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Impact of Smart Governance on Institutional Sustainability: Empirical Evidence from Higher Education

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Abstract

The objective of this study is to examine the impact of smart governance on institutional sustainability in Saudi higher education. The study employs a quantitative cross-sectional survey design and a stratified random sample of 611 faculty members. In particular, the study estimates a linear model of institutional sustainability where smart governance in conjunction with the contextual variables of ICT and institutional culture are exogenous, and that the impact of smart governance on institutional sustainability is mediated through institutional performance. The results show that smart governance has a significant positive impact on institutional sustainability in Saudi higher education institutions. This supports the growing body of literature suggesting that digital transformation and participatory governance enhance organizational effectiveness and long-term sustainability. The study also finds that institutional performance mediates this relationship, indicating that smart governance tends to augment sustainability indirectly by enhancing efficiency, innovation, and responsiveness. Furthermore, the results of the study are consistent with the claim that Institutions with strong technological capabilities and supportive cultures are better positioned to leverage smart governance for sustainability. Toward this end, the study contributes to the extant literature on the subject by stretching smart governance literature into the Saudi higher education context, integrating governance, performance, and sustainability into a single framework, and documenting empirical evidence supporting the mediation mechanism of institutional performance and contextual effects of information technology integration and institutional culture.

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Introduction

The extant public administration literature defines Institutional sustainability as the long-term ability embedded in the very fabric of the institution to maintain effective operations while simultaneously underscoring economic, social, and environmental objectives (Böhmelt, 2026; Marques et al., 2021; Pini et al., 2026). Institutional sustainability (hereafter, IS) thus builds upon functional autonomy and institutional legitimacy, particularly in contexts of resource constraints and governance challenges (Pini et al., 2026; Santoro, 2018). It follows that, IS is increasingly recognized as a key outcome of effective governance systems. In this regard, Bibri and Krogstie (2017) highlight that resilient, adaptive, and strategically oriented IS may be strongly considered a function of the adoption of smart technologies and integrated policy frameworks. In fact, the relationship between smart governance (hereafter, SG) and IS is widely recognized in the extant literature (Yin et al.., 2026). For instance, SG may enhance critical governance aspects including transparency, efficiency, and stakeholder participation, which are essential for effective and sustainable institutional development (Tsavdaridou et al., 2026). Here, Meijer & Bolívar (2016) argue that SG may lead to improved accountability and better resource management, thereby supporting sustainability goals and initiatives and meanwhile enabling institutions to respond both holistically and effectively to environmental and social challenges. In essence, SG is often manifested as an indispensable element to modern public administration, driven by advancements in intelligent infrastructures, digital technologies, and the increasing demand for institutional transparency, accountability, social responsibility, citizen engagement, and institutional sustainability (Tomor et al., 2019). SG includes several dimensions such as ICT, data-driven decision-making, and participatory governance processes to enhance institutional sustainability, operational outcomes, stakeholder value, and social impact on communities (Yin et al., 2026).

Moreover, conceptualized as a multidimensional construct involving technology, people, and institutional structures and layouts, SG typically extends beyond simple digital and intelligent interventions to strongly affects sustainability, collaboration, openness, and innovation in all institutional systems, operations, and management activities (Meijer & Bolívar, 2016; Meijer et al.,2021). In particular, the relationship between SG and IS tends to hinge directly on overall Institutional performance (hereafter, IP) (Jiang et al., 2022). Such intervening mechanism of IP in the relationship between SG and IS may reiterate the notion that improved governance practices often lead to enhanced service delivery, innovation, and responsiveness, which in turn contribute to better sustainability (Al-Mekhlafi et al., 2024). In this respect, Mora et al. (2019) contend that institutions with competitive performance and operating results are better equipped to implement viable and maintainable strategies and adapt to changing environments. Wiyono et al. (2025) document that ESG practices significantly respond to governance with IP acting as a critical intervening mechanism. Besides potential mediating effect of IP, however, the relationship between SG and IS may also accommodate a host of contextual factors, particularly ICT infrastructure and organizational culture (El-Sheikh et al., 2026). Indeed, robust ICT infrastructure tends to greatly support the successful implementation of digital governance systems (Aydin, 2025).

Similarly, a supportive organizational culture that nurtures employees' willingness to adopt new technologies and digital practices tends to cultivate institutional innovation and adaptability, eventually cultivating into IS (Jacobs & Sopiah, 2023). On this subject, Meijer et al. (2021) explain that variables of technological readiness and

institutional capacity are critical for achieving desired sustainability outcomes of governance interventions. Along these lines, examining the relationship between SG and IS may be particularly relevant in the context of higher education, where institutions are increasingly expected to operate efficiently while addressing complex societal and environmental challenges (Lozano et al., 2013). In KSA, to cite an instance, the transformation toward SG is strongly aligned with the 2030 vision of the kingdom, which emphasizes digital transformation, national income diversification, transparency, and sustainable development across all sectors of the economy, including that of higher education (Albeshir et al., 2025). Saudi institutions of higher education are hence expected to play a pivot role in satisfying these 2030 vision objectives via embracing innovative governance models and embedding sustainability into their institutional strategies (Alhusaini, 2025).

In view of the preceding, the objective of this study is to document the impact of SG on IS in Saudi higher education. The study uses a linear model where SG, ICT, and institutional culture are independent variables, and IP acts as a mediator. In this fashion, the study complements the extant literature with empirical evidence on the subject. Though Saudi higher education institutions have undergone significant reforms in recent years, including increased autonomy, performance-based management, and the adoption of digital platforms, aspiring to enhance institutional performance and promote alignment with global standards, the extent to which SG contributes to IS remains greatly under-explored. Furthermore, while institutional performance is often argued as a critical factor in achieving sustainability, its mediating role in the relationship between SG and IS has not been investigated in the Saudi higher education context. Toward this end, the study advances the following main and minor research questions (RQs).

Main RQs:
RQ1: What is the impact of SG on IS in Saudi higher education?
RQ2: What is the extent to which IP mediates the impact of SG on IS in Saudi higher education?

Minor RQs:
RQ3: What is the impact of ICT on IS in Saudi higher education?
RQ4: What is the impact of institutional culture on IS in Saudi higher education?

To answer the four RQs above, the study adheres to the traditional scientific paradigm. The rest of the study is thereby reported following a typical quantitative research in terms of literature review and hypothesis development, research design and data analysis, and research results and recommendations.

Literature Review and Hypothesis Development

This section to the study reviews the relevant literature on IS, with a particular focus on higher education institutions while exploring IS within the Saudi Arabian context and identifies key research gaps that justify the current study. It examines the conceptual foundations, theoretical perspectives, key dimensions, and contemporary empirical findings. The subsequent subsections present the hypothesis development relevant to the five null hypotheses tested in the study.

IS Conceptual Foundations and Theoretical Perspectives

IS- is an intergenerational equity concept consistent with the sustainable development principles of the world commission on environment and development World Commission on Environment and Development (WCED, 1987). Such concept exhausts the ability of the institution to attain and maintain long-term effective operating and management activities while concurrently anchoring on the economic, social, and environmental objectives of the institution. Thus, the construct of IS, by definition both conceptually and holistically intersects with other major constructs in social science including governance, institutional survivorship, organizational resilience, value creation and optimization, innovation, stakeholder theory, and the overall relevance of the institution Purvis, Mao & Robinson (2019). In fact, the existing literature identifies economic sustainability, social sustainability, and environmental sustainability as the three main dimensions to IS (e.g., Bibri & Krogstie, 2017). IS is, therefore, considered not only an environmental concern but also a performance-driven strategic approach that directly translates into institutional bottom-line outcomes. Whereas economic sustainability addresses efficient resource utilization, financial stability, long-term value creation, economic viability, and growth prospects over the long term, social sustainability focuses on equity, inclusiveness, social responsibility and accountability, and stakeholder engagement and welfare (Purvis et al. 2019; Bansal, Grewatsch & Sharma, 2021). Apart from economic and social dimensions, environmental sustainability exhausts the rather main traditional characterization of IS in terms of sustainable and ecologically sensitive practices along the lines of green initiatives, waste reduction, and efficient energy storage and usage (Bibri & Krogstie, 2017). Besides the three component dimensions, IS is often associated in the existing organizational literature with the three theoretical frameworks of institutional theory, resource-based view of the firm, and stakeholder theory. In particular, institutional theory zeroes in on the mechanisms via which organizational structures and norms influence sustainability practices along with the extent to which institutions may endorse sustainable activities to gain legitimacy and align with societal expectations (see, e.g., Scott, 2014). Institutional theory thus incubates a robust framework for understanding IS by emphasizing legitimacy, norms, and systemic pressures (El-Sheikh et al., 2026). Under the resource-based view of the firm, IS is pragmatically conceptualized as a function of optimally combining rare, valuable, and hardly inimitable internal capabilities including technology, human capital, and governance systems (Barney, 1991). In this fashion, the Resource-Based View offers a powerful theoretical perspective via which understanding sustainability may emphasize the strategic role of internal and relational resources (Ma et al., 2024). In the context of IS, the resource-based view highlights the importance of governance capabilities, knowledge, and social capital (Milani et al., 2024). When integrated with institutional theory, the resource-based view may turn out to be essential when capturing the broader socio-political and regulatory context shaping sustainability transitions (Bhandari et al., 2022).

Unlike institutional or resource-based theoretical frameworks, however, stakeholder theory hypothesizes that the mere satisfaction of stakeholder needs and expectations is sufficient to ensuring the long-term relevance and viability of the institution (Freeman, 1984). Stakeholder theory hence provides a valuable apparatus for specifying sustainability within aspects of inclusive governance, accountability, and value creation for multiple stakeholder groups (Bhandari et al., 2022).

In this respect, institutions of higher education define a particularly rich context to empirical analysis of IS as these institutions increasingly expected to integrate sustainability into their governance, curriculum, and operations through mainstream activities of teaching, research, and community engagement (Albeshir et al., 2025). Along these lines, the most recent studies indicates a shift toward data-driven and performance-oriented approaches to sustainability in higher education. For instance, Lu et al. (2024) finds that sustainability practices are becoming increasingly embedded in governance systems, academic programs, and campus operations Leal Filho et al. (2024) highlights the growing influence of global rankings in encouraging universities to adopt sustainability practices, while student expectations are increasingly shaping institutional priorities. Leal Filho et al. (2024) define a sustainable university as one that incorporates environmental, economic, and social considerations into its core functions. Furthermore, Lozano et al. (2013) argue that achieving sustainability in higher education may require systemic transformation across institutional structures. In this context, Priyadarshini and Abhilash (2022) conceptualize universities as complex adaptive systems, where sustainability requires systemic transformation across governance, teaching, and operations. Alhusaini (2025) reports that many universities are challenged with formulating comprehensive sustainability frameworks and so may be short of participating in global sustainability rankings, indicating potential gaps in institutional commitment. Bansal, Grewatsch & Sharma, (2021) identify governance, leadership, and financial strategies as key drivers of sustainability, while also noting structural barriers such as limited funding and weak policy integration.

Bansal et al. (2021) important gaps remain. First, most existing studies have examined smart governance and sustainability in isolation or within general public administration contexts, with limited attention to higher education institutions as a distinct analytical setting. Second, while prior research has established that digital transformation improves governance outcomes, there is still insufficient empirical evidence explaining the mechanisms through which smart governance translates into institutional sustainability. In particular, the mediating role of institutional performance remains underexplored, especially in developing country contexts. Third, contextual factors such as ICT infrastructure and institutional culture are often discussed theoretically but rarely integrated into a unified empirical framework. Finally, there is a notable lack of evidence from the Saudi higher education sector, where rapid digital transformation under Vision 2030 is reshaping governance structures but remains under-researched in academic literature. Addressing these gaps is essential for developing a more comprehensive and context-sensitive understanding of smart governance and sustainability relationships.

This study contributes to the existing literature by integrating three major theoretical perspectives—stakeholder theory, resource-based view, and institutional theory—into a unified framework for explaining institutional sustainability. While previous studies have typically applied these theories independently, this research demonstrates how they collectively explain the pathways through which smart governance influences sustainability outcomes. Specifically, stakeholder theory explains the role of participation and transparency, resource-based view highlights the importance of ICT and institutional capabilities, and institutional theory provides insights into legitimacy and governance structures. By combining these perspectives, the study offers a more comprehensive explanation of how governance systems operate in higher education institutions and how they translate into sustainable institutional performance.

Hypothesis Development of the Impact of SG on IS via IP

The integration of SG practices into higher education may be expected to enhance sustainability by improving decision-making processes, optimizing resource utilization, and enriching stakeholder engagement (Luo et al., 2024). In this study, SG is thus hypothesized to augment sustainability through IP in terms of improving transparency, participation, data-driven decision-making, institutional adaptability, and long-term viability (Yin et al., 2026). Given the rather technocratic lens instructed by institutional theory, SG, as a technology-enabled governance paradigm, may have the potential to enhance IS by improving efficiency, participation, and adaptability (Yin et al., 2026). However, its effectiveness may depend on institutional context, governance quality, and the ability to balance technological innovation with social and environmental considerations (Luo et al., 2024). Furthermore, applying the resource-based view of the firm to understanding the theoretical link between SG and IS, we may able to explain how digital infrastructure, data, and collaborative networks function as strategic resources that simultaneously enhance multiple sustainability outcomes (Helfat et al., 2021). Moreover and in accordance with stakeholder theory, stakeholder engagement is predicted to empower legitimacy, trust, and long-term stability with SG strengthening these dynamics by enabling participatory, transparent, and data-driven governance systems. However, the strength of the impact of SG on IS under stakeholder theory may depend on addressing challenges such as digital inequality, stakeholder coordination, and institutional capacity. Overall, integrating stakeholder theory with SG offers significant potential for advancing sustainable and resilient institutional systems. By the same token, SG is hypothesized in this study to contribute to IS through several theoretical mechanisms. For instance, SG with its data-driven efficiency and digital platforms may intensify administrative efficiency by automating processes, improving data management, and enabling real-time decision-making (Almulhim & Yigitcanlar, 2025; Pereira et al., 2018). SG may be further credited with enriching a culture of collaborative governance where collaboration among stakeholders culminates into better design and implementation of operating activities while strengthening institutional legitimacy and responsiveness (Tomor et al., 2021). Ultimately, SG improves service delivery and operational efficiency. It enhances decision-making quality by leveraging data analytics and stakeholder input (Pereira et al., 2018). Toward this end (Yin et al., 2026) report empirical evidence that SG has significant performance institutional and economic impacts over time, contributing to sustainable development. Over and above, El-Sheikh et al. (2026) contend that SG promotes IP through citizen-centric governance, improving trust and satisfaction both with and within institutions.

H1: SG has a significant positive impact on IS.

H2: SG has a significant positive impact on IP.

Hypothesis Development of the Impact of IP on IS

Böhmelt (2026) defines IP as the extent to which institutions achieve their objectives effectively, efficiently, and in a stakeholder-responsive manner. IP covers the dimensions of efficiency (resource utilization), effectiveness (goal achievement), accountability and transparency, and responsiveness to stakeholders (Andrews et al. (2011). The existing literature further emphasizes that IP is not only an operational outcome but also a strategic determinant of institutional sustainability, resilience, and adaptability (see, e.g., Andrews et al., 2011). This theoretically links IP to IS. In particular, Santoro (2018) contends that high IP enhances public trust, credibility,

and legitimacy, which are essential for long-term sustainability. Pini et al. (2026) adds that institutions consistently delivering effective services and superior performance are more likely to sustain stakeholder support and political backing. AlMalki & Durugbo (2022) explain that high-performing institutions are better equipped to adapt to dynamic environments through innovation and strategic management. They further suggest that performance capabilities enable organizations to respond to crises and evolving societal demands, eventually strengthening sustainability. Böhmelt (2026) compiles empirical evidence that improved institutional performance is associated with better sustainability outcomes, including ecological effectiveness and social value creation, ultimately correlating with better environmental and sustainability scores in global governance contexts.

H3: IP has a significant positive impact on IS.

Hypothesis Development of the Impact of ICT on IS

ICT encompasses digital tools, systems, and infrastructures such as the internet, data analytics, cloud computing, and artificial intelligence to support decision-making processes, service delivery and operations, communication and stakeholder engagement within institutions (Ariyanti et al., 2024). ICT thus enhances IS by improving efficiency in resource utilization where digital systems enable automation, reduce administrative costs, optimize energy consumption, and reduce environmental impact (Shaaban-Nejad & Shirazi, 2022). For instance, Charfeddine and Umlai (2023) show that ICT adoption is associated with improved environmental performance, including reduced emissions and better resource management, eventually leading to IS. Qayyum et al. (2024) document that ICT combined with institutional quality leads to significant reductions in ecological degradation, ultimately translating into IS. Aydin et al. (2025). Evangelista and Hollikas (2022) further suggest that ICT enhances sustainability practices in supply chain management, improving operational performance and sustainability outcomes.

H4: ICT has a significant positive impact on IS.

Hypothesis Development of the Impact of Institutional Culture on IS

Institutional culture is commonly defined as a system of shared values, beliefs, norms, and assumptions that guide behavior within an organization (Jacobs & Sopiah, 2023). It operates at multiple levels, including Underlying assumptions (deep beliefs), Values and norms, and Artifacts and practices (Chenini & Touaiti, 2018). Institutional culture thus plays a key role in shaping employees' attitudes toward change, innovation, and sustainability (Jacobs & Sopiah, 2023). It provides the foundation for embedding sustainability into institutional strategies (Tsavdaridou et al., 2026). In fact, a sustainability-oriented culture aligns institutional values with long-term environmental and social goals, ensuring that sustainability becomes part of everyday practices rather than isolated initiatives (Linnenluecke & Griffiths, 2010.Therefore strong institutional culture promotes shared values that guide employee behavior toward sustainability (Tsavdaridou et al., 2026). Moreover, when sustainability is embedded in cultural norms, employees are more likely to adopt environmentally and socially responsible practices (Grover et al., 2022). Cultural factors also significantly influence the success of institutional change processes (Maestre & Samper, 2025). Furthermore, sustainability often requires transformational change, and institutions with adaptive, innovation-oriented cultures are better equipped to implement sustainability strategies (Jacobs & Sopiah, 2023).

Most importantly, institutional culture contributes to institutional legitimacy by aligning internal practices with societal expectations (Maestre & Samper, 2025). Toward this end, a sustainability-oriented culture enhances stakeholder trust and strengthens the institution's long-term survival (Ketprapakorn & Kantabutra, 2022).

H5: Institutional culture has a significant positive impact on IS.

Higher Education Context in Saudi Arabia

The national strategy instructed by the 2030 vision of the kingdom emphasizes sustainability, digital transformation, and institutional efficiency across sectors, including higher education. Saudi institutions of higher education are thus expected to contribute to sustainable development via promoting environmental responsibility, enhancing social engagement, improving governance and institutional performance. Therefore, Saudi universities are dynamically evolving to adopt sustainability initiatives such as green campuses and digital governance systems. For instance, Alhusaini (2025) reports that sustainability governance in Saudi universities may benefit from policy integration, stakeholder engagement, and comprehensive formulation of performance measurement systems. Aldegheishem (2024) highlights that although Saudi Arabia is currently progressing in smart governance, ICT infrastructure and institutional readiness, positively affecting sustainability implementation outcomes.

Moreover, Albeshir et al., 2025 indicates that governance reforms in Saudi higher education are improving accountability and performance, but full sustainability integration remains challenging. These findings suggest that while Saudi universities are moving toward sustainability, realizing full benefits from aligning governance practices with sustainability objectives is still underway in terms of mitigating disparities in ICT infrastructure and answering to resistance to institutional change. Therefore, examining the relationship between smart governance and institutional sustainability within the Saudi context is both timely and necessary. Additionally, there is limited empirical evidence examining how smart governance influences sustainability outcomes in Saudi higher education (Alhusaini, 2025; Albeshir et al., 2025; Aldegheishem, 2024).

Furthermore, while institutional performance is recognized as a critical factor in achieving sustainability, its mediating role in the relationship between smart governance and institutional sustainability has not been sufficiently investigated in the Saudi context (Alhusaini, 2025). This gap highlights the need for this study that examines the direct impact of SG on IP, the mediating role of IP, and the contextual effects of ICT infrastructure and institutional culture. Toward this end, addressing these gaps may provide valuable insights for policymakers and university administrators seeking to enhance governance effectiveness and sustainability outcomes.

The Saudi higher education context provides a highly relevant setting for examining smart governance and institutional sustainability due to ongoing national reforms under Vision 2030. These reforms emphasize digital transformation, efficiency, transparency, and sustainable development across public institutions, including universities. Despite significant investments in ICT infrastructure and governance modernization, there remains variability in institutional readiness and implementation effectiveness across universities. This makes Saudi Arabia an ideal empirical context to examine how smart governance practices translate into sustainability outcomes under conditions of rapid institutional change. Understanding these dynamics can provide valuable

insights not only for Saudi Arabia but also for other developing countries undergoing similar governance transformations.

Methods

This section presents the target population, sample size determination, the sampling procedure, the data collection instrument, the empirical model, and study results and findings.

Target Population

This study employs a quantitative cross-sectional survey design to examine faculty members across three major Saudi universities that are considered representative of the entire population of Saudi public universities (Albeshir et al., 2025). A probability-based sampling method, namely, proportionate stratified random sampling, is used to ensure that each institution is adequately represented in the sample. Stratified sampling is particularly appropriate in this study since the population of faculty members across the three universities is heterogeneous but can be divided into homogeneous subgroups (strata) (Lohr, 2022). In particular, the target population consists of all faculty members employed at King Saud University (KSU): 3,998 faculty members; King Abdulaziz University (KAU): 6,322 faculty members; and King Faisal University (KFU): 2,100 faculty members. The total population size is thus N = 12,420 faculty members.

Sample Size Determination

The required sample size for this study is determined following Cochran's (1977) formula for large populations and assuming maximum population variability and reduced error margin of 4%.

$$n = Z^2 * p (1 - p) / e^2$$

Where n is required sample size, Z is z-value corresponding to the desired confidence level 1.96 for 95% at 5% type I error, p is estimated proportion of the population, and e is margin of error.

The formula solves for a total sample size for the study of n = 611 faculty members. This sample size is considered adequate for achieving statistical power and generalizability in large populations, consistent with the authoritative statistical literature (Cochran, 1977).

Sampling Protocol (Stratification)

The population is divided into three mutually exclusive strata based on institutional affiliation: KSU, KAU, and KFU. Such stratification ensures that each university is proportionally represented in the final sample (Lohr, 2022). A proportionate allocation method is then applied to determine the number of participants selected from each stratum using the formula:

$$n (s) = (N (s)/N) * n$$

Where n (s) is sample size for each stratum, N (s) is population size of each stratum, N is total population size,

and n is total sample size. The resulting sample distribution is, hence, KSU: 197 faculty members; KAU: 311 faculty members; and KFU: 103 faculty members. This proportional approach minimizes sampling bias and ensures that larger institutions contribute more respondents, reflecting their actual weight in the target population (Lohr, 2022). Moreover, within each stratum, simple random sampling is conducted. A comprehensive list of faculty members is obtained from each university where each faculty member is assigned a unique identification number, and a random number generator is used to select participants according to the allocated sample size for each stratum. This protocol satisfies that every faculty member within each university has an equal and independent chance of selection, thereby maintaining the principles of randomness and probability sampling (Kish, 1965).

Data Collection Instrument

The study adheres to standard ethical guidelines for research involving human participants. Participation is voluntary, confidentiality is maintained, and respondents may withdraw at any time without penalty. Data is anonymized and used solely for research purposes. In particular, data is collected using a structured survey instrument (questionnaire) distributed electronically to the selected participants. Participants are contacted via institutional email, and reminders are sent to improve response rates. Throughout, participation is voluntary, and informed consent is properly obtained prior to survey completion.

The questionnaire is divided into five sections corresponding to the study variable (IS), the main exogenous variable (SG), the mediating mechanism (IP), and the two contextual variables (ICT and institutional culture). All constructs are measured using a 5-point Likert scale (Likert, 1932).

SG is measured (see Table 1) following the validated data collection instruments of Pereira et al. (2018) and Meijer and Bolívar (2016).

Table 1. SG Measurement

Code	Item
SG1	Our institution uses digital technologies to improve decision-making.
SG2	There is transparency in institutional processes and information sharing.
SG3	Stakeholders are actively involved in decision-making processes.
SG4	The institution uses data-driven approaches for policy formulation.
SG5	Governance processes are efficient and responsive to change.

SG is scaled on a binary basis to simplify interpretation with an indicator function that assigns the value of one when the total respondent score is the median value 15 or above and zero otherwise.

ICT is measured (see Table 2) following the validated data collection instruments of Shaaban-Nejad and Shirazi (2022), and Charfeddine and Umlai (2023).

Table 2. ICT Measurement

Code	Item
ICT1	ICT systems improve operational efficiency in the institution.
ICT2	The institution uses advanced digital technologies (e.g., AI, cloud systems).
ICT3	ICT enhances communication within the organization.
ICT4	ICT supports innovation and service delivery.
ICT5	ICT infrastructure is reliable and effective.

ICT is scaled on a binary basis with an indicator function that assigns the value of one when the total respondent score is the median value 15 or above and zero otherwise.

Institutional culture (hereafter, OC) is measured (see Table 3) following the validated data collection instruments of Linnenluecke and Griffiths (2010), and Schein (2010).

Table 3. OC Measurement

Code	Item
OC1	The institution promotes a culture of innovation and learning.
OC2	Employees are encouraged to adopt sustainable practices.
OC3	Leadership supports organizational change and development.
OC4	There is strong alignment between organizational values and sustainability goals.
OC5	Collaboration and teamwork are encouraged.

OC is scaled on a binary basis with an indicator function that assigns the value of one when the total respondent score is the median value 15 or above and zero otherwise.

IP is measured (see Table 4) following the validated data collection instrument of Santoro (2018).

Table 4. IP Measurement

Code	Item
IP1	The institution achieves its objectives efficiently.
IP2	Services provided meet stakeholder expectations.
IP3	Resources are used effectively.
IP4	The institution is responsive to stakeholder needs.
IP5	The institution maintains high levels of accountability and transparency.

IP is scaled on a binary basis with an indicator function that assigns the value of one when the total respondent score is the median value 15 or above and zero otherwise.

The study variable IS- is measured (see Table 5) following the validated data collection instruments of Marques et al. (2021), and Ketprapakorn and Kantabutra (2022).

Table 5. IS Measurement

Code	Item
IS1	The institution ensures long-term financial sustainability.
IS2	Environmental considerations are integrated into operations.
IS3	The institution maintains strong stakeholder relationships.
IS4	The institution adapts effectively to changes and challenges.
IS5	Sustainability is integrated into strategic planning.

IS- is scaled on a binary basis with an indicator function that assigns the value of one when the total respondent score is the median value 15 or above and zero otherwise.

Results and Discussion

In light of the hypothesis development presented in the literature review section to this study, this subsection estimates the following functional form:

IS = f (SG, ICT, OC): IP = f (SG)

In accordance with the following linear specifications:

IS = b0 + b1*SG + b2*ICT + b3*OC + e

IP = b4 + b5*SG + e

IS = b6 + b7*IP + e

Where b0, b4, and b6 are intercept terms, and b1, b2, b3, b5, and b7 are slope parameter estimates, and e is an error term normally distributed with mean zero and constant variance (see Table 6-9).

Table 6. IS = f (SG, ICT, OC)

Regression Statistics	
Multiple R	0.60
R Square	0.36
Adjusted R Square	0.36
Standard Error	0.40
Observations	611

	ANOVA				
	df	*SS*	*MS*	*F*	*Sig. F*
Regression	3	54.46	18.15	116.28	0.00
Residual	607	94.76	0.16		
Total	610	149.21			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.10	0.03	3.16	0.00	0.04	0.16	0.04	0.16
SG	0.37	0.03	10.68	0.00	0.30	0.43	0.30	0.43
ICT	0.28	0.03	8.22	0.00	0.21	0.35	0.21	0.35
UC	0.21	0.03	6.24	0.00	0.14	0.27	0.14	0.27

As shown in Table 6, the findings of this study demonstrate that SG has a significant positive impact on IS in Saudi higher education institutions. This supports the growing body of literature suggesting that digital transformation and participatory governance enhance organizational effectiveness and long-term sustainability (Yin et al., 2026; Pini et al., 2026; Andrews et al., 2011). These findings are also consistent with prior studies indicating that smart governance improves transparency, service quality, and institutional responsiveness in public sector organizations (Meijer et al., 2021; Mora et al., 2019). In the Saudi context, this result aligns with recent evidence showing that governance reforms in higher education are increasingly linked to digital transformation and sustainability objectives under Vision 2030 (Albeshir et al., 2025; Aldegheishem, 2024).

Table 7. IP = f (SG)

Regression Statistics	
Multiple R	0.18
R Square	0.03
Adjusted R Square	0.03
Standard Error	0.49
Observations	611

ANOVA					
	df	*SS*	*MS*	*F*	*Sig. F*
Regression	1	5.20	5.20	21.47	0.00
Residual	609	147.50	0.24		
Total	610	152.70			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.40	0.03	12.98	0.00	0.34	0.46	0.34	0.46
SG	0.19	0.04	4.63	0.00	0.11	0.27	0.11	0.27

Table 8. IS = f (IP)

Regression Statistics	
Multiple R	0.28
R Square	0.08
Adjusted R Square	0.08
Standard Error	0.48
Observations	611

ANOVA					
	df	*SS*	*MS*	*F*	*Sig. F*
Regression	1	11.46	11.46	50.66	0.00
Residual	609	137.75	0.23		
Total	610	149.21			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.44	0.03	15.90	0.00	0.38	0.49	0.38	0.49
IP	0.27	0.04	7.12	0.00	0.20	0.35	0.20	0.35

The results, as shown in Tables 7 and 8, further support that IP mediates the relationship between SG and IS, indicating that SG enhances sustainability indirectly by improving efficiency, innovation, and responsiveness. This finding is consistent with the Resource-Based View, which emphasizes the role of internal capabilities in achieving strategic outcomes. It is also supported by prior research suggesting that institutional performance acts as a key mechanism through which governance reforms translate into sustainable outcomes (AlMalki & Durugbo, 2022; Böhmelt, 2026). In the Saudi higher education context, improving institutional performance has similarly been identified as an important pathway for achieving sustainability outcomes (Alhusaini, 2025). However, although IP plays a significant mediating role, full mediation is not supported (Table 9), suggesting that SG also has a direct effect on IS beyond performance improvements.

Table 9. Full Mediation, IS = f (SG, ICT, OC, IP)

Regression Statistics	
Multiple R	0.63
R Square	0.39
Adjusted R Square	0.39
Standard Error	0.39
Observations	611

ANOVA					
	df	*SS*	*MS*	*F*	*Sig. F*
Regression	4	58.58	14.64	97.92	0.00
Residual	606	90.63	0.15		
Total	610	149.21			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.04	0.03	1.11	0.27	-0.03	0.10	-0.03	0.10
SG	0.34	0.03	9.98	0.00	0.27	0.41	0.27	0.41
ICT	0.27	0.03	8.06	0.00	0.20	0.33	0.20	0.33
UC	0.20	0.03	6.23	0.00	0.14	0.26	0.14	0.26
IP	0.17	0.03	5.25	0.00	0.10	0.23	0.10	0.23

Furthermore, the significant effects of ICT infrastructure and institutional culture highlight the importance of contextual factors (Table 6 and 9). These findings are consistent with previous studies showing that institutions with strong technological capabilities and supportive organizational cultures are better positioned to implement smart governance effectively (Albeshir et al., 2025; Alhusaini, 2025; Al-Mekhlafi et al., 2024). In addition, earlier research emphasizes that technological readiness and institutional capacity are critical enablers of successful digital transformation and sustainability outcomes (Meijer et al., 2021). In Saudi Arabia, ICT readiness and organizational culture have been identified as key factors influencing the successful adoption of smart governance practices in higher education institutions (Albeshir et al., 2025; Aldegheishem, 2024).

From a practical perspective, the findings provide important implications for higher education policymakers and university administrators. The results indicate that smart governance should be understood not only as a technological transformation but also as a broader institutional reform process requiring alignment between digital

infrastructure, organizational culture, and performance management systems. Universities should therefore invest in integrated digital governance platforms, strengthen data-driven decision-making processes, and promote a culture that supports innovation and adaptability. In addition, enhancing institutional performance mechanisms can significantly improve the sustainability impact of governance reforms. These insights are particularly relevant for Saudi higher education institutions undergoing transformation under Vision 2030, where sustainability and digital governance are key strategic priorities. Overall, the findings highlight the importance of aligning governance practices with institutional capabilities and contextual factors to achieve sustainable outcomes.

Recommendations

This study complements the extant literature with contributions to both theory and practice. Theoretically, the study extends smart governance literature into the Saudi higher education context, integrates governance, performance, and sustainability into a single framework, and documents empirical evidence supporting the mediation mechanism of institutional performance and contextual effects of information technology integration and institutional culture. Practically, the study offers insights for university leaders and policymakers, supports the implementation of the objectives of the 2030 vision of the kingdom, and reports a framework for improving governance and sustainability practices. Based on its findings, this study may recommend universities to focus on strengthening smart governance practices in a practical way. Investing in reliable digital infrastructure and integrated data systems can improve decision-making and operational efficiency. At the same time, institutions should make sustainability part of their core governance approach by linking strategic plans to clear sustainability goals. It is also critical to improve how institutional performance is monitored. Universities can benefit from using data to track efficiency, innovation, and service quality on a regular basis. In addition, encouraging collaboration and participation—by involving faculty, students, and external stakeholders in decision-making—can make governance more effective. Aligning these efforts with the objectives of Saudi Arabia's Vision 2030 can further support universities in achieving both governance efficiency and long-term sustainability. Finally, attention should be given to institutional culture. Providing training, supporting new ideas, and creating an environment open to change can help universities fully realize the benefits of smart governance.

Future Research

Though results reported in this study are consistent with hypothetical predictions, the study is limited by its cross-sectional design and focus on a specific group of universities, which may not fully capture changes over time or differences across contexts. Future research could use longitudinal data to better understand how governance reforms influence sustainability in the long run. Future studies may also examine how Vision 2030 initiatives influence governance and sustainability outcomes over time.

Comparative studies across countries or regions would also be useful to see whether these findings apply in different higher education systems. In addition, future work could explore other factors that may influence this relationship, such as leadership styles, policy environments, or external partnerships. Most importantly, future studies may revisit the subject with mediating mechanisms more than just institutional performance and contextual

factors more than just ICT and institutional culture. Expanding the model in this way can provide a more complete picture of how sustainability is achieved in higher education institutions. Moreover, this study employs previously validated instruments with established reliability and validity. It follows that, additional psychometric testing is not conducted, consistent with recommendations for secondary or confirmatory research (DeVellis, 2017). Furthermore, the primary aim of this study is to examine preliminary patterns rather than establish definitive measurement properties, and so comprehensive reliability and validity testing is reserved for future research (DeVellis, 2017). In addition, the research questions answered in this study hinge on meaningful cutoffs with respect to the endorsement vs. non-endorsement of faculty beliefs about IS and SG (see, e.g., Streiner, 2002; Altman & Royston, 2006). Collapsing Likert-scale categories may thus reflect a conceptually important distinction that maps directly onto behavioral or policy-oriented outcomes relevant to the impact of SG on IS, the mediating role of IP, and the contextual effects of ICT and institutional culture (Cohen, 1983; MacCallum et al., 2002). Toward this end, future scholars may consider reassessing the psychometric properties and scale of the measures, in case higher generalizability of findings is desired (Altman & Royston, 2006).

Conclusion

This study examined how smart governance influences institutional sustainability in Saudi higher education. The findings show that smart governance plays a meaningful role in improving sustainability outcomes, both directly and through its effect on institutional performance. In other words, universities that adopt more transparent, data-driven, and participatory governance practices tend to perform better, and this improved performance supports long-term sustainability.

The study also highlights that technology and institutional culture are important supporting factors. Strong ICT infrastructure and a culture that encourages innovation and adaptability make it easier for universities to benefit from smart governance. These findings are particularly relevant in the context of Saudi Arabia's Vision 2030, which places strong emphasis on digital transformation and sustainable development in higher education. Overall, the results suggest that sustainability in higher education is not achieved by governance reforms alone, but through a combination of governance quality, performance capacity, and institutional readiness.

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