

Model of the Impact of Knowledge Management, Innovation, and Competitiveness on the Performance of Technical Vocational Higher Education

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Abstract

This research investigates the impact of knowledge management, competitiveness, and innovation on the performance of civil servant personnel within the Applied Undergraduate Program at T University. Driven by fluctuating performance outcomes (2018–2023) and the professionalism mandates of Law Number 5 of 2014, this study addresses a critical gap by analyzing the specific mediating mechanisms of performance in technical-vocational higher education. Using a census method, data were collected between August and October 2024 through interviews with assessors and managers, complemented by objective performance appraisals from 2023. Partial Least Squares Structural Equation Modeling (PLS-SEM) via SmartPLS revealed that knowledge management significantly enhances innovation and competitiveness. Furthermore, innovation significantly drives personnel performance, whereas the direct effects of knowledge management and competitiveness were insignificant. Indirectly, knowledge management improves performance solely through innovation, acting as a mediator rather than through competitiveness. The novelty of this research lies in empirically demonstrating that, in highly regulated vocational education environments, knowledge assets translate into tangible performance only when strictly channeled through innovative practices. Theoretically, this extends the knowledge-based view by isolating innovation as the critical mediator for civil servant performance. Practically, university administrators and policymakers must prioritize knowledge-sharing initiatives that directly stimulate innovation to meet academic and bureaucratic targets, rather than focusing primarily on individual competitiveness.

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Introduction

In the contemporary era of global industrial transformation, propelled by the swift advancement of digital technology and automation, organizations across various sectors must manage knowledge effectively, foster continuous innovation, and sustain competitiveness amidst

increasingly intense competitive dynamics (Machado et al., 2022). Approximately 85% of global organizations consider knowledge management and innovation key factors in determining organizational sustainability and performance (Migdadi, 2022). In higher education, especially vocational education, these challenges become increasingly complex given the demands to produce adaptive, innovative graduates who compete in high-tech manufacturing industries (Lund & Karlsen, 2020).

In Indonesia, the transformation of vocational education is a national priority, as mandated by Presidential Regulation 68 of 2022 on the Revitalization of Vocational Education and Training. (Suharno et al., 2020). The manufacturing sector's contribution to the national GDP reached 19.25%, making it a strategic sector that requires a workforce with high technical and innovative competencies. (Ramakrishnan & Gaur, 2019). However, the performance of most vocational education programs, including manufacturing engineering, continues to face challenges in adapting to changes in industrial technology and in effectively managing institutional knowledge. It impacts low levels of innovation, weak institutional competitive advantages, and declining graduate performance in the world of work. (Lund & Karlsen, 2020).

The Applied Undergraduate Program at T University, one of the leading vocational engineering programs in Indonesia, also faces similar challenges. Although it has implemented various strategies to strengthen industry-based curricula and improve the quality of human resources, this program still needs to optimize its knowledge management, strengthen the culture of innovation, and build sustainable competitive advantages to improve its performance. The urgency of this issue is evident in the study program's internal performance evaluations. Based on team member performance assessments from 2018 to 2023, there has been a fluctuating, often stagnant trend in key performance indicators, particularly in innovation outputs such as applied research and industrial collaborations, which have remained [insert percentage/number, e.g., 15%] below institutional targets. Furthermore, fulfilling the strict professionalism and outcome-orientation demands for civil servant personnel, as mandated by Law Number 5 of 2014, adds a layer of bureaucratic complexity to achieving these targets. Consequently, scholarly investigations into the interplay between knowledge management, innovation, competitiveness, and performance in vocational education are of paramount importance.

Theoretically, knowledge management is seen as a systematic process of creating, sharing, and utilizing organizational knowledge to achieve competitive advantage. (Mahdi et al., 2019). Effective knowledge management has been shown to increase an organization's innovative capacity, thereby strengthening its market competitiveness. (Kmieciak & Michna, 2018). Within the Resource-Based View (RBV) framework, knowledge-based resources are considered strategic assets that are challenging to replicate and can confer a sustainable competitive advantage. (Bergh et al., 2025). In addition, innovation is seen as an important mediator that links knowledge management to improved organizational performance. (Iqbal, 2021).

Despite numerous studies establishing the knowledge-innovation-performance nexus in corporate settings and traditional research universities, a critical gap remains regarding how these dynamics operate within highly regulated, state-run vocational higher education institutions. Previous research has largely overlooked the dual role of academic personnel as civil servants, bound by strict bureaucratic frameworks yet simultaneously required to be agile and innovative. This study positions itself by addressing this specific contextual gap and exploring how knowledge management translates into performance when constrained by public-sector regulations.

Therefore, the core research problem addressed in this study is the inconsistency of civil servant personnel performance despite the presence of knowledge assets, raising critical questions about the efficacy of innovation and competitiveness as mediating mechanisms. Specifically, this study aims to answer the following research questions: (1) How do knowledge management,

innovation, and competitiveness directly affect the performance of civil servant personnel in technical vocational higher education? Furthermore, (2) Does innovation significantly mediate the relationship between knowledge management and performance in this specific bureaucratic setting?

By addressing these questions, this study offers significant theoretical and practical contributions. Theoretically, this research extends the Resource-Based View (RBV) and the Knowledge-Based View (KBV) to the public vocational education sector by isolating innovation as a crucial, quantifiable mediator of civil servant performance. The novelty of this research lies in empirically validating a structural model that tests these variables within the context of Law Number 5 of 2014. Practically, this study is anticipated to yield a conceptual model that other vocational education institutions can adopt, with strategic implications for supporting the national agenda to increase the competitiveness of the Indonesian manufacturing industry towards the vision of Indonesia Emas 2045.

Methods

One of the main demands of government agencies is to implement work oriented towards tangible results. This demand implies the need for innovation in how tasks are carried out, so that results are faster, better, more effective, and more efficient. As an integral part of the government, the Applied Undergraduate Program at T University is expected to adopt an innovative approach to its duties and functions. However, the competitiveness gap in the Applied Undergraduate Program at T University hinders innovation and performance improvement. Therefore, a targeted strategy, including knowledge management, is required to enhance the competitiveness of civil servants. For optimal results, it is imperative to identify and classify personnel groups that require the greatest improvement in competitiveness and innovation.

Numerous studies have demonstrated that knowledge management plays a crucial role in fostering innovation. It positively influences innovation by converting knowledge into the organization's intangible assets. (Obeidat et al., 2016). A moderately positive correlation is observed between knowledge management orientation and innovation performance. (Zia, 2020). Similarly, knowledge management is important for increasing innovation in technology-based small and medium enterprises. (Zhou et al., 2023). In addition, empirical studies on the effects of implementing knowledge management on personnel competitiveness have shown that it significantly enhances personnel competitiveness. (Ababneh & Ababneh, 2025). In contrast, age and gender diversity also contribute to the innovation climate in an organization, confirming a significant positive relationship between the innovation environment, age, and gender diversity. (Li et al., 2022).

The study was conducted from August to October 2024 in the Applied Undergraduate Program at T University. The dataset comprises both primary and secondary sources. Primary data were obtained through comprehensive interviews with all civil servant personnel of the Applied Undergraduate Program members at T University. The questionnaires were developed following the operational definitions of the research variables and utilized a five-point Likert scale, with response options spanning from 1 (strongly disagree) to 5 (strongly agree). Prior to implementation, the questionnaire was rigorously evaluated for validity and reliability using a sample of 30 trial participants. Validity analysis was performed using Pearson's product-moment correlation; items were considered valid if the calculated t-value exceeded the t-value from the t-table. Cronbach's alpha was used to assess reliability, with a minimum acceptable value of 0.60. (Cho & Kim, 2015). All trial analyses were performed using SPSS software version 22. Secondary data were obtained from the Applied Undergraduate Program in Manufacturing Engineering at T University, academic literature, scientific journals, previous research results, laws and regulations, and other relevant sources.

The study population included all employees of the Applied Undergraduate Program at T University, totaling 130 as of September 2024. The sampling method used a saturated sampling technique (census), in which all population members were used as research respondents. This sample size ($n=130$) is methodologically robust and comfortably satisfies the "ten times rule" for PLS-SEM, while also providing adequate statistical power for the structural model evaluated (Hair et al., 2022). It should be noted that the number of employees can change each month dynamically due to incoming and outgoing transfers, retirements, resignations, and other factors.

The gathered data were analyzed using both descriptive and inferential statistical methods. Descriptive analysis was employed to characterize the respondents, focusing on gender, age, educational background, years of service, and class. In addition, a Spearman correlation test was performed to assess the association between individual characteristics and the study's endogenous variables. The significance level was determined by evaluating p-values (2-tailed) < 0.05 , while the strength of the association was measured using the correlation coefficient, which ranges from -1 to +1.

To ensure high construct validity, the measurement scales for the variables were explicitly adapted from established literature. The knowledge management indicators used Nonaka's SECI (Socialization, Externalization, Combination, Internalization) framework, which is recognized as the most prevalent conceptual model in knowledge management research. (Farnese et al., 2019). Meanwhile, the innovation dimension is important because of its relevance to public sector organizations. (Demircioglu & Audretsch, 2017). Competitiveness and performance indicators were operationalized in accordance with the governmental performance appraisal framework mandated by Law Number 5 of 2014. The research variables and their measurement indicators are presented in Table 1.

Table 1. Research Variables and Indicators

No	Variable	Indicator	Code
1	Knowledge management (KM)	Socialization	KM1
		Externalization	KM2
		Combination	KM3
		Internalization	KM4
2	Innovation (IN)	Services Innovation	IN1
		Technology Innovation	IN2
		Administrative Innovation	IN3
3	Competitiveness (CO)	Quality of Education Programs Industry	CO1
		Partnerships	CO2
4	Performance (PF)	Team Member Work Targets	PF1
		Work Behavior	PF2

Source: Processed Primary Data (2025)

Structural equation modeling using partial least squares (SEM-PLS) was employed to analyze the relational model among latent constructs, each defined by multiple indicators. This approach facilitates the concurrent examination of the associations between independent and dependent variables. (Wang et al., 2015). The SEM-PLS analysis was conducted systematically in SmartPLS using two primary stages. The first stage involved evaluating the measurement model (outer model). Convergent validity was assessed by examining whether the outer loadings exceeded 0.70 and whether the Average Variance Extracted (AVE) values exceeded 0.50. Internal consistency reliability was confirmed by Cronbach's Alpha and Composite Reliability (CR) values exceeding 0.70. Discriminant validity was rigorously evaluated using the Heterotrait-Monotrait Ratio of Correlations (HTMT) criterion. The second stage evaluated the structural model (inner model) to test the hypothesized relationships. It included assessing the coefficient of determination (R^2) to measure the model's predictive accuracy and the cross-validated redundancy (Q^2) to determine predictive

relevance. Finally, to test the significance of both the direct path coefficients and the mediating effects, a bootstrapping procedure with 5,000 subsamples was performed, evaluating the t-statistics and corresponding p-values.

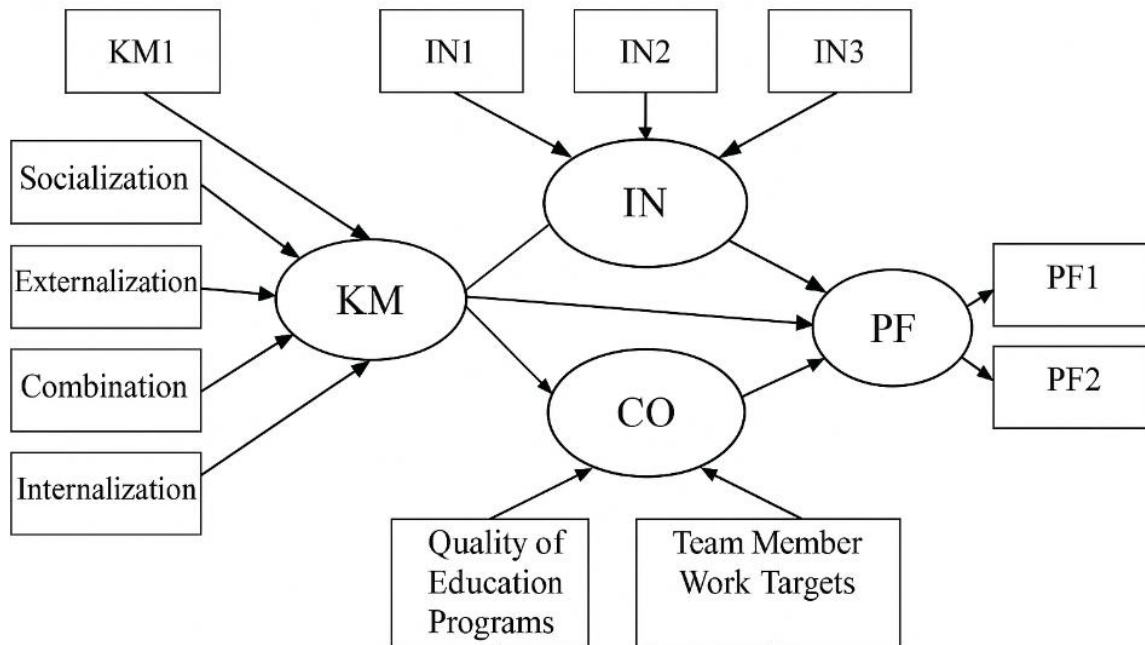


Figure 1. SEM Models

Results and discussion

Before deploying the questionnaire, validity and reliability were comprehensively evaluated. Following standard PLS-SEM procedures, the measurement (outer) model was assessed for convergent validity, discriminant validity, and internal consistency. The findings indicated that all indicators demonstrated loading factor values exceeding 0.6, satisfying the initial validation criteria. Nevertheless, two AVE values were below 0.5 in the Work Behavior (PF2) and externalization (KM2) dimensions, necessitating the removal of the indicators with the smallest loading factors from these dimensions. Following this adjustment, the revised model's Average Variance Extracted (AVE) values exceeded 0.5, and its Composite Reliability (CR) values exceeded 0.7. Discriminant validity was also confirmed. Consequently, all measurement model evaluations fulfilled the criteria to advance to the structural model evaluation stage. The structural (inner) model elucidates the relationships between the latent variables and their predictive power. The test results show the R² values for each endogenous latent variable (Table 2).

Table 2. The R² value of the inner model

Endogenous latent variables	R ²
Innovation (IN)	0.52
Competitiveness (CO)	0.62
Performance (PF)	0.16

Source: Processed Primary Data (2025)

The R² values indicate moderate to substantial predictive power. The R² value for the innovation variable is 0.519, indicating that knowledge management explains 51.9% of its variance. For competitiveness, the R² value is 0.620. Meanwhile, the R² value for the performance variable is 0.157, indicating that the combined model explains 15.7% of the variance in performance. Furthermore, the Q² values for all endogenous constructs were greater than 0, confirming the model's predictive relevance.

The significant relationship between constructs was evaluated using a t-test derived from a bootstrapping process (5,000 subsamples). A summary of the path coefficients, t-statistics, and the final decisions for all tested hypotheses is presented in Table 3.

Table 3. Path coefficient and t-test

Path	Path Coefficient	t-test	Result
Direct Influence			
Knowledge Management (KM) to Innovation (IN)	0.72	14.99	Significant
Knowledge Management (KM) to Competitiveness (CO)	0.79	19.44	Significant
Knowledge Management (KM) to Performance (PF)	0.006	0.037	Not Significant
Innovation (IN) to Performance (PF)	0.37	2.71	Significant
Competitiveness (CO) to Performance (PF)	0.03	0.19	Not Significant
Indirect Influence			
Knowledge Management (KM) to Innovation (IN) to Performance (PF)	0.26	2.55	Significant
Knowledge Management (KM) to Competitiveness (CO) to Performance (PF)	0.18	0.18	Not Significant

Source: Processed Primary Data (2025)

The findings of this study offer a nuanced understanding of the Knowledge Management-Performance nexus in the highly regulated context of technical-vocational higher education. Consistent with previous studies (Obeidat et al., 201) (Zhou et al., 2023), Knowledge management significantly influences both innovation ($t=14.99$) and competitiveness ($t=19.44$). Viewed through the lens of Nonaka's SECI model, this confirms that the internalization and externalization of knowledge directly equip academic personnel with the capacity to generate novel ideas and maintain an edge in academic competencies. However, contrary to prevailing assumptions in corporate-centric literature (Zaim et al., 2019), this study reveals a critical divergence: the direct effect of knowledge management on performance is insignificant ($t=0.037$).

Furthermore, competitiveness does not significantly impact performance ($t=0.186$), nor does it mediate the relationship between KM and performance. This anomaly can be explained by the specific bureaucratic structure of civil servant personnel under Law Number 5 of 2014. In this rigid environment, simply possessing knowledge (KM) or individual competitiveness (CO) does not automatically translate into recognized performance outputs, as appraisal systems (SKP) are tied to highly specific, quantifiable bureaucratic targets rather than fluid individual competencies. This finding challenges the traditional Resource-Based View (RBV), suggesting that in the public sector, knowledge is merely a latent resource. It only becomes a valuable capability when it is actively transformed into tangible innovations.

The acceptance of H4 and H6 strongly supports it. Innovation emerges as the sole, vital mediator ($t=2.554$) that bridges the gap between knowledge assets and actual performance. When knowledge is applied to create structural or technological innovations—such as developing new educational applications or streamlining administrative infrastructure—it directly fulfills the tangible outcome demands of the civil servant performance appraisals. Theoretically, this study extends both RBV and the SECI framework by introducing a boundary condition. In highly regulated public vocational institutions, the translation of knowledge into performance is exclusively dependent on the mediating power of innovation.

The empirical evidence from the Applied Undergraduate Program at T University dictates a strategic pivot for university administrators. Rather than investing solely in general competency training that fails to improve performance directly, management must explicitly design knowledge management initiatives that drive tangible innovations. First, to stimulate the SECI cycle, particularly internalization, the institution must build an accessible, centralized database for all academic and bureaucratic regulations (SOPs). It reduces personnel's cognitive load, allowing them

to redirect their efforts from interpreting rigid rules to developing creative solutions. Second, the performance appraisal process itself must be optimized. Since innovation is the primary driver of recognized performance, administrators must establish formal incubators or recognition systems within the department. When individual creative ideas—such as a new teaching module or a digital administrative shortcut—are recognized and adopted as organizational innovations, they directly fulfill both the institutional goals and the individual Employee Work Targets (SKP). By aligning knowledge sharing directly with innovative outputs, the vocational program can effectively navigate bureaucratic constraints while enhancing its overall educational and industrial competitiveness.

Conclusion

The assessment of civil servant personnel performance in the Applied Undergraduate Program at T University followed the existing bureaucratic rules. However, the performance achievement values assigned by the assessors do not fully reflect the personnel's actual performance. This study concludes that knowledge management significantly influences innovation and competitiveness. Implementing effective knowledge management will generate new ideas that serve as the basis for innovation and expand a person's knowledge, undoubtedly increasing their competitiveness. Crucially, the findings reveal that knowledge management and competitiveness do not directly affect performance, whereas innovation does. Therefore, knowledge management indirectly affects personnel performance exclusively through innovation in the Applied Undergraduate Program at T University. Theoretically, this research offers a novel contribution by extending the Resource-Based View (RBV) to the context of highly regulated public-sector institutions. It demonstrates that in a bureaucratic vocational environment bounded by strict performance regulations (such as Law Number 5 of 2014), knowledge assets and individual competitiveness do not automatically translate into measurable performance. Innovation serves as the sole, critical mediator; knowledge must be actualized into tangible, innovative practices to fulfill institutional performance targets. Practically, these findings provide specific policy implications for institutional management. Since innovation is the primary driver of performance, university administrators must shift from merely providing general competency training to actively establishing platforms that stimulate technological and administrative innovation. It is recommended that institutional policymakers redesign the current performance appraisal implementation (SKP) to recognize and reward practical innovations explicitly. Furthermore, management should institutionalize the knowledge-sharing process by creating easily accessible digital databases for Standard Operating Procedures (SOPs), thereby reducing bureaucratic friction and fostering an environment where innovative ideas can flourish. Despite its significant contributions, this study has several limitations that provide avenues for future research. First, the scope is confined to a single study program at T University, which may limit the generalizability of the findings across different vocational disciplines or non-governmental institutions. Future research should expand the sample to include multiple vocational universities or polytechnics to validate the proposed model. Second, this study relies on cross-sectional data, capturing the phenomena at a single point in time. Future studies are encouraged to employ longitudinal designs to observe the dynamic evolution of knowledge management and innovation. Finally, investigating the role of other moderating or mediating variables, such as transformational leadership or digital infrastructure readiness, would further enrich the current structural model.

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