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Knowledge Management Foundations and Their Mediating Effects on Innovation and Performance: A Case Study of a Vocational Higher Education Institution in Indonesia

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Abstract

Knowledge Management (KM) is essential in various sectors, including vocational higher education. A literature review revealed that adopting KM can improve innovation and organizational performance in Higher Education Institutions (HEIs). However, some HEIs in developing countries have yet to realize the benefits of KM, and its implementation still needs improvement. The KM process is affected by several issues, including organizational barriers, knowledge hoarding, a lack of a knowledge-sharing culture, ineffective KM mechanisms, and resistance to technology. Nevertheless, only a few researchers have investigated the antecedents of KM, particularly in vocational higher education institutions. This study aims to evaluate the influence of KM foundation factors on KM processes, innovation, and organizational performance in a vocational HEI, specifically the School of Meteorology, Climatology, and Geophysics (STMKG) in Indonesia. It also examines the mediating effects of KM processes and innovation and provides recommendations for improving STMKG's KM foundation. An explanatory research approach was applied in this study, incorporating both qualitative and quantitative techniques. The results show that Organizational Structure (OS) and Technological Factors (IT) significantly influence KM processes. Innovation (IN) is also a significant mediator between KM processes and Organizational Performance (OP). The practical implication of this study is that it provides recommendations for crucial KM factors based on Importance-Performance Analysis (IPA) for policymakers to improve the foundation of KM at STMKG. Additionally, the study contributes to the academic field by providing insights for further research on KM development in vocational higher education institutions.

Keywords: Knowledge Management, Vocational Higher Education Institution, Partial Least Squares-Structural Equation Modeling (PLS-SEM), Importance Performance Analysis.

Introduction

In the 1990s, many organizations realized that knowledge is essential for achieving and sustaining a competitive edge. Effective Knowledge Management (KM) has proven to play a significant role in driving Innovation (IN) and improving Organizational Performance (OP), both in the private and public sectors. However, success in these sectors does not guarantee success in the academic environment. Higher Education Institutions (HEIs) have unique characteristics that combine elements of the business, voluntary, and public sectors (Fullwood et al., 2019). KM adoption in higher education, especially vocational education institutions, still faces various challenges. In particular, vocational or technical education focuses on practical training and skills that match the needs of a specific industry or occupation. It offers hands-on experience with technical skills that are specific, practical, and tailored to support employment in a particular sector directly (Fuller, 2015).

As a vocational HEI in Indonesia, the School of Meteorological, Climatological, and Geophysical Agency (STMKG) attempts to improve its ability to manage knowledge as a strategic asset to improve the quality of education and produce competent graduates for the Meteorology, Climatology, and Geophysics Agency (BMKG). STMKG uses a Learning Management System (LMS) to support learning and administration processes. Additionally, it utilizes a digital library application as a centralized repository for academic resources, facilitating knowledge discovery and internalization. However, the academic community still needs to use the LMS optimally and widely. STMKG has a vision to become a center of excellence and a world-class institution but still needs to improve the KM foundation to strengthen it. Observations and interviews with academicians show a lack of voluntary knowledge sharing among lecturers and academic staff, a lack of reward systems to encourage IN, and the absence of formal policies requiring knowledge sharing and repository contributions.

Many studies discuss factors that influence knowledge management (Haryani & Suryasari, 2020; Rezaei et al., 2021), but only a few focus on the KM foundation, particularly in vocational education. This study aims to fill this gap by exploring the factors that affect the KM foundation at STMKG. This research aims to empirically examine how KM foundation factors influence KM processes, IN, and organizational performance at STMKG. We used the PLS-SEM method to measure the significant impact of KM foundation factors, test the mediating role, and provide recommendations for improving STMKG's KM foundation. The questions in this research are as follows:

- RQ1: Do KM Foundation factors influence KM processes, IN, and OP in STMKG?
- RQ2: Does the KM process mediate the impact of KM foundation factors on IN and OP?
- RQ3: Does IN mediate the influence of KM foundation factors and KM process on OP?
- RQ4: What recommendations can we offer to improve the foundation of KM at STMKG?

The structure of this research paper is as follows: Section 2 describes the literature review on knowledge management foundations and theoretical frameworks. Section 3 outlines the research methods, while Section 4 presents the research results and discussion. Finally, Section 5 provides conclusions and suggestions for future research.

Literature Review

Knowledge Management in Higher Education Institutions

According to Becerra-Fernandez and Sabherwal (2015), KM is an approach that involves processes of creating, capturing, codifying, and transferring knowledge within an organization to optimize knowledge resources and achieve competitive advantage. In the higher education sector, KM plays a pivotal role, allowing institutions to effectively manage and disseminate knowledge, thereby enhancing the quality of teaching, learning, and research outcomes (Kumar, 2023). However, many universities lack a comprehensive KM strategy, complicating its implementation. Identifying the enablers and obstacles to KM processes is essential for improvement (Ramachandran et al., 2013; Veer Ramjeawon & Rowley, 2020).

Knowledge Management Foundation

Knowledge Management (KM) consists of two primary elements: KM solutions and KM foundations. KM solutions involve practices like capture, discovery, sharing, and application of knowledge. KM foundations provide long-term support through infrastructure, mechanisms, and technology. Infrastructure ensures sustainability, mechanisms facilitate KM, and technology supports KM systems. The success of KM Solutions depends on robust KM Foundations. Research highlights the critical role of KM infrastructure factors in education, including leadership, Organizational Culture (OC), Organizational Structure (OS), technology, KM mechanisms, and reward systems (Becerra-Fernandez & Sabherwal, 2015).

A. Leadership

Leadership is crucial in integrating KM behaviors with policies, identifying knowledge opportunities, maintaining KM standards, and facilitating organizational learning (Koohang et al., 2017; H. F. Sahibzada et al., 2021). Various studies show that leadership significantly influences KM processes in HEIs and impacts IN and OP (Rehman & Iqbal, 2020). Moreover, effective and efficient leadership contributes to establishing a positive, trustworthy environment, enhancing KM processes, employee satisfaction, IN, and organizational success (Iqbal, 2021; Paliszkiewicz et al., 2014; Rehman & Iqbal, 2020; U. F. Sahibzada et al., 2022). Based on this evidence, we propose five hypotheses:

- H1a: Leadership directly and positively influences KM processes significantly.
- H1b: Leadership directly and positively influences IN significantly.
- H1c: Leadership has a significant positive and direct effect on OP.
- H8a: KM processes mediate the relationship between leadership and OP.
- H8b: KM processes mediate the relationship between leadership and innovation.

B. Organizational Culture (OC)

Organizational Culture (OC), defined as the practices, values, and norms shared within an organization, significantly influences KM in HEIs (Kumari et al., 2023; Lo & Tian, 2020). It identifies the knowledge to manage, who should share it, and how new knowledge is developed and utilized (Lo & Tian, 2020). Previous research has shown that OC plays a key role in facilitating the process and enhancing the success of KM, and in turn, will drive IN

(Adeinat & Abdulfatah, 2019; Iqbal, 2021; Iqbal et al., 2019; Kumari et al., 2023; Lo & Tian, 2020). Based on these findings, we propose the following hypotheses:

- H2a: OC has a significant positive and direct effect on KM processes.
- H2b: OC has a significant positive and direct effect on IN.
- H8c: KM processes have a mediating effect on the relationship between OC and IN.

C. Organizational Structure (OS)

Organizational structure (OS), defined as the formal allocation of job roles and the administrative mechanisms to control and integrate work activities, significantly influences KM processes (Farooq, 2023; Mahmoudsalehi et al., 2012). The type and characteristics of an OS shape the processes of knowledge creation, transformation, and sharing by affecting social interactions (Chen & Huang, 2007; Farooq, 2023). Furthermore, standardized incentive systems enhance and support KM initiatives (Kumari et al., 2023). Various studies show OS significantly impacts KM processes, leading to the following hypothesis:

- H3: OS has a significant positive and direct effect on KM processes.

D. Knowledge Management Mechanism

Within the framework of organizations, KM involves managing explicit and tacit information critical for operational work, as described by Nonaka and Akeuchi (1995). Technological platforms in HEIs facilitate the sharing of explicit knowledge, while direct interactions such as discussions, storytelling, and mentoring enable the sharing of tacit knowledge (Kanyundo et al., 2023). This process emphasizes the importance of socialization and externalization (Nonaka & Akeuchi, 1995). Recent studies by Dei and van der Walt (2020) and Kanyundo et al. (2023) highlight the importance of these mechanisms in KM practices. Based on these findings, we propose the following hypotheses:

- H4: KM mechanism has a significant positive and direct effect on KM processes.

E. Technology

Technology infrastructure, including hardware, software, automated solutions, and staff support, is crucial for KM (Chong et al., 2010; Islam et al., 2015; Saide et al., 2019). Information Technology (IT) plays a vital role in managing, discovering, and sharing knowledge, significantly improving its development, implementation, and distribution (Chong et al., 2010; Islam et al., 2015; Saide et al., 2019; Veer Ramjeawon & Rowley, 2020). Information Technology facilitates storing and sharing knowledge through university digital repositories (Kanyundo et al., 2023). An analysis of the factors determining KM success revealed that more than half of the frameworks identified human and technological factors as keys to success (Razmerita et al., 2016; Saide et al., 2019). Based on this, we propose the following hypotheses:

- H5: Technologies have a significant positive and direct effect on KM processes.

Knowledge Management Process

The KM process is a component of KM Solutions that includes discovering, capturing, sharing, and applying knowledge (Becerra-Fernandez & Sabherwal, 2015). Nonaka and Akeuchi (1995) describe the conversion of knowledge processes through a knowledge spiral that includes four modes: socialization, externalization, internalization, and combination (Nonaka & Takeuchi, 1995). KM processes are crucial for facilitating Innovation (IN) and improving organizational performance, with studies showing a strong positive correlation between KM processes and competitive excellence in HEIs (Iqbal et al., 2019; Rehman & Iqbal, 2020; H. F. Sahibzada et al., 2021; U. F. Sahibzada et al., 2022; Sekli & De La Vega, 2021). This analysis leads to the formulation of the following hypotheses:

- H6a: KM processes have a positive and significant impact on IN.
- H6b: KM processes have a positive and significant impact on OP.
- H9b: IN has a mediating effect on the relationship between KM processes and OP.

Innovation and Organizational Performance

Innovation is a critical element within organizations that drives the creation of new products, services, and managerial approaches by adopting fresh ideas and technologies (Iqbal, 2021). According to Iqbal et al. (2019), IN speed is defined as the rate at which a university launches new methods and programs, while IN quality measures how well these services meet current demands compared to competitors. Many scholars agree that effective KM practices in universities promote innovation, refine research and curriculum, and enhance administration functions, among other advantages (Iqbal, 2021; Iqbal et al., 2019; Kanyundo et al., 2023; Rehman & Iqbal, 2020). Based on these findings, we propose the following hypotheses:

- H7: IN has a significant positive and direct effect on OP.
- H9a: IN has a mediating effect on the relationship between leadership and OP.

Organizational Performance (OP) is a key metric for assessing organizational success, especially in knowledge-based institutions. Evaluating OP involves work quality, employee efficiency, improvements, innovation, leader-member dynamics, and new methods (Rehman & Iqbal, 2020). In research HEIs, OP indicators include student satisfaction, curriculum development, responsiveness, student satisfaction, research ranking, and research productivity (Iqbal et al., 2019).

Partial Least Square-Structural Equation Model

Partial Least Square (PLS) is a variance-based Structural Equation Modeling (SEM) method that assesses the relationships between constructs and indicators in measurement models and also between latent constructs in structural models (Hair et al., 2019). It involves stages like the PLS algorithm and bootstrapping to test validity, reliability, and causal relationships (Kono & Sato, 2023). PLS is known as soft modeling because it does not require a specific measurement scale, allowing the use of small samples (under 100). The recommended minimum sample size for PLS-SEM is 30-100 samples (Ghozali, 2014; Hair et al., 2019).

Mediation in PLS-SEM

Mediation occurs when the mediator variable is between two related constructs in the model. Changes in the external construct influence the mediator, affecting the internal construct. Analyzing this relationship clarifies the cause-and-effect between constructs. A model can have one or multiple mediators (multiple mediator analysis) (Ringle et al., 2024). To analyze mediation, researchers propose a model as depicted in Figure 1: p3 is the direct effect, p1·p2 is the indirect effect, and the total effect is the sum of p3 (direct effect) and p1.p2 (indirect effect) (Hair et al., 2019; Zhao et al., 2010).

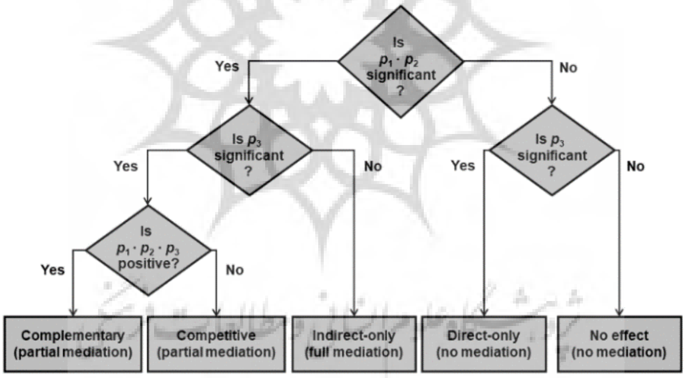

Figure 1. Model to analyze mediation in PLS-SEM

Importance Performance Analysis

Interest-Performance Analysis (IPA) evaluates customer satisfaction by mapping importance and performance levels on a two-dimensional plane, allowing for the evaluation of the strengths and weaknesses of concentrating on particular attributes (Chou et al., 2023; Martilla & James, 1977). The explanation of each quadrant in the plane is as follows:

- First Quadrant ("Maintain Good Performance"): high performance and importance. Continue focusing on these to maintain a competitive edge.
- Second Quadrant ("Excessive Possibility"): high performance but low importance. Conserve resources and avoid overinvesting here.
- Third Quadrant ("Low Priority"): low performance and importance. These attributes are

low priority and not crucial for service quality.

- Fourth Quadrant ("Concentrate Here"): low performance but high importance. Focus on improving these attributes.

IPA analysis results are used to improve strategies in various management areas, especially KM. This approach helps prioritize improvements and prevent the wasting of resources on less important components. Effective focus and resource allocation can improve overall performance (Chou et al., 2023; Fereidoonian et al., 2021).

Methodology

This research adopts an explanatory study strategy to explore causal relationships through qualitative and quantitative approaches (see Figure 2). In the qualitative phase, we identify problems through interviews with STMKG's leadership, lecturers, and students. These interviews focused on understanding the foundations and processes of KM and their impact on innovation IN and OP. Subsequently, a theoretical framework was constructed based on an extensive review of relevant literature. After integrating relevant theories, we develop and distribute the research instrument online to collect data from appropriate respondents, reflecting actual conditions and expectations. The expectation data collected was then processed and analyzed using PLS-SEM and Importance Performance Analysis (IPA), and compared with the actual condition data to identify gaps. After identifying the gaps, the most urgent indicators were selected based on the IPA analysis to formulate improvement recommendations.

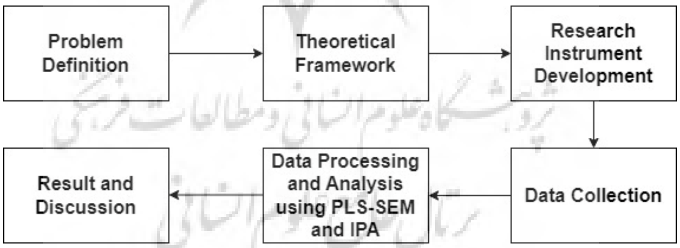

Figure 2. Research Flow

Theoretical Framework

As Figure 3 shows, the framework model for this research is derived from previous studies that formulated hypotheses.

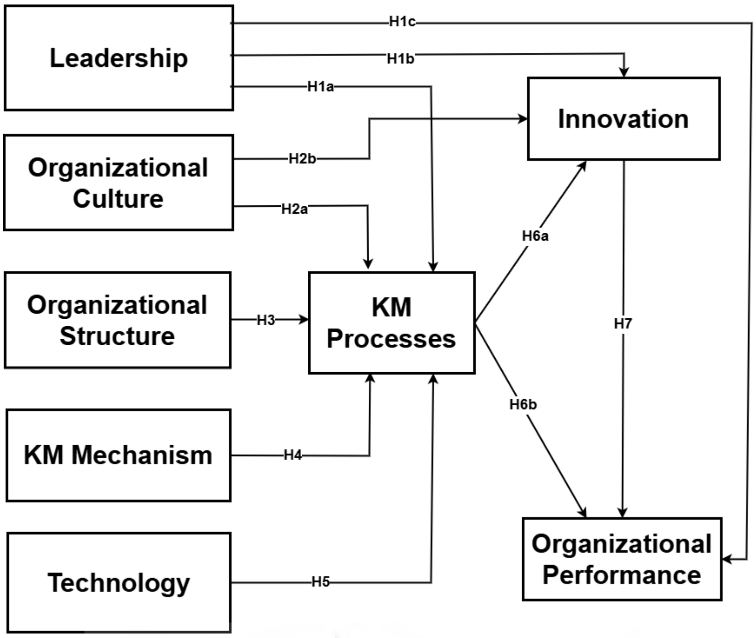

Figure 3. The proposed research model

The research model in Figure 3 illustrates the relationships between various factors affecting knowledge management IN, KM processes, and organizational performance. It examines how leadership, OC, organizational structure, KM mechanisms, and technology directly impact KM processes, influencing IN and OP. Additionally, the model assesses whether leadership and OC indirectly affect IN and OP. The hypotheses (H1a, H1b, H1c, H2a, H2b, H3, H4, H5, H6a, H6b, H7) outline these relationships, highlighting the pivotal role of KM processes in mediating the effects of these factors on innovation and organizational performance.

Research Instrument Development

This study used a structured questionnaire with three sections. The first section introduced the research objectives. The second section gathered respondent demographics: gender, age, education, position, and length of service. The third section measured constructs with eight variables and 34 indicators: leadership (5 items), OC (3 items), organizational structure (4 items), KM mechanism (5 items), technology (4 items), KM process (5 items), IN (5 items), and OP (6 items). Each indicator included an agreement statement and a question on its importance. Responses were measured using a 5-point Likert scale from "1 = strongly disagree" to "5 = strongly agree" to assess attitudes, opinions, and perceptions (Sugiyono, 2018; Vanitha & Alathur, 2021). The 5-point scale was reliable and informative, enabling more straightforward responses (Aybek & Toraman, 2022).

Data Collection

Data were collected using random sampling to ensure equal selection chances for all target population members. To collect quantitative data, we distributed a questionnaire to 77 respondents, including structural officials, lecturers, and academic staff at STMKG. Administered online via Google Forms, the survey produced 54 valid responses for further analysis. The number of reactions analyzed aligns with previous research on minimum sample sizes. Each independent variable needs to have at least ten data records (Hair, 1998; Samsudeen & Mohamed, 2019). With five independent variables in this study, the minimum number of respondents required is 50. Additionally, another researcher (Samsudeen & Mohamed, 2019; Sekaran & Bougie, 2010) suggested that a sample size between 30 and 500 is generally adequate for most research. This study expects 30 to 50 questionnaire responses to meet the minimum sample requirements.

Data Processing and Analysis

The collected expectation data were processed using the PLS-SEM method to test the hypotheses and evaluate the theoretical fit. Responses from the Likert scale-based questionnaire were initially processed using Microsoft Excel and then further analyzed with SmartPLS 3.2.9. This tool was selected for its suitability for small sample sizes and effectiveness with as few as 50 samples (Paxton et al., 2001; Saide et al., 2019).

The analysis follows the reflective measurement model guidelines and structural model assessment guidelines. The correlation of loadings, or outer loadings, should be ≥ .. 888 for reflective indicators. Additionally, we assess convergent validity using the Average Variance Extracted (AEE), ensuring it meets the threshold of ≥ .. ... The statistical importance of indicator weights is determined using a t-statistic above 1.95 and a p-value below 0.05. Hypotheses were tested using the two-tailed bootstrapping method, which assesses the presence of a significant effect without specifying the direction of the effect (Hair et al., 2019).

After identifying important factors through PLS-SEM analysis, we used IPA to assess the gaps between the importance of factors influencing the KM foundation, which affects the processes, IN, and performance of KM organizations, and the current KM condition. This study provides detailed empirical evidence and integrates IPA and PLS-SEM to offer improvement recommendations based on priorities. Data was collected via a questionnaire on the importance and performance of various indicators to conduct the IPA analysis. The calculation of average values for importance and performance used:

$$\text{Average}= \frac{\Sigma x}{n} \quad (1)$$

Where X is the importance or performance score of the respondent, and n is the number of respondents. The formula for calculating the performance percentage is as follows:

$$\text{Performance Percentage} = \left(\frac{\text{Total Performance Scores}}{\text{Total Importance Scores}}\right) \times 100\% \quad (2)$$

The performance percentage indicates whether performance improvement is needed or not. (Fereidoonian et al., 2021)

Results

Measurement Model Analysis

Measurement Model Analysis is carried out by calculating the validity and reliability of the variables used in the study. At this stage, the Outer Model test evaluates the relationship between latent variables (constructs) and the indicators that form them. The test results show that several indicators have an outer loading value of less than 0.708, including two indicators on variable OS, two on variable MC, and one on variable KP. Therefore, we removed these two indicators from the initial model and recalculated the outer loading, resulting in a revised model, as shown in Figure 4. The construct validity test ensures that each indicator is valid and can explain the latent variable. The process initially calculates internal consistency, Cronbach's alpha (CA), and composite reliability (CR) values. CA and CR assess the sample's bias and response reliability (Alves & Pinheiro, 2022). Table 1 demonstrates the reliability, with CA and CR values exceeding 0.7.

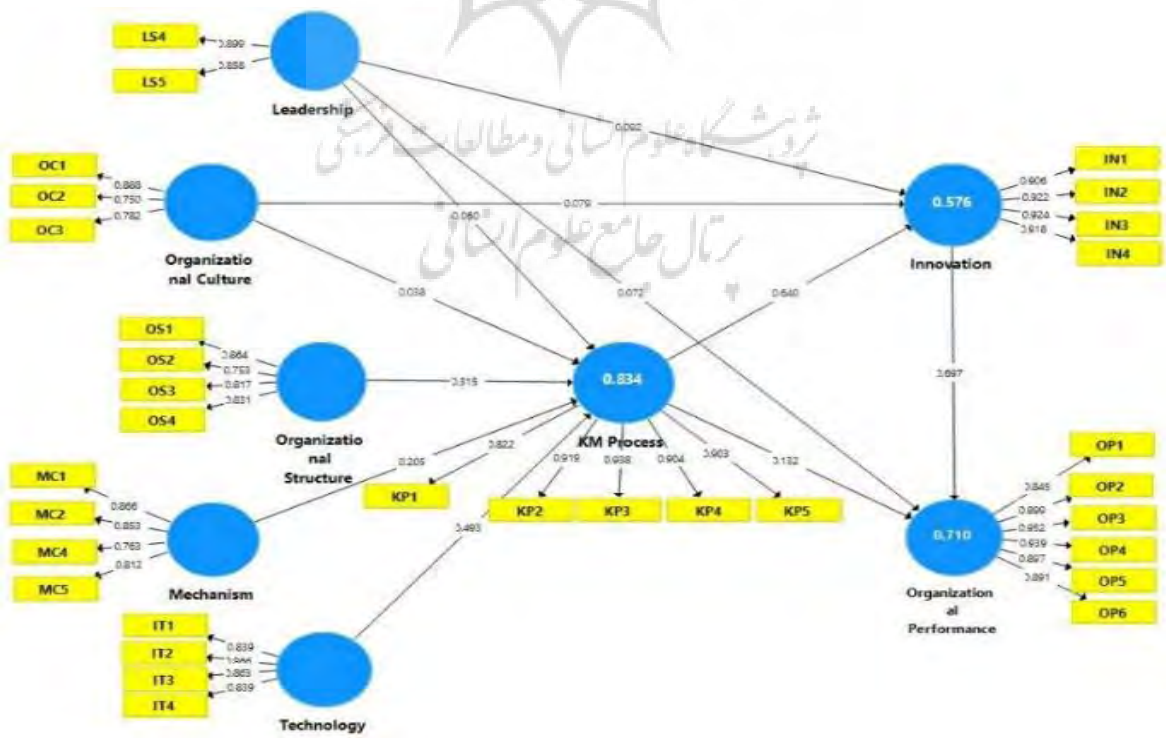

Figure 4. Outer Model Readjustment Test

Convergent validity is determined through factor loadings and average variance extracted (AVE) (Hair et al., 2022). The results show that both measures were confirmed, with all factor loadings exceeding the required value of 0.7 and AVE values surpassing 0.5, as shown in Table 1.

Table 1. Construct Validity Test Results

Construct	Item	Factor loading	CR	CA	AVE
Leadership	LS1	0.649	0.871	0.706	0.772
	LS2	0.669			
	LS3	0.682			
	LS4	0.899			
	LS5	0.858			
Organizational Culture	OC1	0.888	0.850	0.736	0.654
	OC1	0.750			
	OC1	0.782			
Organizational Structure	OS1	0.864	0.889	0.836	0.668
	OS2	0.753			
	OS3	0.817			
	OS4	0.831			
KM Mechanism	MC1	0.866	0.894	0.842	0.680
	MC2	0.853			
	MC3	0.696			
	MC4	0.763			
	MC5	0.812			
Technology	IT1	0.839	0.914	0.874	0.726
	IT2	0.866			
	IT3	0.863			
	IT4	0.839			
KM Process	KP1	0.822	0.954	0.939	0.806
	KP2	0.919			
	KP3	0.938			
	KP4	0.904			
	KP5	0.903			
Innovation	IN1	0.906	0.955	0.937	0.842
	IN2	0.922			
	IN3	0.924			
	IN4	0.918			
Organizational Performance	OP1	0.845	0.964	0.955	0.818
	OP2	0.899			
	OP3	0.952			
	OP4	0.939			
	OP5	0.897			
	OP6	0.891			

Table 1 confirms both convergent validity and reliability. Indicators LS1, LS2, LS3, and MC3 are invalid, leading to their removal from the model. Additionally, discriminant validity is verified based on the criteria proposed by Fornell and Larcker (1981), as shown in Table 1.

Structural Model Analysis

The structural model explains how latent variables are related to one another (Hair et al., 2019). Structural model analysis is carried out by evaluating the coefficient of determination or R-square (R^2) value and testing its significance through path coefficients analysis. The results appear in Table 2, Table 4, and Figure 5 for clarity and reference.

Table 2. Verification of Hypotheses

Effect	Hypotheses	ß	t-value	p-value	Decision
LS -> KP	H1a	-0.06	0.532	0.595	Not Supported
LS -> IN	H1b	0.092	0.801	0.423	Not Supported
LS -> OP	H1c	0.072	0.618	0.537	Not Supported
OC-> KP	H2a	0.038	0.287	0.774	Not Supported
OC -> IN	H2b	0.079	0.490	0.624	Not Supported
OS -> KP	H3	0.315	2.944	0.003	Supported
MC -> KP	H4	0.205	1.347	0.178	Not Supported
IT -> KP	H5	0.493	3.390	0.001	Supported
KP -> IN	H6a	0.640	4.107	0.000	Supported
KP -> OP	H6b	0.132	0.576	0.565	Not Supported
IN -> OP	H7	0.697	3.783	0.000	Supported

Data analysis shows that hypotheses H3, H5, H6a, and H7 are supported by empirical evidence, while hypotheses H1a, H1b, H1c, H2a, H2b, H4, and H6b are not supported. This study found that the organizational structure (OS) factor has a significant influence on the knowleege management process (MM process) (β = .. ,,,, t = .. 444, P = .. 333). Technological factors (IT) also significantly influence the KM process (β = .. ,,,, t = 3.000, P = 0.001). In addition, the KM Process significantly affects IN (β = .. ,,,, t = .. 777, P = ..)))) , and IN significantly affects PP (β = .. ,,,, t = 3.,,,, P = .. 000). These findings support hypotheses H3, H5, H6a, and H7. The analysis examined the direct impact relationships before testing the mediator model across five hypotheses. Table 3 presents the results.

Table 3. Decision Making Mediation

Effect	Hypotheses	Is p1.p2 significant?	Is p3 significant?	Decision
LS -> KP -> OP	H8a	No	No	No Effect (No Mediation)
LS -> KP -> IN	H8b	No	No	No Effect (No Mediation)
OC -> KP -> IN	H8c	No	No	No Effect (No Mediation)
LS -> IN -> OP	H9a	No	No	No Effect (No Mediation)
KP -> IN -> OP	H9b	Yes	No	Indirect-only (Full Mediation)

This study found that IN has a mediating factor between the KM Process and OP, so the KM Process can affect OP through IN. These findings support Hypothesis H9b. This analysis calculates the coefficient of determination and the R^2 value. The R-square value reflects the explanatory or predictive power of the model, with a value range between 0 and 1. The greater the R-square value, the stronger the model's ability to explain the data. The R-square values define 0.75 as strong, 0.50 as moderate, and 0.25 as weak.

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Table 4. R-Square (R^2) value

Construct	R^2	R^2 adjusted	Description
Innovation	0.576	0.552	Moderate
KM Process	0.834	0.818	Strong
Organizational Performance	0.710	0.694	Moderate

In this study, the adjusted R-square value for the KM Process variable is 0.818, placing it in the strong category. Table 4 shows that the OP variable has an adjusted R-Square of 0.694, while the IN variable has an adjusted R-Square of 0.552, indicating a moderate explanatory power level. These results suggest that the KM Foundation accounts for 81.8% of the variation in the KM Process, with the remaining 18.2% attributed to other variables not included in this study.

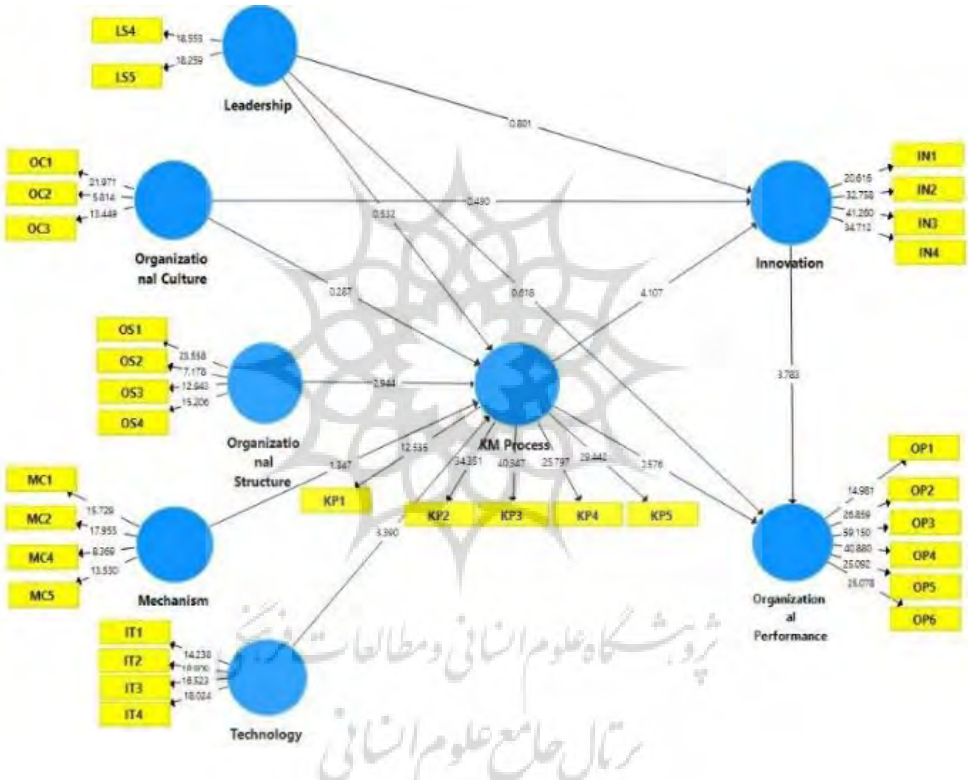

Figure 5. Path Coefficient Result

Gap Analysis

The gap analysis results for implementing KM Foundation, KM Process, and IN, as shown in Table 5, indicate that faculty and staff are not sufficiently satisfied, revealing a gap between the total average performance and importance scores. Comparing the total respondent performance and importance using equation (2) yields a percentage of 84.8%, which remains below 100%. Therefore, significant improvements are needed to enhance satisfaction among faculty and staff.

Table 5. Gap Analysis Importance and Performance

	Performance	Importance
Total Average	86.0	101.4
Total respondent score	4904	5780
Cartesian boundary	3.7	4.4

Figure 6 illustrates the position of each indicator. The position is determined by plotting the average performance scores on the Y-axis and the average importance scores on the X-axis. The Cartesian boundary is calculated by dividing the total average by the number of indicators.

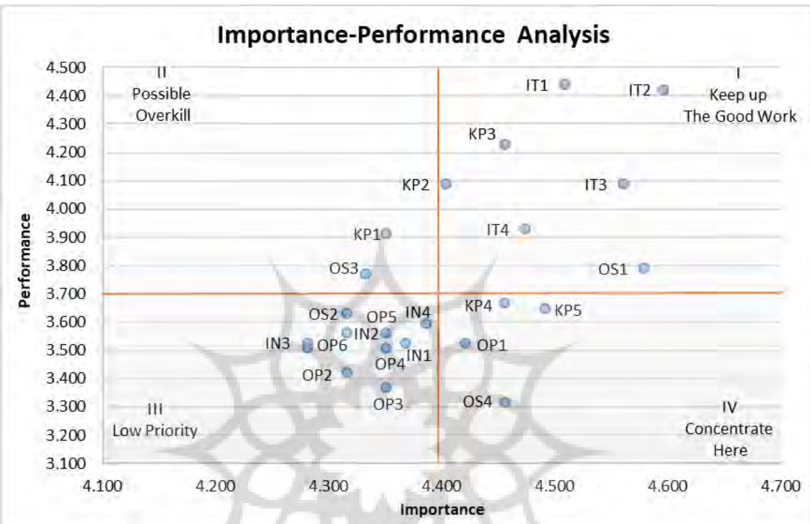

Figure 6. IPA Analysis Diagram

The IPA results show the position of each item in a four-quadrant matrix. The IPA matrix (Figure 6) distributes each item across the quadrants. Items in quadrant IV, such as OS4, KP4, KP5, and OP1, require special attention because they show high respondent expectations (importance) but low satisfaction (performance). These items are the primary focus for improvement to enhance overall performance and satisfaction.

Discussion

This study highlights the impact of KM foundation elements on KM processes, innovation (IN), and the performance of vocational HEIs. Firstly, the research underscores the influence of organizational structure and technology on KM processes for lecturers and staff. These findings validate hypotheses H3 and H5, confirming the significant impact of OS and technology on the KM process, as highlighted by previous studies (Farooq, 2023; Fullwood et al., 2019; Iqbal et al., 2019; Lo & Tian, 2020; Naeem, 2019; Sekli & De La Vega, 2021; Veer Ramjeawon & Rowley, 2020).

Secondly, this study emphasizes the crucial role of KM processes in fostering innovation at STMKG. These findings validate hypothesis H6a and corroborate previous models (Iqbal, 2021; Iqbal et al., 2019; Rehman & Iqbal, 2020). Thirdly, the study finds that innovation enhances STMKG's performance, validating hypothesis H7 and confirming prior research (Iqbal et al., 2019; Rehman & Iqbal, 2020). Fourthly, the study provides empirical insights into how KM processes indirectly influence organizational performance by innovation as a mediator. The findings indicate that KM processes impact innovation, which enhances the performance of vocational HEIs, validating hypothesis H9b and aligning with previous research findings (Iqbal et al., 2019; Rehman & Iqbal, 2020). However, the study could not identify a significant direct relationship between KM processes and OP, thereby not supporting hypothesis H6b.

Finally, this study provides recommendations based on the IPA results, which identify KP4, KP5, OP1, and OS4 as key priorities in Quadrant IV, requiring STMKG to focus on these areas. We recommend improving the KM Process by focusing on KP4 and KP5, which pertain to KM capturing and KM application. Previous research informs these recommendations, ensuring alignment with the current state of KM at STMKG (Chen & Huang, 2007; Dei & van der Walt, 2020; Iqbal, 2021; Iqbal et al., 2019; Kanyundo et al., 2023; Kumari et al., 2023; Rezaei et al., 2021; Riccio et al., 2022). The recommendations include: (1) Developing a manual procedure detailing steps for documentation, roles and responsibilities, quality assurance processes, and review protocols to ensure consistency and clarity in documenting knowledge. (2) Revise employee work instructions to mandate contributions to the knowledge repository. (3) Enhance the digital repository by improving search functionalities and user interfaces to make the digital library more accessible and user-friendly. (4) Mandate regular internal training and external seminars for employees. (5) Continuously update employees on knowledge through various training methods. (6) Organize frequent workshops and seminars on KM topics like data management and information literacy. (7) Develop and offer online courses and webinars on KM principles, tools, and best practices. (8) Continuously update the digital library with the latest research papers, case studies, and KM tools, ensuring accessibility and user-friendliness. (9) Feedback should be used to improve KM training programs and resources continuously, clearly communicating updates to all stakeholders. These recommendations aim to enhance innovation and impact OP, particularly OP1, ensuring STMKG's academic and non-academic quality development surpasses other vocational universities.

The authors also propose enhancements to the organizational structure (OS) found in Quadrant IV, particularly OS4, based on prior research (Al-Kurdi et al., 2020; Iqbal, 2021; Lo & Tian, 2020; Veer Ramjeawon & Rowley, 2020). The recommendations are as follows: (1) Clearly define criteria for knowledge-sharing rewards to ensure transparency and fairness. (2) Implement knowledge-based rewards to promote innovation, such as sponsorships for conferences, education opportunities, recognition awards, professional development, and career advancement. (3) Provide individual and team-based incentives for collective knowledge creation and sharing achievements, including salary increases and bonuses. We recommend improvements to the OS according to OS4: (1) Define clear criteria for knowledge-sharing rewards to ensure transparency and fairness. (2) Offer various incentives, such as monetary rewards, recognition awards, professional development opportunities, and career advancement.

We also provide recommendations for indicators not in quadrant four but affecting the KM process, as the KM process is a dependent variable. Based on the PLS-SEM results, the technology significantly impacts the KM process. Therefore, according to previous studies, the recommendations include: (1) Implement an integrated knowledge management system (KMS) with tools like document management and knowledge repositories (e.g., Microsoft SharePoint, Confluence). (2) Introduce comprehensive, collaborative platforms with cloud storage, such as Microsoft Teams.

This research provides theoretical and practical contributions by emphasizing the role of the KM foundation in influencing KM processes and their impact on innovation and HEI performance. The research findings give practical support to STMKG in enhancing KM implementation through strategic recommendations focused on improving organizational structure and technological capabilities. Empirical evidence from PLS-SEM analysis confirms the significant influence of OS and IT on KM processes. Prioritizing improvements to KM processes based on high-priority indicators in quadrant IV of the IPA is crucial to sustaining competitive advantage, fostering innovation, and improving organizational performance.

Theoretically, this study enriches the KM literature by emphasizing fundamental factors facilitating KM processes. Findings indicate that organizational structure and technology are crucial for KM processes. Effective KM processes enhance innovation and positively impact HEI performance. The empirical evidence from this study, as indicated by the adjusted R-squared values, provides significant insights. Empirical evidence, shown by adjusted R-squared values, provides significant insights. The KM Process variable's R-squared value of 0.818 demonstrates the strong explanatory power of KM foundations, suggesting that strengthening them improves KM process effectiveness. The OP variable, with an R-squared value of 0.694, falls within the moderate category, indicating that KM processes, innovation, and other included variables significantly affect OP. However, other substantial factors also play a role. The R-squared value of the IN variable of 0.552 indicates that although KM processes and foundations influence IN, there is influence from other factors not included in this model. These findings prove the theories linking KM foundations, KM processes, OP, and IN. Future research should explore additional variables influencing these outcomes and expand theoretical frameworks to incorporate broader factors. Such efforts would offer a more holistic understanding of KM across various organizational contexts.

Conclusion

This study develops a model to examine the impact of the knowledge management foundation, consisting of leadership, organizational culture, organizational structure, knowledge management mechanisms, and technology, on knowledge management processes and its impact on innovation and performance in higher education institutions. In addition, this study also evaluates the mediating role of knowledge management processes between leadership and organizational culture on innovation, as well as the role of innovation in mediating leadership, knowledge management processes, and the performance of higher education institutions. Data were collected from 57 lecturers and education staff at STMKG and analyzed using the partial least square-structural equation model and importance-performance analysis methods. The results showed that organizational structure and technology positively influence knowledge management processes. Furthermore, knowledge management processes positively influence innovation, enhancing organizational performance. Additionally, innovation mediates the relationship between knowledge management processes and organizational performance.

We expect our recommendations to enhance the knowledge management foundation, improving knowledge management processes, innovation, and organizational performance at STMKG. A well-structured and systematic knowledge management process ensures that knowledge is consistently documented, shared, and applied, creating a fertile environment for innovation. When employees are better equipped with the latest knowledge, best practices, and appropriate rewards, they can develop creative solutions and work improvements, driving innovation that will drive organizational performance. Incorporating knowledge management into STMKG's strategic plan will also promote better and more optimal knowledge management practices to support STMKG's vision of becoming a globally recognized center of excellence.

Limitation and Future Research

This study has several limitations that provide opportunities for future research. Firstly, the small sample size and only one vocational higher education institution limit the generalizability of the findings. Future research should enlarge the sample size and expand the study location to include other vocational institutions. Secondly, this research focused on Indonesia, so its results may not apply to other developing countries with different cultures and institutional frameworks. Replicating this research in other developing countries may help verify the findings. Thirdly, this study focuses on the influence of knowledge management foundations on knowledge management processes, innovation, and organizational performance. Future research can consider other important factors such as trust, organizational commitment, individual factors, human resources, and funding. In addition, future studies can focus on performance variables more specific to higher education institutions in Indonesia, especially those related to the "tridharma" of higher education.

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Conflict of interest

The authors declare no potential conflict of interest regarding the publication of this work. In addition, the ethical issues including plagiarism, informed consent, misconduct, data fabrication and, or falsification, double publication and, or submission, and redundancy have been completely witnessed by the authors.

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