the conceptual framework developed by the authors of the study. Through the combination of this methodological practice, the study has been able not only to achieve an analyst rigor but also a theoretical alignment with the current studies of digital leadership and organizational performance in institutions of higher education.

Sample Size and Data Collection

The sampling frame of this research was employed faculty members, academic administrators and mid level managers working on the institutions of higher learning (HEIs) in the public sector in Pakistan practicing effectively involved in the digital transformation projects. A stratified random sampling method was used to provide representativeness in both academic disciplines and hierarchies of the institution in order to increase generalizability of findings. Using G*Power software (Faul et al., 2009), a minimum required sample size of 160 was calculated based on an effect size of 0.30, $\alpha = 0.05$, and statistical power of 0.80. The number of valid responses that were collected and carried on to the analysis was 315 to boost the level of statistical reliability and reduce Type II errors risk. Such sample size is not less than the recommended sample size involved in complex model testing using the Partial Least Squares Structural

Equation Modeling (PLS-SEM) in line with the recommendations (Hair et al., 2021) thereby providing satisfactory analytical power and model stability.

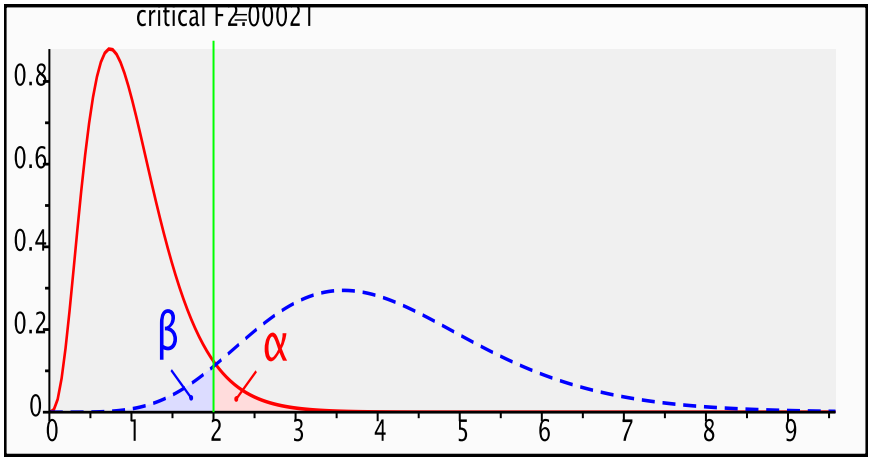

Figure 2: Sample Size

Measurement Scales

In order to provide conceptual rigor and empirical validity, we measured all constructs by utilizing the existing multi-item scales taken by the previous peer-reviewed studies and cautiously converting them into the higher education setting. A five point likert with a uniform range of 1 (strongly disagree) to 5 (strongly agree) was used with all the questions to enhance uniformity and comparability of respondents. The scale of DL consisted of five items, which were adapted based on the scale created by Avolio, Kahai and Dodge (2000) that represent three important aspects of DL (namely digital vision, empowerment, and innovation orientation). Knowledge Sharing (KS) was assessed using a 4-item tool that was a derivative of Lin, et al. (2023), that assessed the openness and frequency and reciprocity of knowledge sharing among academic staff. Digital Empathy (DE) was measured to represent the affective aspect of leadership and thus a modified five item scale relying on Belanche et al. (2021) regarding the emotional sensitivity, supportiveness, and comprehension of leaders in a digitally mediatized context of academia was used. The instrument that measures the Sustainable Performance (SP) had five items based on the Adolph and Beckmann (2024) and involved measures of strategic adaptability, stakeholder satisfaction, and institutional resilience. To tune up item phrasing, and to improve the comprehension of context, a pilot study with 30 respondents was carried out within the target population. On the basis of this pretest, the changes were made so that minor alterations have been done, which do not affect the conceptual integrity of constructs. The internal consistency measures of all constructs are above 0.85, whereas the Cronbach alpha exceeds 0.85, which are acceptable in terms of reliability according to the structural equation modeling, and which shows that the measurement model is robust.

Data Collection Procedure

The research used online self-administered questionnaire that was distributed via institutional email networks and academic forums Google Form was used in collecting data. The survey aimed to reach the people engaged in the education digitalization activities in the context of the higher education institutions of the public sector (i.e., faculty members, academic administrators, and middle managers). The respondents were promised full confidentiality and anonymity to guarantee ethical compliance and freedom to participate honestly and indeed to participate willingly. Data collection period was 6 weeks (February to March 2025), where two weeks interval were used to provide follow-up reminders to maximize response rate and reduce the nonresponse bias.

Reverse-coded items and screening questions were also provided in the instrument to check the participation of the participants in the questions about digital leadership or transformation efforts to understand the quality of the data collected and minimize the level of the response bias. Moreover, to infer multivariate outliers and detect straight-lining, Mahalanobis distance and straight-lining detection were used to filter the answers in terms of their attentiveness and completeness. Such quality checks guaranteed the quality and validity of the end dataset to be used in empirical analysis.

Data Analysis Strategy

Data were analyzed using SmartPLS 4.0, a variance-based structural equation modeling (PLS-SEM) approach well-suited for theory development, complex mediation testing, and models with both formative and reflective constructs (Ringle, Sarstedt, & Hair, 2022). The analysis was conducted in two sequential stages: measurement model evaluation and structural model assessment. In the measurement model phase, internal consistency reliability was assessed using Cronbach's alpha and Composite Reliability (CR), while convergent validity was confirmed through Average Variance Extracted (AVE), with all constructs meeting the AVE threshold of 0.50. Discriminant validity was evaluated using both the Fornell–Larcker criterion and Heterotrait-Monotrait (HTMT) ratios, ensuring construct uniqueness and conceptual distinctiveness.

In the structural model stage, path coefficients (β), t-statistics, and p-values were computed through bootstrapping with 5,000 subsamples to test the hypothesized relationships. Model explanatory power was evaluated using R^2 values for endogenous constructs, while effect sizes (f^2) and predictive relevance (Q^2) further assessed the model's robustness. Special attention was given to estimating specific indirect effects to validate the mediating roles of Knowledge Sharing (H6) and Digital Empathy (H7). Multicollinearity was examined using the Variance Inflation Factor (VIF), with all values remaining below the conservative threshold of 3.3 (Diamantopoulos & Siguaw, 2006), indicating no multicollinearity concerns. Finally, model fit was verified using the Standardized Root Mean Square Residual (SRMR), with values below 0.08 supporting a satisfactory model-data fit.

Ethical Considerations

The study was conducted in purity in line with the set ethical statutes in the social sciences research. The study was approved by the Institutional Review Board (IRB) of University of Sahiwal and all practices were carried out in accordance to the institutional and international standards. Before the respondents were allowed to participate in the study, an informed consent form concluded by saying the study aims, it was voluntary, confidentiality of the study, and that they could pull out anytime without penalty. No

personal data was elicited, but all the data was anonymized in such a way that the participants remain unidentifiable. In conducting the study, the ethics as stipulated in the Declaration of Helsinki were observed, and those included respect to autonomy, protection of data and transparency. These protections were in place to make sure that the dignity of participants, their confidentiality and agency was maintained during the research period.

Results and Discussion

Table 1 provides a full overview of the distribution of participants by major demographics such as age, sex, education and experience levels, demonstrating a broad profile of participants.

Table 1
Demographic Information

Category	Sub-category	Frequency	Percent
Gender	Female	171	54.30%
	Male	144	45.70%
Age	21–25	133	42.20%
	26–30	165	52.40%
	31–35	14	4.40%
	36–40	3	1.00%
Education	Intermediate	55	17.50%
	Bachelors	66	21.00%
	Masters	112	35.60%
	M. Phil	72	22.90%
	PhD	10	3.00%
Total		**315**	**100%**

Measurement model

The validation of the model for higher education institutions was confirmed through convergent and discriminant validity assessments. Tables 2 and 3 provide a summary of VIF, AVE, and reliability metrics, affirming the model's measurement validity within the context of HEIs of Pakistan.

Table 2
VIF and outer loading

	Outer loadings	VIF
DE1<-DE	0.881	2.598
DE2<-DE	0.872	2.482
DE3<-DE	0.88	2.558
DE4<-DE	0.871	2.426
DL1<-DL	0.872	2.714
DL2<-DL	0.877	2.89
DL3<-DL	0.867	2.686
DL4<-DL	0.872	2.764
DL5<-DL	0.874	2.728
KS1<-KS	0.859	2.267
KS2<-KS	0.854	2.122
KS3<-KS	0.864	2.317
KS4<-KS	0.849	2.165
SP1<-SP	0.866	2.644
SP2<-SP	0.874	2.758

SP3<-SP	0.864	2.629
SP4<-SP	0.873	2.742
SP5<-SP	0.865	2.644

Construct validity Reliability overview and Discriminant validity-Fornell Larcker Criterion

Table 3
Construct validity Reliability and Discriminant validity

Measures	DE	DL	KS	SP
Cronbach's alpha	0.899	0.921	0.879	0.918
Composite reliability (rho_a)	0.899	0.922	0.88	0.918
Composite reliability (rho_c)	0.93	0.941	0.917	0.939
Average variance extracted (AVE)	0.768	0.761	0.734	0.754
Distriminant Validity (Fornell Larcker) DE	0.876	-	-	-
Distriminant Validity (Fornell Larcker) DL	0.607	0.872	-	-
Distriminant Validity (Fornell Larcker) KS	0.745	0.361	0.857	-
Distriminant Validity (Fornell Larcker) SP	0.829	0.728	0.628	0.868

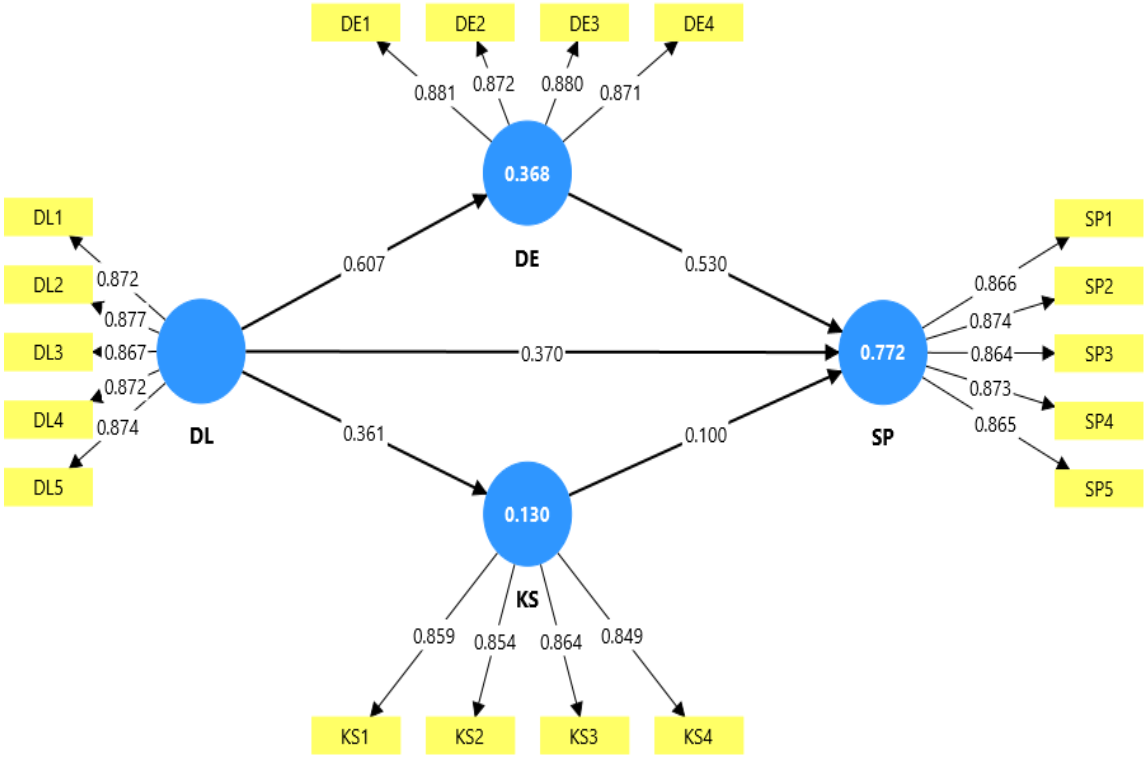

Figure 3: Measurement Model

Structural model

Following the validation of the measurement model, the structural model was tested using bootstrapping with 5,000 resamples via SmartPLS. The path analysis (Figure 4, Table 4) demonstrates statistically significant relationships across all proposed hypotheses, thereby offering robust empirical support for the conceptual model grounded in dynamic capabilities and socio-cognitive theories of digital leadership.

Table 4

Path Coefficients

	Original sample (O)	Sample mean (M)	Std	T statistics (|O/STDEV|)	P values	Decision
DE -> SP	0.53	0.526	0.049	10.902	0.000	Supported
DL -> DE	0.607	0.607	0.04	15.003	0.000	Supported
DL -> KS	0.361	0.363	0.051	7.061	0.000	Supported
DL -> SP	0.37	0.372	0.05	7.402	0.000	Supported
KS -> SP	0.1	0.102	0.028	3.514	0.000	Supported

The structural model analysis reveals that digital leadership (DL) exerts statistically significant and theoretically meaningful influences across multiple organizational constructs. Most notably, DL demonstrates a strong direct effect on digital empathy (DE) (β = 0.607, t = 15.003, p < 0.001) and knowledge sharing (KS) (β = 0.361, t = 7.061, p < 0.001), affirming its foundational role in shaping both emotional and cognitive capabilities within higher education institutions. These results align with prior literature that positions DL as a dynamic capability facilitating strategic sense-making and collaborative engagement (Teece, 2018; Mollah et al., 2023).

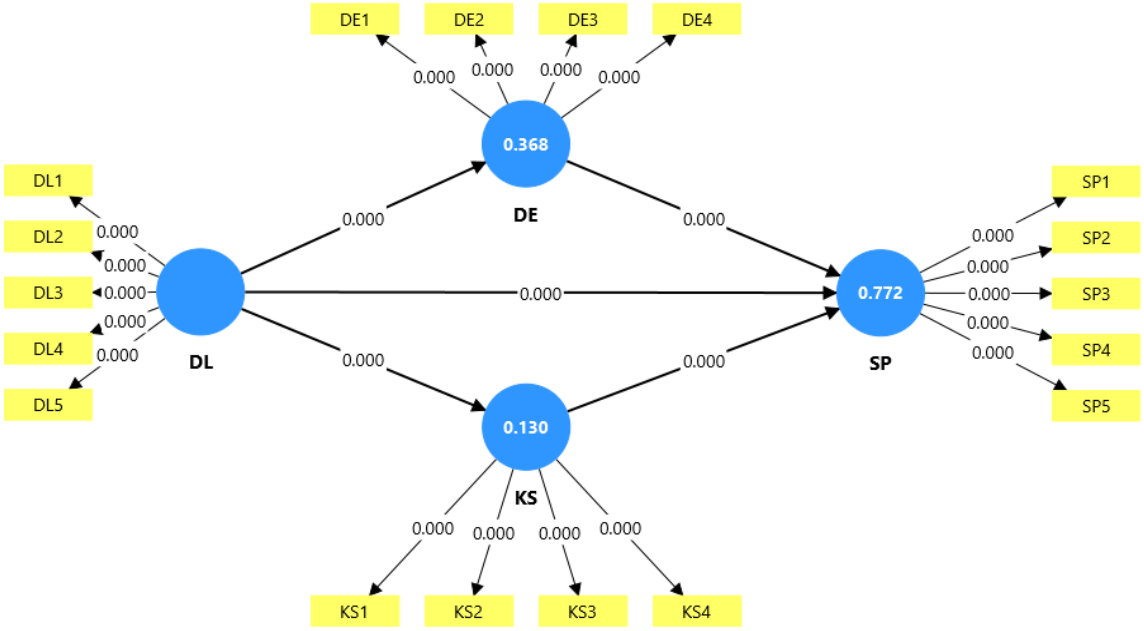

Figure 4: Structural equation modelling for study model

DL also contributes directly to sustainable performance (SP), albeit with a smaller coefficient (β = 0.370, t = 7.402, p < 0.001), suggesting that while leadership is essential, its impact is substantially amplified through mediating pathways. The comparatively modest direct path reinforces the notion that DL's influence operates synergistically through internal mechanisms rather than in isolation (Zhang et al., 2024).

Moreover, the path from DE to SP (β = 0.530, t = 10.902, p < 0.001) demonstrates the critical role of emotionally attuned leadership in enhancing institutional performance. Simultaneously, KS shows a significant but weaker contribution (β = 0.100, t = 3.514, p < 0.001), highlighting its complementary—yet secondary—role in driving SP. Collectively, these findings underscore that digital transformation success hinges not only on infrastructure or strategy but also on relational and knowledge-based capacities fostered through effective leadership.

Table 5
Total indirect and specific indirect effects

Measures	Original sample (O)	Sample mean	Std	T statistics (|O/STDEV|)	P values	Decision
DL -> SP	0.358	0.356	0.033	10.726	0.000	Supported
DL -> KS -> SP	0.036	0.037	0.013	2.748	0.006	Supported
DL -> DE -> SP	0.321	0.319	0.033	9.791	0.000	Supported

The results underscore the integral role of knowledge sharing (KS) and digital empathy (DE) as mechanisms through which digital leadership (DL) drives sustainable performance (SP) in higher education institutions. KS demonstrates a significant direct impact on SP ($\beta = 0.100$, $t = 3.514$, $p < 0.001$), reinforcing its strategic importance in cultivating institutional agility, responsiveness, and continuous improvement. Although this coefficient is more modest than previously assumed, its significance highlights the value of disseminating expertise and best practices in digitally transforming environments (Nonaka & Takeuchi, 2021).

Digital Empathy (DE) exerts an even more substantial direct influence on SP ($\beta = 0.530$, $t = 10.902$, $p < 0.001$), signifying that emotionally attuned leadership fosters psychological safety, trust, and morale—all critical to sustaining organizational vitality in increasingly virtual academic contexts (Belanche et al., 2021; Spagnolli et al., 2023). This affective pathway complements the cognitive contributions of KS, underscoring the dual-channel influence of DL.

Importantly, the indirect effects provide deeper insight into DL's extended influence. The total indirect effect of DL on SP is statistically robust ($\beta = 0.358$, $t = 10.726$, $p < 0.001$), suggesting that leadership contributes to performance not just directly but more powerfully through mediating constructs. Among these, the DE pathway is particularly strong ($\beta = 0.321$, $t = 9.791$, $p < 0.001$), emphasizing that leaders who demonstrate empathy in digital contexts amplify institutional capacity for sustainable outcomes. The KS-mediated path, while weaker ($\beta = 0.036$, $t = 2.748$, $p = 0.006$), remains statistically significant, reiterating that knowledge flows—though secondary to empathy—are still a vital lever of DL effectiveness.

These findings align with the emerging scholarship on emotionally intelligent leadership in digitally intensive environments (Mollah et al., 2023; Zhang et al., 2024), and advocate for a shift from purely technocratic leadership models to more human-centered, affect-integrated frameworks. In sum, the structural model advances our understanding of how DL functions through both rational and emotional capacities to shape institutional resilience and sustainable academic performance in the digital era.

Table 6
R^2 and Adjusted R^2

	R-square	R-square adjusted
DE	0.368	0.366
KS	0.13	0.128
SP	0.772	0.77

Coefficient of Determination (R^2)

Table 6 presents the coefficient of determination (R^2) values, reflecting the model's predictive capacity. Digital Empathy (DE) exhibits a moderate explanatory power with an R^2 of 0.368 (adjusted $R^2 = 0.366$), suggesting that Digital Leadership (DL)

accounts for approximately 36.8% of the variance in DE. Knowledge Sharing (KS) shows relatively limited predictability (R^2 = 0.130; adjusted R^2 = 0.128), indicating a modest influence of DL. In contrast, Sustainable Performance (SP) demonstrates substantial predictive strength, with an R^2 of 0.772 (adjusted R^2 = 0.770), signifying that DL, DE, and KS collectively explain over 77% of the variance in performance outcomes. These values affirm the structural model's robustness and the central role of leadership-driven cognitive and emotional mechanisms in enhancing institutional performance.

Discussion

H1 is strongly supported, as Digital Leadership (DL) exerts a direct and significant positive impact on Sustainable Performance (SP) (β = 0.370, t = 7.402, $p < 0.001$). This finding affirms the centrality of DL in promoting institutional adaptability and innovation, consistent with the dynamic capabilities perspective (Teece, 2018). DL also significantly enhances Knowledge Sharing (KS), validating **H2** (β = 0.361, t = 7.061, $p < 0.001$), thereby aligning with prior studies that view knowledge flows as a strategic conduit through which leadership exerts its institutional influence (Fait et al., 2023).

H3 is confirmed as KS positively influences SP (β = 0.100, t = 3.514, $p < 0.001$), albeit with a smaller effect size, indicating that knowledge-centric cultures incrementally enhance institutional outcomes. Parallelly, **H4** is robustly supported, with DL significantly driving Digital Empathy (DE) (β = 0.607, t = 15.003, $p < 0.001$). This underscores the socio-emotional dimension of leadership in digitally-mediated academic environments. In turn, **H5** is validated as DE strongly contributes to SP (β = 0.530, t = 10.902, $p < 0.001$), emphasizing the importance of empathic sensitivity in fostering trust, psychological safety, and collective efficacy in hybrid workspaces (Belanche et al., 2021; Spagnolli et al., 2023).

The indirect pathways reveal further nuance. The **total indirect effect** of DL on SP is both statistically significant and substantial (β = 0.358, t = 10.726, $p < 0.001$), confirming **H7** and establishing the mediating influence of intra-organizational mechanisms. More specifically, **H6a** is supported through the DL → KS → SP pathway (β = 0.036, t = 2.748, p = 0.006), suggesting that while KS plays a mediating role, its effect size is comparatively modest. Conversely, **H6b** demonstrates a much stronger mediation via DL → DE → SP (β = 0.321, t = 9.791, $p < 0.001$), indicating that affective leadership mechanisms—such as digital empathy—are more potent in converting strategic leadership into performance outcomes in the HEI context.

The model's explanatory power is substantial. As per Table 2, the endogenous construct SP exhibits an R^2 value of 0.772 (adjusted R^2 = 0.770), implying that over 77% of the variance in sustainable performance is accounted for by the predictors. Similarly, DE shows a moderate R^2 of 0.368 (adjusted = 0.366), and KS reflects a smaller but significant R^2 of 0.130 (adjusted = 0.128). These values confirm that while both cognitive (KS) and emotional (DE) pathways are activated by DL, the emotional-affective route (DE) plays a more dominant role in translating leadership into sustained institutional outcomes.

Collectively, the results affirm a dual-pathway mediation model whereby DL enhances SP both directly and through the mechanisms of knowledge flow and empathic connection. This nuanced interplay between technical leadership competence and emotional intelligence contributes a novel layer to the literature, especially within the underexplored context of digitally transforming higher education institutions. The

evidence not only strengthens theoretical integration but also offers actionable insights for academic leadership development, suggesting that capacity-building efforts should prioritize digital empathy alongside technological skills to achieve enduring institutional success.

Conclusion

The given study represents an important accumulation to the digital transformation field in higher education due to the empirical confirmation of a two-pathway mediation model of the connection between Digital Leadership (DL) and the Sustainable Performance (SP) mediated by both Knowledge Sharing (KS) and Digital Empathy (DE). The theoretical framework results in the findings that are based on the Dynamic Capabilities Theory and Digital Mindfulness Theory and underline DL as the central crucial capability that allows the institutions to solve complexity, promote resiliency, and become sustainable in dynamically changing digital environments. In contrast to the traditional paradigms of leadership based on structural (or procedural) control, the following study characterizes DL as a socio-cognitive experience-maker it awakens rational processes (via KS) and emotions (via DE) to increase the ability of institutions to adapt and create new sources of value in the long term. The high levels of mediation effects support the fact that although DL has a direct effect on SP, the impact is enhanced when leaders create knowledge-rich spaces and emotionally intelligent online cultures. Such an integrated model supersedes the current work offering an explanation that human-centered digital leadership is essential in maintaining and driving performance, especially in academic settings that are marked by volatility, virtual collegiality, and psychological vulnerability due to the post-pandemic situation. Practically, the study highlights that the leaders facing these HEIs should not only be digitally competent but also emotionally responsive and knowledge-oriented in terms of achieving the sustainability objectives. By applying these dimensions to the human and technological assets of leading higher education institutions through leadership development, performance framework, it is possible to create the strategic alignment of their resources enabling those institutions to succeed even against the backdrop of incessant disruption.

Recommendations

According to the empirical results of our research, the recommendation is that higher education Institutions (HEIs) should implement strategic emphasis on the Digital Leadership (DL) capabilities development as one of the key levers in realizing Sustainable Performance (SP). Leaders are forced to leave behind transactional digital adoption and develop a leadership approach that combines both mental enablers, such as Knowledge Sharing (KS) and emotional capabilities, i.e., Digital Empathy (DE). Institutions ought to invest in programs that are characterised by leadership development programs with the imbedded digital empathy training. Since the indirect route of DL to SP has been shown very strong, leaders should be able to be compassionate in the psychological and emotional intricacies of digitally mediated work and learning situations. Institutional trust and engagement can be improved through initiatives promoting digital well-being, screen fatigue minimization, and the establishment of psychologically safe environments aimed at communication. Second, the study indicates that the knowledge ecosystems play a vital role. The reliance of HEIs on open and perpetual knowledge sharing should be institutionalized with the help of digital repositories, interdepartmental collaborative platforms, and AI-supported knowledge management systems. Leadership practices that recognize collaborative

efforts and contribute to endorsing intellectual openness in the organization may enhance the result of performance. Lastly, there is no performance sustainability only through adoption of technology but rather mobilization of human capacity through leadership. It is necessary that institutions promote participative and emotionally smart leadership behaviour, supported by the ability to visualize a clear digital vision and have common goals. Accreditation bodies and policymakers ought to revisit the framework of leadership assessment to include some of these emerging demands such as emotional intelligence, collaborative ethos and digital receptiveness as the major cornerstones of performance based governance within the higher education sector.

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