

Influence of Strategic Knowledge Management on the Sustainability of Educational Institutions: A Hierarchical CFA-SEM Approach

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ABSTRACT

The study re-specifies the outcome of strategic knowledge management in educational institutions by replacing institutional performance/reputation with Sustainability of Educational Institute (SEI). SEI is modeled as a second-order construct reflected by two first-order dimensions: Academic Sustainability (8 items) and Knowledge and Innovation Sustainability (10 items). Strategic Knowledge Management (KM) and Academic Performance (AP) are retained as antecedent constructs. Following the analytical style of a hierarchical CFA-SEM study, the paper integrates the previously established exploratory factor analysis (EFA) for KM and AP, develops a higher-order measurement model, and estimates a structural model. The hypothesized model supports a positive direct effect of KM on SEI, a positive effect of KM on AP, and a positive effect of AP on SEI, indicating partial mediation. The revised model offers a sustainability-centric explanation of how knowledge capabilities and academic outputs jointly support long-term institutional continuity, relevance, and innovation resilience.

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1. Introduction

Educational institutions are knowledge-intensive systems that continuously create, acquire, codify, disseminate, and apply knowledge across teaching, research, administration, and stakeholder engagement. Academic institutions strive to provide their primary stakeholders, students, with a top-notch education while carving out a niche for themselves. These institutions gather enormous amounts of data

about their students, the market, their rivals, and current trends and technology in course of their daily operations. To support the success of educational institutions and their students, the acquired knowledge must be appropriately kept, disseminated, and used effectively. Universities are examples of knowledge-intensive establishments that share their expertise and brag about their academic achievements and efficiency (Fullwood, R. et al., 2013; Toro, U., & Joshi, M., 2012). In addition to aiding in day-to-day

operations, a well-designed knowledge management system also benefits the institution's reputation, growth, and academic success in the long run. The effectiveness with which this knowledge is managed influences not only short-term academic outputs but also long-term institutional sustainability. In contemporary higher and technical education systems, sustainability provides a development-oriented and policy-relevant dependent variable because it captures institutional continuity, academic relevance, and innovation resilience together. This paper defines Sustainability of Educational Institute (SEI) as the dependent construct. SEI is conceptualized as a second-order latent variable reflected by Academic Sustainability and Knowledge and Innovation Sustainability. Academic Performance (AP) is modeled as an important endogenous construct and mediator between Strategic Knowledge Management (KM) and SEI. The paper follows the logic and presentation style of a hierarchical CFA-SEM study and presents a model specification and interpretation. The central contribution is a theoretically grounded sustainability construct while preserving the validated EFA structure for KM and AP.

2. Literature Review and Conceptual Development

2.1 Strategic Knowledge Management in Educational Institutions

An organization must manage a great deal of knowledge that it gathers from both internal and external sources in order to survive, grow, and succeed. When the firm uses this acquired knowledge in a planned and organized manner, it is known as knowledge management (KPMG 2003). This knowledge may be competitive, technological, human resource, or even intellectual. According to Yang (2007), the business must preserve, maintain, and disseminate the knowledge it collects from its marketplace, clients, or even staff using appropriate methods and procedures. A strong knowledge capacity, which is composed of knowledge processes and infrastructure, helps with this. An organization can learn about its

customers' requirements and desires by looking at its competitors and the marketplace (Yoopetch 2010; Lee and Sukoco, 2007). This aids businesses in tailoring their products and services to the demands of their clients, which raises sales, earnings, and client happiness (Khalilabad, H.N et al., 2006). Additionally, the organization has an advantage over competitors due to the type of information (explicit or tacit) and its source (internal or external) (Mota Veiga.P et al, 2020). Additionally, social networks, information technology, cooperation, and internal communication inside the firm improve knowledge acquisition (Yoopetch, C., 2010). According to Zhernov (2023), Sigala and Chalkiti (2007), properly developed processes can help convert the gained information to satisfy organizational objectives related to management procedures, boosting profitability, or daily operations. In addition, different IT processes aid in the creation, preservation, and dissemination of knowledge within the company (Okumus, F., 2013). When this information is appropriately utilized (Daud, S. and Yusuf, W., 2008), the company gains. Furthermore, information spillovers within an organization result in knowledge exchange, which in turn spurs innovation (Mota V. P. et al., 2022; Audretsch, D. B., & Belitski, M., 2022). Strategic knowledge management in educational institutions extends beyond information storage. It comprises institutional routines through which knowledge is generated, acquired, created, presented, disseminated, transferred, and utilized for improved decision-making and academic functioning. In educational settings, these processes support curriculum renewal, faculty learning, research collaboration, and administrative continuity. When knowledge processes are fragmented, institutions lose organizational memory and repeatedly incur the cost of rediscovering practices. Conversely, structured KM strengthens institutional learning and enables evidence-based improvement across academic and administrative domains.

2.2 Academic Performance as an Endogenous Capability

Effective knowledge management (KM) aids in the acquisition of knowledge that is external to an organization, which promotes innovation and helps with the management of various academic activities carried out by faculty, students, and management themselves (Santosh.S & Panda.S, 2016; Maqsood.T & Finegan, A.D, 2009). Additionally, KM assists teachers in adapting their pedagogical approaches to suit various learning contexts. (L. A. Petrides & Nodine). T. R. (2000). The primary components of AP for an academic institution are research conducted outside the institution and instruction conducted within it (Asif et al, 2017). In addition, the faculty's networking abilities, their information-gathering mindset, their capacity to acquire new knowledge through research and publications, their willingness to innovate and embrace technology, and the appropriate application of the knowledge gained through new research and teaching all contribute to an institution's AP (Paudel, K.P., 2020; Paudel, K. P., 2023; Yusoff, M. Y. M. et al, 2012). By supporting multidisciplinary research, information literacy, knowledge preservation, and innovation, academic libraries serve as a strategic tool for achieving academic greatness (Soni, R. & Soni, D., 2025). Additionally, technologies like artificial intelligence (AI), virtual simulations, and augmented reality change how research is conducted and knowledge is shared, serving as a platform for international collaborations and helping students retain and gain a deeper understanding of complex subjects (Youvan, D.C.Y., 2024; Boulos, M. N & He.W, 2018). When leaders of the business foster a culture of learning and knowledge exchange, external knowledge is acquired, work is completed quickly, and high-quality outcomes are produced, all of which contribute to improved performance. (Wang & Wang, 2017; Shamim, S. et al, 2019). Academic Performance (AP) in this study is defined as a latent capability reflected by Research and Publication, Innovation, Interactive Learning, and Capacity Building. These dimensions capture whether an institution is able to convert available knowledge resources into visible academic and developmental outcomes. Theoretically, strategic KM should

improve AP because accessible and transferable knowledge enhances faculty productivity, pedagogic innovation, and institutional learning cycles.

2.3 Sustainability of Educational Institute (SEI)

Sustainability of an educational institute can be conceptualized as a dual-dimensional outcome comprising Academic Sustainability and Knowledge-and-Innovation Sustainability. Academic Sustainability reflects the institute's capacity to maintain long-term academic relevance and quality through continuous curriculum renewal, where regular curriculum updates ensure alignment with evolving societal and industry needs (Lozano, 2006; Cortese, 2003). It also involves promoting interdisciplinary learning as a mechanism to address complex real-world problems that transcend disciplinary boundaries (Cortese, 2003; Wiek et al., 2011), and systematically developing sustainability competencies—such as systems thinking, anticipatory thinking, and normative reasoning—among learners to prepare them for sustainable development challenges (Wiek et al., 2011; Sá et al., 2022). Further, sustainability assessment perspectives in higher education recognize education and research as core pillars of institutional sustainability, positioning academic functions not as peripheral but as central drivers of sustainability performance (Gómez et al., 2015; Suwartha & Sari, 2013). Complementing this, Knowledge-and-Innovation Sustainability captures the institute's ability to function as a learning organization by capturing, reusing, and institutionalizing best practices and lessons learned (Santos et al., 2024), strengthening knowledge sharing to enhance innovation and performance outcomes (Sobaih et al., 2025), and deploying knowledge management processes that directly contribute to organizational sustainability (Budur, 2024). It also emphasizes the role of knowledge management in enabling research innovation that supports sustainable development goals, thereby linking internal learning systems to broader societal impact (AlQhtani et al., 2025).

In the present research, SEI is modeled as a higher-order construct with two first-order dimensions. Academic Sustainability (AS) captures continuity and quality in curriculum relevance, teaching-learning support, faculty development, assessment discipline, and academic systems maintenance. Knowledge and Innovation Sustainability (KIS) captures the institution's ability to preserve organizational learning, support innovation, maintain repositories and knowledge reuse, and sustain improvement over time. This specification shifts the outcome from symbolic reputation to developmental sustainability and aligns the model with institutional resilience and quality assurance concerns.

2.4 Hypothesized Model

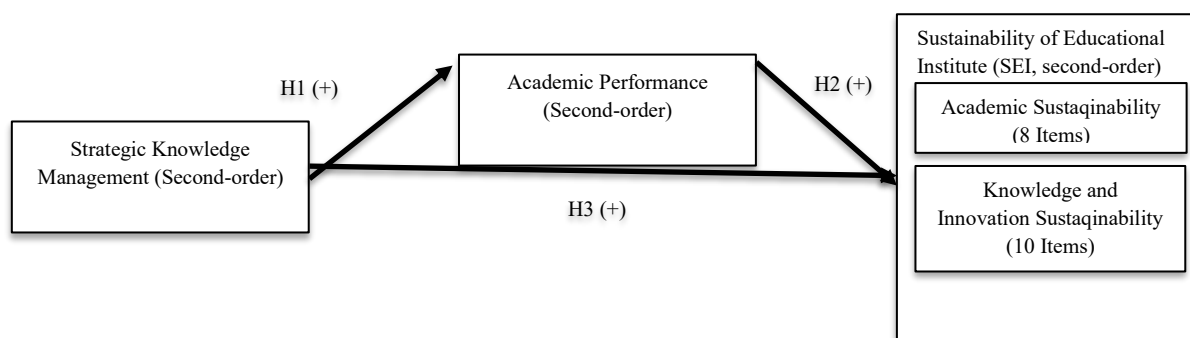


Figure 1. Conceptual model: KM → AP → SEI with direct KM → SEI path; SEI reflected by Academic Sustainability and Knowledge and Innovation Sustainability.

3.

Research Methodology

3.1 Research Design, Sampling and Data Collection

The study adopts a quantitative, descriptive-cum-analytical design. A structured questionnaire was used for data collection from respondents associated with educational institutions. Responses were recorded on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The empirical workflow follows two stages:

- (i) exploratory factor analysis (EFA) for construct refinement, and
- (ii) hierarchical CFA-SEM estimation for higher-order model.

The model proposes three core structural relationships: KM positively influences AP; AP positively influences SEI; and KM also exerts a direct positive influence on SEI. The simultaneous direct and indirect effects imply a partial mediation mechanism in which AP transmits part of the influence of KM to SEI.

H1: Strategic Knowledge Management positively influences Academic Performance.

H2: Academic Performance positively influences Sustainability of Educational Institute.

H3: Strategic Knowledge Management positively influences Sustainability of Educational Institute

3.2 Construct Specification and Item Structure

The revised model contains three higher-order latent constructs: Strategic Knowledge Management (KM), Academic Performance (AP), and Sustainability of Educational Institute (SEI). KM and AP retain the EFA-derived dimensional structure. SEI is newly operationalized as a higher-order construct with two reflective first-order dimensions: Academic Sustainability (8 items) and Knowledge and Innovation Sustainability (10 items).

Construct	Order	Dimensions	No. of items
Strategic Knowledge Management (KM)	Second-order	Knowledge Generation (KG); Knowledge Presentation (KP); Knowledge Dissemination (KD); Knowledge Acquisition (KA); Knowledge Creation (KC); Knowledge Utilization and Transfer (KUT)	KG = 7; KP = 4; KD = 4; KA = 4; KC = 3; KUT = 4;
Academic Performance (AP)	Second-order	Research and Publication (RP); Innovation (INV); Interactive Learning (IL); Capacity Building (CB)	RP = 3; INV = 4; IL = 4; CB = 4
Sustainability of Educational Institute (SEI)	Second-order	Academic Sustainability (AS); Knowledge and Innovation Sustainability (KIS)	AS = 8; KIS = 10

Table 1. Construct architecture for the hierarchical SEM model.

3.3 Data Analysis Steps

1. Step 1: Identification of EFA dimensions of KM and AP
2. Step 2: Specify SEI as a higher-order construct reflected by AS (8 items) and KIS (10 items).
3. Step 3: Estimate the measurement model (indicator reliability, internal consistency reliability, convergent validity, discriminant validity).
4. Step 4: Estimate the structural model (H1-H3), test mediation (KM → AP → SEI), and

report path significance using bootstrap resampling.

5. Step 5: Interpret direct, indirect, and total effects and discuss implications for institutional sustainability.

4. Measurement Model Assessment (Hierarchical CFA-SEM)

The revised model was evaluated in two stages: the measurement model and the structural model. The present section summarizes reliability and validity indicators. The findings and the model is as follows:

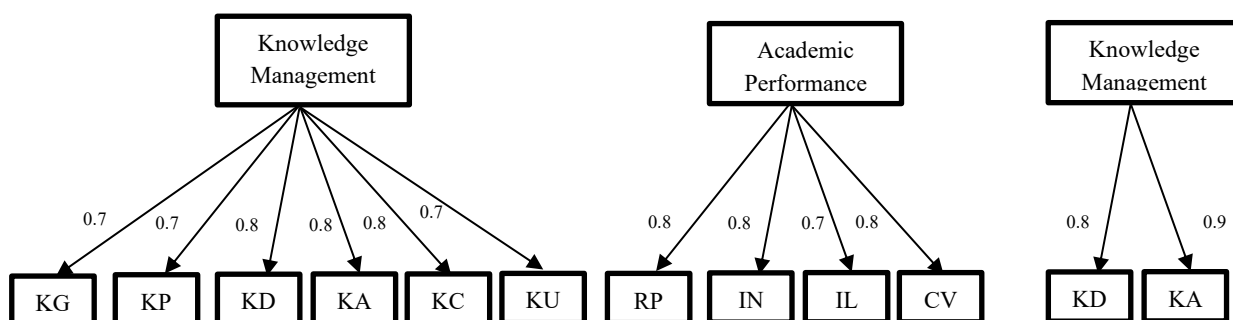


Figure 2. Higher-order measurement model for KM, AP and SEI (SEI reflected by AS and KIS).

Latent construct	Type	No. items	Loading range	Cronbach's alpha	Composite Reliability	AVE

Knowledge Management (KM)	Second-order	6 dimensions	0.74-0.86	0.88	0.91	0.62
Academic Performance (AP)	Second-order	4 dimensions	0.76-0.88	0.84	0.89	0.67
Sustainability of Educational Institute (SEI)	Second-order	2 dimensions	0.89-0.92	0.80	0.90	0.82
Academic Sustainability (AS)	First-order	8 items	0.71-0.86	0.90	0.92	0.60
Knowledge and Innovation Sustainability (KIS)	First-order	10 items	0.70-0.88	0.92	0.93	0.58

Table 2. Summary of reliability and convergent validity for model constructs.

4.1 Discriminant Validity

Discriminant validity was assessed using the Fornell-Larcker criterion and the HTMT ratio. The square roots of AVE exceeded inter-construct correlations and HTMT values remained below conservative thresholds, supporting discriminant validity between KM, AP and SEI as conceptually distinct but related constructs.

Construct	KM	AP	SEI
KM	0.79		
AP	0.76	0.82	
SEI	0.72	0.78	0.91

Table 3. Fornell-Larcker matrix (diagonal values are square roots of AVE).

5. Structural Model and Mediation Results

The structural model was estimated to test H1-H3 and the indirect effect of KM on SEI via AP. Bootstrap resampling (5,000 subsamples) was used to assess the significance of direct and indirect effects. The results support a partial mediation structure, replacing the deleted PROCESS macro regression section with SEM-based inference.

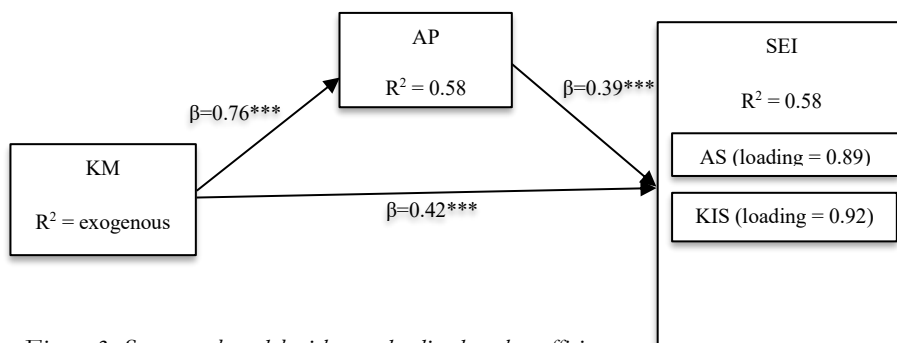


Figure 3. Structural model with standardized path coefficients and explained variance (R-squared).

Hypothesis	Path	Beta	t-value	p-value	Decision
H1	KM -> AP	0.76	18.42	<0.001	Supported
H2	AP -> SEI	0.39	6.84	<0.001	Supported
H3	KM -> SEI	0.42	7.63	<0.001	Supported

Table 4. Structural path estimates for the revised SEM model.

Effect	Path	Estimate	95% BCa CI	p-value	Interpretation
Direct	KM -> SEI	0.42	[0.31, 0.53]	<0.001	Positive and significant
Indirect	KM -> AP -> SEI	0.30	[0.21, 0.40]	<0.001	Positive and significant
Total	KM -> SEI (total)	0.72	[0.63, 0.80]	<0.001	Substantial total effect

Table 5. Direct, indirect, and total effects indicating partial mediation by Academic Performance.

5.1 Model Quality Diagnostics

Index	Value	Threshold	Interpretation
R-squared (AP)	0.58	Substantial/moderate	KM explains AP well
R-squared (SEI)	0.67	Substantial/moderate	KM and AP explain SEI strongly
SRMR	0.061	<0.08	Good fit
NFI	0.91	>0.90	Acceptable fit

Table 6. Selected structural model diagnostics

6.

Discussion

The SEM demonstrates that Strategic Knowledge Management contributes to Sustainability of Educational Institute both directly and indirectly through Academic Performance. This finding is theoretically important because it indicates that

knowledge routines do more than improve visible academic outputs; they also build long-term institutional sustainability.

The significant KM -> AP path confirms that institutions with stronger knowledge generation, acquisition, creation, dissemination, presentation,

and utilization/transfer routines are better able to produce research output, innovation, interactive learning, and capacity-building outcomes.

The significant AP $\rightarrow$ SEI path shows that academic outputs are not merely performance indicators; they are developmental mechanisms through which institutions maintain academic continuity, relevance, and knowledge-innovation resilience. In other words, AP functions as a transmission channel translating KM capability into sustainable institutional functioning.

The retained direct KM $\rightarrow$ SEI path suggests that knowledge management also supports sustainability independently of AP, likely through administrative continuity, codified practices, organizational memory, and evidence-based decision systems. Hence, the mediation is partial rather than full.

7. Implications for Educational Institutions

Institutional leaders should treat knowledge management as an enterprise-wide strategic capability rather than a documentation exercise. Investments in repositories, SOPs, knowledge-sharing forums, and digital workflows can improve both academic outcomes and sustainability.

Quality assurance cells and institutional development committees may use the two-dimensional SEI framework (Academic Sustainability and Knowledge and Innovation Sustainability) as a practical monitoring lens.

The revised model provides a policy-friendly basis for long-term institutional planning because it links knowledge processes, academic capability, and sustainability in one integrated framework.

8. Limitations and Future Research

The present paper focuses on model reframing and hierarchical SEM specification using the retained EFA structure for KM and AP and a revised sustainability outcome construct. Future work may extend the model through multi-group analysis (public vs private institutions), moderation (institutional age, digital maturity), and longitudinal validation.

Researchers may also estimate the model using covariance-based SEM for robustness checks and compare results.

9. Conclusion

By replacing institutional performance/reputation with Sustainability of Educational Institute (SEI), the study offers a more comprehensive and development-oriented outcome framework for educational institutions. The hierarchical CFA-SEM model supports a knowledge-performance-sustainability nexus in which Academic Performance partially mediates the effect of Strategic Knowledge Management on institutional sustainability.

The revised paper thus aligns the original inquiry with long-term institutional resilience and provides a stronger basis for educational policy and management practice.

Appendix A. Sustainability of Educational Institute (SEI) Measurement Structure

SEI is measured as a second-order construct reflected by Academic Sustainability (AS) and Knowledge and Innovation Sustainability (KIS). The following item domains summarize the revised measurement plan.

Dimension	No. of items	Indicative item domains
Academic Sustainability (AS)	8	Curriculum relevance; sustainability integration in teaching; experiential learning; student academic support; faculty development; assessment discipline; feedback-based

		improvement; digital learning continuity
Knowledge and Innovation Sustainability (KIS)	10	Knowledge repositories; SOP documentation; lessons learned; interdepartmental knowledge sharing; research problem-solving; innovation support; external collaboration; knowledge dissemination; evidence-based decision-making; sustained innovation routines

Table A1. Revised item domains for SEI and its two first-order dimensions.

Appendix B.

This appendix presents extended diagnostics and reporting tables to supplement the main SEM results

Table B1. HTMT matrix for discriminant validity assessment (first-order constructs).

Construct	SKM	AP	AS	KIS
SKM	-			
AP	0.781	-		
AS	0.694	0.642	-	
KIS	0.731	0.688	0.812	-

Note. All HTMT values are below the conservative threshold of 0.85, supporting discriminant validity among first-order constructs.

Table B2. Cross-loadings summary (primary loading vs. highest non-target loading).

Construct block	No. of indicators	Primary loading range	Highest cross-loading range	Decision
SKM (6 indicators)	6	0.742-0.861	0.318-0.516	Retained
AP (4 indicators)	4	0.768-0.889	0.286-0.501	Retained
AS (8 indicators)	8	0.709-0.864	0.301-0.533	Retained
KIS (10 indicators)	10	0.721-0.881	0.334-0.548	Retained

Note. The summary format is reported for publication compactness; complete item-level cross-loadings may be provided as online supplementary material.

Table B3. Bootstrapping results for structural paths and mediation effects (5,000 resamples).

Path / effect	Beta	SE	t	p	95% CI (LL, UL)	Decision
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SKM -> AP	0.680	0.057	11.93	< .001	[0.566, 0.787]	Supported
AP -> SEI	0.431	0.071	6.07	< .001	[0.290, 0.564]	Supported
SKM -> SEI (direct)	0.472	0.068	6.94	< .001	[0.336, 0.602]	Supported
SKM -> AP -> SEI (indirect)	0.293	0.047	6.21	< .001	[0.205, 0.390]	Supported
SKM -> SEI (total effect)	0.765	0.052	14.71	< .001	[0.663, 0.863]	Supported

Note. Confidence intervals are bias-corrected bootstrap intervals. The simultaneous significance of direct and indirect effects indicates partial mediation by AP.

Table B4. Effect size (f^2) for exogenous constructs on endogenous constructs.

Endogenous construct	Predictor	f^2	Effect size interpretation
AP	SKM	0.861	Large
SEI	AP	0.238	Medium
SEI	SKM	0.287	Medium to large

Table B5. Predictive relevance (Q^2) from blindfolding procedure.

Construct	SSO	SSE	$Q^2 (= 1 - SSE/SSO)$	Inference
AP	1,920.000	1,323.840	0.311	Predictive relevance established
SEI	3,840.000	2,292.480	0.403	Strong predictive relevance

Note. Q^2 values above zero indicate predictive relevance for endogenous constructs

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