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Connecting the dots: Knowledge management as mediator and moderator between intellectual capital and procurement performance

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Abstract

Knowledge management is increasingly regarded as a strategic element in the public sector due to its potential in managing intangible assets such as intellectual capital. This study aims to examine the role of knowledge management as both a mediating and moderating variable in the relationship between public intellectual capital and government procurement performance, with a case study at the Ministry of Finance. Public intellectual capital is divided into five components: human capital, organizational capital, social capital, technological capital, and relational capital. The analysis employs structural equation modeling – partial least squares (SEM-PLS) with a total of 298 respondents. In the first model, where knowledge management is positioned as a moderating variable, the results indicate that human, social, and relational capital have a significant direct impact on procurement performance. However, knowledge management does not demonstrate a significant moderating effect on these relationships. In contrast, the second model highlights the mediating role of knowledge management, which significantly bridges the influence of several intellectual capital components, specifically organizational, social, technological, and relational capital on procurement performance outcomes. This study underscores the theoretical relevance of positioning knowledge management as a mediating mechanism in public intellectual capital research. These findings further emphasize the importance of systematically and strategically integrating knowledge management into intellectual capital, rather than merely as a supporting factor.

Introduction

In modern public governance, public procurement is no longer merely an administrative instrument to fulfill operational needs, but has evolved into a strategic function that drives innovation, transparency, and efficiency in public service delivery (Uyarra et al., 2020; Mebrate & Shumet, 2024). As an integral part of public financial management, public procurement plays a critical role in ensuring the effectiveness of public expenditure and achieving comprehensive performance across the public sector (Keith et al., 2016; OECD, 2020). Digital transformation through the integration of information technology and adaptive approaches has been proven to enhance the success of public procurement implementation, particularly in terms of process efficiency, information transparency, and responsiveness to environmental dynamics (Changalima & Mdee, 2023; Nicholas & Deus, 2024).

Public procurement activities involve various risks, which result from the large volume of purchases, complex processes, and the involvement of numerous stakeholders, making them vulnerable to integrity, financial, technological, reputational, social, and environmental issues throughout the procurement cycle (OECD, 2023). These conditions underscore the importance of

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continuous improvement efforts within the public procurement system that are oriented toward performance, accountability, and value-for-money outcomes.

One of the most relevant conceptual approaches to explain organizational performance especially in the public sector is the resource-based view (RBV) and its development into the knowledge-based view (KBV). Both perspectives highlight the importance of intangible assets, such as intellectual capital and knowledge management, as sources of sustainable competitive advantage (Kianto et al., 2013; Gogan et al., 2016; Barney & Hesterly, 2019). Intellectual capital refers to the knowledge-based resources possessed by an organization (Campos et al., 2006). While there is no universally agreed-upon definition, Dhar et al. (2018) emphasize that intellectual capital encompasses a combination of knowledge, experience, intelligence, creativity, entrepreneurial spirit, and capabilities that are essential for achieving competitive advantage in a technology- and knowledge-driven global economy.

The importance of intellectual capital has become increasingly evident in the context of digital transformation and organizational adaptation to environmental changes. Organizations with strong intellectual capital are considered more prepared to face digitalization challenges and more resilient in navigating global market dynamics (Gariba et al., 2025). In this regard, knowledge management plays a crucial role as a mechanism for managing intellectual capital so that it can be accessed, shared, and utilized optimally (Dalkir, 2005; Alavi & Leidner, 2001). Several studies indicate that knowledge management may act as both a mediating and moderating variable in the relationship between intellectual capital and organizational performance (Ling, 2013; Hussinki et al., 2017; Rehman et al., 2022). However, despite its conceptual relevance, empirical evidence on the strategic role of knowledge management in the public sector—particularly in the context of government procurement—remains limited.

Many previous studies have explored the link between intellectual capital and organizational performance, but they mostly focus on the private sector and rarely examine this relationship in Indonesia's public sector, especially in public procurement. In addition, research on knowledge management often treats it only as a supporting factor, without analyzing its dual role as both mediator and moderator, which this study addresses by comparing both roles and providing new evidence from the Ministry of Finance.

Literature Review and Hypotheses Development

Model 1: The Moderating Role of Knowledge Management

Procurement performance

Public procurement is well known as an important driver of organizational performance. Keith et al. (2016) point out that choosing and applying the right procurement strategies can strongly improve both organizational effectiveness and competitiveness. Procurement performance itself can be understood as the extent to which the procurement function of an organization achieves its targets in a cost-efficient way, while at the same time fulfilling the requirements of quality, timeliness, and budget control (Changalima & Mdee, 2023). In support of this, Mebrate and Shumet (2024) show that procurement practices have a significant effect on organizational outcomes, especially when planning is well structured and staff competence is high. In the public sector, many factors shape procurement performance. Changalima and Mdee (2023) stress that the competence of procurement officers is a key factor, since better skills lead to more effective planning and, in the end, to higher quality procurement. Likewise, Nguyen (2016) found that structural elements such as organizational processes, technological models, inventions, patents, copyrights, business strategies, and information systems also contribute positively to performance. Taken together, these studies suggest that procurement performance in public organizations is not only influenced by tangible resources, but even more by intangible aspects that are part of public intellectual capital. Components such as human capital, organizational capital, and other intangible capacities work together to determine how procurement contributes to accountability, effectiveness, and overall organizational success.

Knowledge management

Knowledge management is a systematic and planned approach for creating, capturing, organizing, disseminating, and applying knowledge to strengthen organizational capabilities (Dalkir, 2005; Alavi & Leidner, 2001). Its implementation across individual, community, and organizational levels ensures that valuable knowledge is both accessible and applicable, thereby reducing the risk of knowledge loss due to employee turnover, retirement, or insufficient documentation. Well-managed knowledge serves as a critical organizational asset that supports better decision-making, increases productivity, standardizes processes, and drives innovation (Gold et al., 2001). Developing strategies that promote the sharing of tacit knowledge enhances an organization's capacity to remain competitive and adapt to dynamic environments.

Model 1 is designed to explore the direct influence of the five variables of public intellectual capital namely public human capital, public organizational capital, public social capital, public technological capital, and public relational capital on procurement performance. In addition to testing these direct relationships, knowledge management is introduced as a moderating variable positioned between public intellectual capital and procurement performance. The purpose is to examine whether knowledge management strengthens or alters the impact of each intellectual capital variable on procurement outcomes. The model assumes that when knowledge is systematically acquired, shared, and applied, it can enhance the strategic utilization of intellectual capital, thereby improving procurement results. This reflects an interaction-based approach, in which knowledge management potentially plays a complementary role in optimizing public sector capabilities through enhanced knowledge flows and organizational learning. Ling (2013) emphasizes that effective knowledge management processes can amplify the benefits of intellectual capital in organizational contexts. Hussinki et al. (2017) found that organizations with strong intellectual capital may perform well regardless of whether knowledge management practices are highly developed, but in the absence of knowledge management, the benefits of intellectual capital are less likely to translate into superior performance. In line with this, Omar and Johar (2022) argue that knowledge management has proven to be an effective moderator in strengthening relationships between independent and dependent variables in various organizational settings. Drawing on the KBV theory, they highlight that knowledge management capabilities—covering knowledge acquisition, organization, sharing, and application—enable organizations to convert individual and collective knowledge into strategic resources that enhance performance outcomes. As a moderator, knowledge management ensures that the latent potential of intellectual capital is fully realized by facilitating knowledge integration across units, avoiding redundancy, and ensuring that valuable tacit knowledge is not lost but transformed into actionable insights.

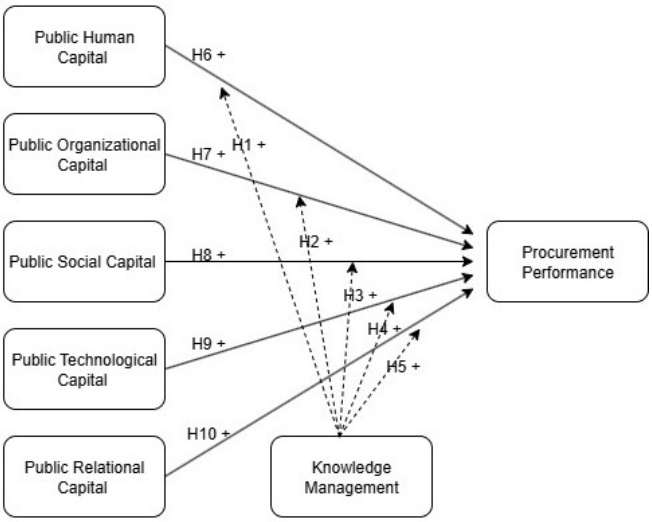

Figure 1. The Influence of Public Intellectual Capital on Procurement Performance with Knowledge Management as a Moderating Variable
Source: Authors own work, 2025

H_1: Knowledge management strengthens the effect of public human capital on procurement performance.
H_2: Knowledge management strengthens the effect of public organizational capital on procurement performance.
H_3: Knowledge management strengthens the effect of public social capital on procurement performance.
H_4: Knowledge management strengthens the effect of public technological capital on procurement performance.
H_5: Knowledge management strengthens the effect of public relational capital on procurement performance.

Public human capital

According to Campos et al. (2006), public human capital includes attitudes and behaviors that come from the basic sources that motivate people to act. This knowledge shapes a person's view of the world, which is influenced by mindsets, beliefs, and motivations. Another part is technical knowledge, which is about understanding the tasks or activities that a person does and having the ability to apply that knowledge well in real work situations. Subramaniam and Youndt (2005) say that the value of human capital can be improved through good recruitment, training, and keeping skilled employees. Farah and Abouzeid (2017) demonstrate that public human capital which includes technical knowledge, motivation, adaptability, and collaborative skills positively affects the performance of public organizations. Supporting this, Aman-Ullah et al. (2022) found that dimensions of human capital capacity, knowledge, and skills have a significant positive relationship with organizational performance in the hospitality industry.

In line with the concept of public human capital, procurement performance is significantly shaped by specific components of public human capital. The skills of procurement personnel are a critical factor influencing procurement performance, particularly when these skills are applied through effective procurement planning (Changalima & Mdee, 2023). Empirical evidence further demonstrates that human resource development practices, specifically career development, training, and performance appraisal, exert a statistically significant and positive influence on the effectiveness of public procurement (Jaffu & Changalima, 2023). This implies that investing in the continuous development of human capital not only strengthens individual capabilities but also enhances institutional capacity to deliver procurement functions more effectively and efficiently.
H_6: Public human capital has a positive effect on procurement performance.

Public organizational capital

Public organizational capital encompasses explicit and implicit knowledge that forms the basis for organizational activities, allowing them to function efficiently and effectively. It represents the organization's ability to carry out routine operations in a consistent and well-structured manner. As noted by Campos et al. (2006), public organizational capital is built from elements such as organizational culture, structure, learning processes, and internal operational systems, which together serve as the foundation for long-term organizational performance. Similarly, Dhar et al. (2018) describe organizational capital as being closely linked to organizational culture, managerial processes, and work practices that facilitate the creation, development, and use of knowledge within the organization.

Youndt and Snell (2004) find that human, social, and organizational capital significantly and positively affect organizational performance, while Nguyen (2016) shows that structural capital—which encompasses organizational structures, processes, technological models, inventions, patents, copyrights, business strategies, and information systems—has a direct positive impact on performance. In public procurement, strong organizational capital ensures that procurement processes are governed by clear rules, transparent procedures, and efficient workflows, thereby enhancing accountability and service quality. Studies have shown that

components of public organizational capital significantly influence procurement performance. Gyamfi et al. (2021) found that organizational culture positively affects the effectiveness of public procurement.

H_7: Public organizational capital has a positive effect on procurement performance.

Public technological capital

Public technological capital refers to the intangible technological assets that stem from technical knowledge and support the operational effectiveness of public organizations. It reflects the integration of organizational knowledge directly linked to the execution of activities and the operation of technical systems (Martín-de Castro et al., 2013). As noted by Campos et al. (2006), this capital includes technological capabilities such as research and development programs, technological resources, and ownership of intellectual property, all of which contribute to improving efficiency, driving innovation, and enhancing service quality. Public technological capital also covers IT infrastructure, the adoption of emerging technologies, and tools that streamline processes.

The components of public technological capital such as technological models, inventions, patents, copyrights, and information systems have a positive effect on organizational performance (Nguyen, 2016). In the context of procurement performance, these results are influenced by factors such as information availability and technology adoption (Eldin et al., 2019), as well as the effective utilization of information technology (Kumar & Ganguly, 2021). Nicholas and Deus (2024) emphasize that technological capacity has the potential to directly improve procurement performance.

H_8: Public technological capital has a positive effect on procurement performance.

Public social capital

Public social capital reflects the extent to which public organizations are trusted by the community. According to Campos et al. (2006), this form of capital is associated with the values embedded within the organization in its role as a public service provider, as reflected in the level of trust, social stability, and the quality of relationships between the organization and the community. Social capital develops through interactions among individuals or groups, which are generally not bound by formal rules and procedures, thereby generating dynamic forms of knowledge (Subramaniam & Youndt, 2005).

Public social capital, which reflects trust, shared values, and collaborative norms among stakeholders, plays an important role in enhancing procurement performance. In addition, ethical standards and transparency in procurement foster public trust and strengthen institutional legitimacy, thereby improving procurement outcomes (OECD, 2020).

H_9: Public Social capital has a positive effect on procurement performance.

Public relational capital

Public relational capital represents the value created through an organization's relationships with external stakeholders. According to Campos et al. (2006), it includes ties with suppliers, collaborations with partner institutions, and interactions with the media, reflecting the organization's capacity to establish and sustain relationships with suppliers, partners, and the wider public. Dhar et al. (2018) further describe relational capital as encompassing strategic alliances, licensing agreements, partnerships with other organizations, and customer relationships, all of which contribute to strengthening organizational performance. Empirical studies also demonstrate that well-developed external networks improve procurement quality by building trust and facilitating inter-agency collaboration (Hermawan et al., 2020). When applied to public procurement, this implies that effective procurement performance cannot be achieved only through strong internal coordination among procurement units, but also requires well-managed external collaboration.

H_{10}: Public relational capital has a positive effect on procurement performance.

Model 2: Knowledge Management as Mediator

Knowledge management

The relationship between knowledge management and intellectual capital is reciprocal, with both considered essential drivers of organizational performance and long-term competitive advantage (Alhamoudi, 2023). Intellectual capital, which includes human, structural, and relational components, positively influences knowledge management, and through this mechanism, contributes to greater innovation and improved organizational performance. This underscores the mediating role of knowledge management in linking intellectual capital to organizational outcomes, as it enables the flow of knowledge, supports collaboration, and strengthens decision-making processes (Suparwadi, 2024).

Building on this perspective, Model 2 is designed to test the indirect effect of public intellectual capital on procurement performance by positioning knowledge management as a mediating variable. Within this framework, the five dimensions of public intellectual capital—public human capital, public organizational capital, public social capital, public technological capital, and public relational capital—are proposed as antecedents of knowledge management, which in turn is expected to directly enhance procurement performance. The underlying assumption is that intellectual capital by itself may not be sufficient to drive superior procurement outcomes unless it is effectively captured, organized, and applied through knowledge management practices. By functioning as an intermediary, knowledge management transforms knowledge resources embedded at the individual and organizational levels into practical capabilities that strengthen strategic procurement activities.

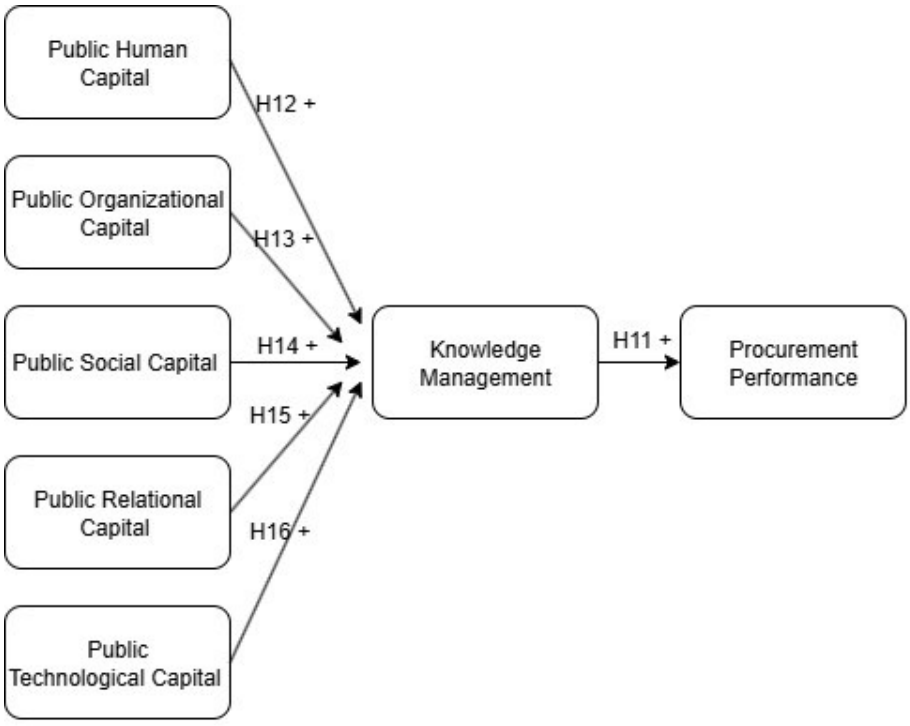

Figure 2. The Influence of Public Intellectual Capital on Procurement Performance with Knowledge Management as a Mediating Variable
Source: Authors own work, 2025

Effective knowledge management processes ensure that the knowledge generated from human, organizational, social, technological, and relational capital is systematically captured, stored, shared, and applied to procurement activities, thereby enhancing performance (Zack et al., 2009; Kianto et al., 2014). Empirical studies further confirm this role: Abualoush et al. (2018) demonstrate that knowledge management processes are vital for translating intellectual resources into superior organizational outcomes. In the public procurement context, knowledge management

is expected to convert intellectual capital resources into actionable capabilities that strengthen procurement strategies. Well-implemented knowledge management systems help maintain institutional memory, support evidence-based decision-making, and prevent the repetition of mistakes, ultimately leading to greater procurement efficiency, accountability, and performance.
H_{11}: Knowledge management has a positive effect on procurement performance.

Public human capital

Public human capital—covering individual competencies, motivation, adaptability, and technical expertise—provides the foundation for effective knowledge creation and sharing in public organizations (Ployhart & Moliterno, 2011). Employees with strong technical expertise, supported by continuous learning orientation and development, enhance their competencies to generate new knowledge and collectively strengthen the organizational knowledge base (Kianto et al., 2017). Motivation supports consistent knowledge-sharing behaviors and improves the quality of knowledge processes (Wang & Noe, 2010). Adaptability enables employees to respond to changes and adopt new technologies that shape how knowledge is developed and used (Campbell et al., 2012).
H_{12}: Public human capital has a positive effect on knowledge management.

Public organizational capital

Public organizational capital shapes the internal structures, formal procedures, and culture that make knowledge acquisition, storage, and dissemination possible (López-Nicolás & Meroño-Cerdán, 2011). An enabling infrastructure that integrates clear processes, information technology, and governance builds organization-wide knowledge management capability and reduces friction in knowledge flows (Zheng et al., 2010). A supportive culture together with formalized routines guides how employees create, share, and use knowledge, improving the quality and consistency of knowledge processes (Donate & Sánchez de Pablo, 2015). When these structural and cultural elements are aligned, employees can codify and access knowledge assets more easily and embed them into daily work (Andreeva & Kianto, 2012). Evidence from recent reviews also shows that organizational systems and culture are central drivers of successful knowledge management implementation and outcomes (Inkinen, 2016). In the public sector, public organizational capital complements other intangible capitals to translate managerial intent into repeatable knowledge management practices across units (Pee & Kankanhalli, 2016).
H_{13}: Public organizational capital has a positive and significant effect on knowledge management.

Public social capital and public relational capital

In public organizations, social capital, seen in trust, cohesion, and cooperative norms, amplifies employees' ability to turn dispersed know-how into clear, shareable procedures and routines (Andreeva & Kianto, 2012). Trust and dense ties among units make it easier to transfer and combine knowledge across organizational boundaries so insights do not remain at the individual level only (Tsai & Ghoshal, 1998). As these interactions stabilize, personal know-how is converted into institutional knowledge that strengthens innovation and performance (Inkinen, 2016). At the same time, relational capital, reflected in high-quality external relationships with suppliers, partner institutions, and citizens, opens channels for bringing new knowledge into the organization (Inkpen & Tsang, 2005). Strong inter-organizational ties further support the movement of both tacit and explicit knowledge, enriching the organizational knowledge base and its practical use (Kale, Singh, & Perlmutter, 2000).
H_{14}: Public social capital has a positive and significant effect on knowledge management.
H_{15}: Public relational capital has a positive and significant effect on knowledge management.

Public technological capital

Public technological capital, comprising IT infrastructure, digital platforms, and process digitalization, provides the technical backbone for acquiring, storing, and disseminating

organizational knowledge (López-Nicolás & Meroño-Cerdán, 2011). In public organizations, an integrated infrastructure that links clear procedures with information systems reduces friction in knowledge flows and builds organization-wide knowledge management capability (Pee & Kankanhalli, 2016). When digital tools are embedded into knowledge management routines such as capture, codification, retrieval, and sharing, the quality and consistency of knowledge use improve across units (Inkinen, 2016). Alignment between technology, governance, and organizational processes further strengthens knowledge utilization by clarifying roles and enabling efficient access to knowledge assets (Zheng et al., 2010).

H_{16}: Public technological capital has a positive effect on knowledge management.

Research Methods

This study subjects comprising civil servants who serve as procurement officers within the Ministry of Finance of the Republic of Indonesia. Data were collected through an online survey using an electronic questionnaire distributed via Google Forms. The questionnaire was structured with closed-ended statements utilizing a five-point Likert scale, ranging from "strongly disagree" to "strongly agree," to capture respondents' perceptions of the research constructs. The study employed seven latent constructs as variables. Five of these represent components of public intellectual capital, adopted from the model developed by Campos et al. (2006), namely public human capital, public organizational capital, public social capital, public technological capital, and public relational capital. The knowledge management variable was measured using indicators from Gold et al. (2001) and Rehman et al. (2022). Meanwhile, the procurement performance variable was assessed using outcome-based indicators as proposed by Changalima and Mdee (2023). All constructs were measured using a five-point Likert scale to ensure consistency across variable measurement.

The research sample comprised 298 employees of the Indonesian Ministry of Finance who met specific criteria, namely those working in the procurement of goods and services. The sampling technique used was purposive sampling, as the study intentionally selected respondents with relevant expertise and direct involvement in procurement processes, ensuring that the data collected would be contextually appropriate for examining the research variables. The minimum required sample size was determined based on the commonly used ratio in exploratory factor analysis, which is 5:1 (five respondents per questionnaire item), as recommended by Memon et al. (2020). With 42 statement items in the research instrument using Likert's scale, the minimum sample size needed was 210 respondents. The final dataset of 298 respondents was well above the minimum requirement, providing stronger statistical power to test the model using SEM-PLS.

The questionnaire in this study began with questions capturing respondents' demographic and professional characteristics, including gender, education level, work location, and years of experience in procurement. This information was collected to provide contextual understanding and support the interpretation of the study's findings. The statements used to measure the components of public intellectual capital: public human capital, public organizational capital, public social capital, public technological capital, and public relational capital were adapted from Firmansyah et al. (2025) and Campos et al. (2006) to align with the context of this research. The items for the procurement performance variable were adapted from Changalima and Mdee (2023), while the items for the knowledge management variable were adopted from Rehman et al. (2022) and Gold et al. (2001). Table 1 presents the questionnaire items used to measure each variable.

Data analysis was performed using SmartPLS version 4.0 software. The analysis consisted of two main phases: evaluation of the measurement model (outer model) and the structural model (inner model). The outer model evaluation assessed construct validity and reliability through factor loadings, average variance extracted (AVE), and composite reliability. The inner model evaluation examined the strength of relationships among latent constructs via path coefficients, R^2 values, Q^2 and hypothesis testing for both direct and indirect effects.

Table 1. Questionnaire Items

Variables	Statement Items
Public human capital	1. I have a strong commitment to my work in the office. 2. I am able to motivate myself to work effectively. 3. I can easily adapt to changes occurring within my organization. 4. I frequently receive specialized training related to the specific work I perform. 5. I have substantial experience and expertise in my field of work within the organization. 6. I am able to work well in a team. 7. I am able to communicate work-related matters effectively to colleagues. 8. I have good leadership skills
Public organizational capital	1. My workplace has an organizational culture that encourages employees to perform well. 2. My workplace has an organizational culture that enhances employee motivation. 3. The organizational culture in my workplace fosters high integrity among employees. 4. The organizational structure in my workplace aligns with job capacity. 5. Work problems are resolved through discussions between employees. 6. Existing procedures and work processes allow me to develop my competencies. 7. The current standard operating procedures are effective in completing work within one section/division. 8. The current standard operating procedures are effective in completing work between sections/divisions.
Public social capital	1. My workplace is committed to improving public service functions. 2. My workplace has easily accessible public information. 3. My workplace makes efforts to foster social relationships among employees. 4. My workplace makes efforts to create social relationships between employees and community
Public technological capital	1. My workplace has effective research and development capabilities. 2. My workplace adopts new technologies to improve work productivity. 3. My workplace has effective information and communication systems that support the efficiency of the goods/services procurement business process. 4. My workplace uses licensed software.
Public relational capital	1. My workplace has standard procedures in dealing with suppliers of goods and services. 2. My workplace is able to collaborate with agencies/offices under the Ministry of Finance. 3. My workplace is able to collaborate with other agencies/offices outside the Ministry of Finance 4. The public has a positive perception of the head of my office. 5. My workplace has a good image in the eyes of the media.
Procurement performance (Changalima & Mdee, 2023)	1. The goods and services received in my office meet the predetermined specifications. 2. The outcomes of goods/services procurement add value to my office. 3. The completion time for goods/services procurement in my office aligns with the established schedule. 4. The procurement process in my office prioritizes achieving the lowest possible price without compromising quality. 5. I do not perceive any hidden costs in procurement activities.
Knowledge management (Rehman et al., 2022; Gold et al., 2001)	1. My workplace has mechanisms for exchanging knowledge with other institutions. 2. My workplace has mechanisms for creating new knowledge from existing knowledge. 3. My workplace uses feedback to improve work performance. 4. My workplace has mechanisms for sharing knowledge with employees. 5. My workplace has mechanisms for acquiring knowledge from individuals. 6. My workplace has mechanisms for replacing outdated knowledge. 7. My workplace has mechanisms for linking knowledge to the problems faced. 8. My workplace uses knowledge to improve efficiency.

Source: Authors own work, 2025

Results and Discussion

Respondent Characteristics

The demographic profile of the respondents indicates that the majority are male (83.89%), with female participants comprising 16.11% of the total sample. In terms of educational background, most respondents hold an undergraduate degree (DIV/S1) at 46.98%, followed by those with a master's degree (S2) at 30.87%. Respondents with diploma-level qualifications (DI, DII, and DIII) represent a smaller portion, and only 0.67% of respondents hold a doctorate degree (S3). This distribution reflects a workforce that is generally well-educated, with a strong representation of higher education among procurement personnel.

Geographically, the majority of respondents are based in Java (42.62%), followed by Sumatra (22.82%) and Borneo (12.75%), with smaller proportions working in Sulawesi, Moluccas –Papua, and Bali, West Nusa Tenggara, East Nusa Tenggara. Regarding procurement experience, almost half of the respondents (47.32%) have between one and five years of experience, while 19.13% are relatively new with less than one year. The remainder have longer tenures, including 14.43% with 5–10 years of experience, and a small proportion (9.06%) with over 10 years. These figures suggest a workforce that is predominantly early to mid-career, with a strong concentration of experience in the early stages of procurement practice.

Measurement Model Assessment

The measurement results for both models (KM as moderator in Model 1 and KM as mediator in Model 2) indicate generally acceptable validity. In Model 1, most indicators exceeded the 0.70 threshold, with a few retained between 0.60–0.70 for theoretical consistency. Only one item, public human capital item 4 (PHC-4) was removed to improve AVE above 0.50. In Model 2, a similar pattern was observed: procurement performance, knowledge management, and most capital dimensions loaded strongly, and again required the removal of PHC-4 to meet the AVE criterion. Overall, both models demonstrate reliable measurement structures, with minor adjustments needed mainly for the public human capital construct.

Table 2. Construct Reliability and Convergent Validity

Variable	Cronbach's Alpha	rho_a (M1)*	rho_a (M2)**	rho_c (M1)*	rho_c (M2)**	AVE (M1)*	AVE (M2)**
Procurement performance	0.859	0.873	0.869	0.9	0.9	0.646	0.645
Knowledge management	0.92	0.925	0.923	0.935	0.935	0.643	0.643
Public human capital	0.85	0.86	0.854	0.885	0.886	0.525	0.527
Public organizational capital	0.919	0.925	0.928	0.935	0.935	0.644	0.644
Public relational capital	0.802	0.813	0.803	0.863	0.863	0.559	0.558
Public social capital	0.771	0.783	0.775	0.851	0.853	0.588	0.593
Public technological capital	0.793	0.827	0.816	0.866	0.867	0.622	0.624

*M1=Model 1

**M2=Model 2

Source: Data processing, 2025

The results of the reliability and convergent validity tests for both models confirm strong measurement properties. All Cronbach's alpha, rho_A, and composite reliability (rho_C) values exceeded 0.70, while the AVE values were above 0.50, indicating adequate internal consistency and convergent validity (Hair et al., 2022).

The HTMT analysis in both Model 1 and Model 2 indicates potential concerns, as the pairs of public organizational capital with public relational capital (0.912) and public relational capital with public social capital (0.918) slightly exceed the recommended threshold of 0.90, suggesting some conceptual overlap (Hair et al., 2022). Nevertheless, the cross-loading analysis confirms that all indicators load higher on their intended constructs than on others, thereby supporting discriminant validity at the indicator level. Although the HTMT results highlight a methodological

limitation, the evidence from cross-loadings justifies the retention of these constructs. Given the conceptual closeness of social and relational capital in the context of public procurement, they were maintained to ensure theoretical comprehensiveness. Overall, these results demonstrate that the measurement models for both approaches (KM as moderator in Model 1 and KM as mediator in Model 2) meet the criteria for reliability and validity, providing a solid foundation for subsequent structural analysis.

Structural Model Assessment

The collinearity diagnostics for both models indicate that multicollinearity is generally not a major concern. In Model 1, the VIF values range from 2.186 to 5.007, with public social capital showing the highest score (5.007). Although this slightly exceeds the conservative threshold of 5.0 (Hair et al., 2022), it remains within an acceptable range and does not pose a severe risk to the stability of the estimates. By contrast, Model 2 exhibits considerably lower VIF values across all predictor constructs, ranging from 1.000 to 3.155. These results demonstrate that the predictors of knowledge management in Model 2 are more independent and free from redundancy compared to those in Model 1. Taken together, the comparison suggests that Model 2 achieves a more parsimonious structure with better collinearity diagnostics, thereby strengthening the robustness of its structural relationships.

In Model 1 (KM as moderator), the adjusted R^2 for procurement performance is 0.546, meaning that 54.6% of its variance is explained by the predictors, with a Q^2 value of 0.342 confirming good predictive relevance. This suggests that the model not only fits the existing data but is also useful for forecasting procurement outcomes. In Model 2 (KM as mediator), the explanatory power is distributed differently: procurement performance records a moderate adjusted R^2 of 0.300 with a Q^2 of 0.188, while knowledge management is explained more strongly with an adjusted R^2 of 0.625 and a Q^2 of 0.392, indicating robust predictive relevance (Hair et al., 2022). Taken together, Model 1 provides stronger explanatory power for procurement performance directly, whereas Model 2 demonstrates that knowledge management plays a central role by being more effectively explained and predicted within the model.

Hypothesis Test

Table 3 displays the hypothesis testing results. The table includes path coefficients, t-statistics, and p-values, offering insight into which relationships are statistically significant and how knowledge management may interact with intellectual capital.

The moderation test in Model 1 shows that knowledge management does not strengthen the relationship between intellectual capital and procurement performance. Only H1 (Knowledge management x public human capital -> procurement performance) is significant, but the effect is negative ($O = -0.150$; $t = 1.717$; $p = 0.043$), so it is rejected. All other interaction effects (H2–H5) are not significant. These results indicate that knowledge management does not really work as a positive moderator. One possible explanation is that in the public sector, with its regulated procurement system, formal knowledge management routines may replace rather than increase the contribution of intellectual capital, so the impact is not reinforced. This is in line with Hussinki et al. (2017), who argue that strong intellectual capital can still lead to performance even without strong knowledge management practices, and different from private-sector evidence where knowledge management usually strengthens the capability–performance link (Ling, 2013).

On the other hand, the mediation test in Model 2 gives stronger results. Knowledge management has a significant positive effect on procurement performance (H11: $O = 0.550$; $t = 12.020$; $p = 0.000$). This means that knowledge management becomes a channel that explains how intellectual capital can improve procurement performance, and shows that knowledge management is a strategic mechanism for better outcomes. This result is also consistent with Gold et al. (2001) and Alavi and Leidner (2001), who explain that organizations managing knowledge effectively usually achieve higher operational efficiency and effectiveness. Overall, the findings suggest that knowledge management is more suitable as a mediator than as a moderator, because it works as a pathway that translates intellectual capital into procurement performance improvements.

Table 3. Hypothesis Testing Results

Variable	Original sample (O)	Standard deviation (STDEV)	T-statistics	P-values	Conclusion
Knowledge management x public human capital → procurement performance	-0.150	0.087	1.717	0.043	H1 Rejected
Knowledge management x public organizational capital → procurement performance	0.035	0.081	0.429	0.334	H2 Rejected
Knowledge management x public social capital → procurement performance	0.075	0.114	0.663	0.254	H3 Rejected
Knowledge management x public technological capital → procurement performance	-0.038	0.083	0.451	0.326	H4 Rejected
Knowledge management x public relational capital → procurement performance	0.021	0.121	0.175	0.430	H5 Rejected
Public human capital → procurement performance	0.107	0.063	1.710	0.044	H6 Accepted
Public organizational capital → procurement performance	0.073	0.085	0.862	0.194	H7 Rejected
Public social capital → procurement performance	0.374	0.134	2.790	0.003	H8 Accepted
Public technological capital → procurement performance	-0.005	0.064	0.077	0.469	H9 Rejected
Public relational capital → procurement performance	0.296	0.114	2.603	0.005	H10 Accepted
Knowledge management → procurement performance	0.550	0.046	12.020	0.000	H11 Accepted
Public human capital → knowledge management	-0.016	0.064	0.249	0.402	H12 Rejected
Public organizational capital → knowledge management	0.271	0.091	2.990	0.001	H13 Accepted
Public sosial capital → knowledge management	0.169	0.093	1.808	0.035	H14 Accepted
Public relational capital → knowledge management	0.241	0.088	2.730	0.003	H15 Accepted
Public technological capital → knowledge management	0.251	0.058	4.323	0.000	H16 Accepted

Source: Data processing, 2025

In Model 1, the results show that public human capital has a significant positive effect on procurement performance (H6: p-value = 0.044; path coefficient = 0.107). This confirms that employees' technical expertise, work commitment, communication skills, and leadership are important success factors in achieving effective procurement outcomes. This finding is consistent with Farah and Abouzeid (2017), who emphasize that human capital is a key determinant of performance in the public sector. However, in Model 2, the effect of public human capital on knowledge management is not significant (H12: p-value = 0.402; t-statistic = 0.249). This suggests that although employees may possess valuable knowledge, such individual competencies have not been systematically absorbed into the organization's KM processes. This result is consistent with Hussinki et al. (2017), who argue that intellectual capital alone does not automatically transform into effective knowledge management without organizational mechanisms to capture and disseminate it. In the context of public procurement, much of the knowledge tends to remain concentrated within the procurement management unit, limiting its integration into broader knowledge management practices.

According to Model 1, the effect of public organizational capital on procurement performance is not statistically significant (H7: p-value = 0.194). Although perceptions of

organizational structure and culture are relatively strong, their direct contribution to procurement outcomes is not evident. This finding contradicts Farah and Abouzeid (2017) but supports Hakim et al. (2020), who argue that organizational systems alone cannot drive performance unless they are effectively implemented. In the context of public procurement, the strong emphasis on compliance requirements often restricts organizational flexibility and the adoption of innovative practices. Conversely, Model 2 shows that public organizational capital has a significant positive effect on knowledge management (H13: O = 0.271; p-value = 0.001). This suggests that well-established organizational structures, cultures, and work systems provide a solid foundation for developing and disseminating knowledge in public institutions. This result aligns with Nguyen (2016), who emphasizes that organizational systems and procedures facilitate collective learning and formal knowledge sharing. Taken together, these findings suggest that public organizational capital does not directly enhance procurement performance, but it plays an important indirect role by strengthening knowledge management processes. In other words, its value is realized when it acts as a structural enabler for knowledge creation and sharing, which in turn can support better procurement outcomes.

The results show that public social capital has a significant positive effect on procurement performance (H8: p-value = 0.003; path coefficient = 0.374). Trust, interpersonal relationships, and effective social communication among employees foster collaboration, which in turn improves the efficiency and effectiveness of procurement processes. This finding is in line with Subramaniam and Youndt (2005) and Reed et al. (2006), who underline the importance of social capital in enhancing organizational performance. Public relational capital also demonstrates a significant positive effect on procurement performance (H10: p-value = 0.005; path coefficient = 0.296). Strong connections with institutions, suppliers, and other external stakeholders help ensure smooth procurement operations and better outcomes, a result consistent with Hermawan et al. (2020).

Furthermore, when examined through the mediation framework, both public social and relational capital show significant positive contributions to knowledge management. social capital (H14: O = 0.169; p-value = 0.035) emphasizes the role of trust, interaction, and collaborative norms among employees in supporting effective knowledge sharing and integration. Likewise, Relational capital (H15: O = 0.241; p-value = 0.003) highlights how external networks with partners and suppliers facilitate the inflow and exchange of valuable knowledge, thereby expanding the organizational knowledge base. These findings strengthen the view that relational and social linkages are fundamental enablers of knowledge management processes, aligns with Subramaniam and Youndt (2005), who found that social capital fosters informal learning networks that accelerate knowledge diffusion and utilization. The evidence suggests that social and relational capital not only enhance procurement performance directly but also provide the conditions necessary for effective knowledge management, positioning them as key levers for both operational excellence and long-term learning capacity in public procurement.

The analysis shows that public technological capital does not have a significant direct effect on procurement performance (H9: p-value = 0.469). Although various technologies such as software and information systems are already in use, their impact on procurement outcomes remains limited. This supports the view of Croteau and Bergeron (2001), who argue that technology contributes to performance only when it is strategically applied and fully integrated into organizational processes. In contrast, Model 2 highlights the strong role of public technological capital in enabling knowledge management. Public technological capital records the highest effect among the five components (H16: O = 0.251; p-value = 0.000; t-statistic = 4.323), underscoring the importance of IT infrastructure, digital platforms, and technological readiness as critical enablers of knowledge processes. This finding is consistent with Chen et al. (2014), who emphasize that technological capability supports the efficient collection, dissemination, and utilization of organizational knowledge.

These results suggest that while technology alone does not directly enhance procurement performance, its value emerges when embedded in knowledge management systems. In the public sector, effective KM is shaped not only by individual competencies but also by institutional structures, social trust, external networks, and technological readiness. Strengthening technological

capital within a systemic framework that integrates structural, social, and technological dimensions is therefore essential for advancing knowledge management as a mediating mechanism to improve procurement performance.

Conclusion and Implication

This study examines two structural models to understand the relationship between public intellectual capital and procurement performance, taking into account the role of knowledge management as both a moderating and mediating variable. The first model tests the direct influence of five dimensions of public intellectual capital on procurement performance, with knowledge management positioned as a moderator. The results indicate that public human capital, public social capital, and public relational capital have significant direct effects on procurement performance, while public organizational capital and public technological capital do not. Moreover, no significant moderating effects of knowledge management were identified in any of these relationships.

The second model explores knowledge management as a mediating variable in the relationship between public intellectual capital and procurement performance. The findings reveal that knowledge management has a highly significant direct effect on procurement performance, and several dimensions of intellectual capital—namely public organizational capital, public relational capital, public social capital, and public technological capital—also exert significant influence on knowledge management. However, public human capital does not exhibit a significant relationship with knowledge management. These results underscore that effective knowledge management can partially mediate the influence of intellectual capital on procurement outcomes, particularly when supported by well-established organizational systems, strong external relations, appropriate technologies, and a collaborative social climate.

Building on the comparative analysis of both structural models, it is evident that Model 2 offers a more comprehensive and conceptually grounded understanding of the relationship between public intellectual capital, knowledge management, and procurement performance. Unlike Model 1, which tested knowledge management solely as a moderator and found no significant moderating effects, Model 2 positions knowledge management as a mediating variable, revealing both strong direct and indirect effects on procurement performance. This aligns with the structural model assessment, where Model 2 not only demonstrated superior explanatory and predictive metrics (e.g., R-square and Q^2 values) but also effectively linked these results to hypothesis validation through bootstrapping. Therefore, Model 2 can be seen as a stronger framework because it shows the important role of knowledge management in improving procurement performance. This model is more practical and easier to apply, so it is more suitable to be used as a reference for public sector strategies in utilizing intellectual capital through effective knowledge management.

We acknowledge that this study has certain limitations, particularly in the measurement model's discriminant validity assessment. While cross-loading results confirmed that all indicators loaded highest on their respective constructs, the HTMT ratio indicated high correlations between certain construct pairs, namely public social capital and public relational capital, as well as public organizational capital and public social capital. This statistical overlap suggests that these constructs may share conceptual similarities in the public procurement context. We kept these constructs for theoretical completeness, but we realize the existing data doesn't really show a clear distinction between them. In the future, research can fix this by refining the measurement tools, adding new indicators that can better capture the unique aspects of each construct, or trying an alternative model, like a higher-order construct. Also, expanding the dataset with more types of organizational settings can improve the generalizability and robustness of the measurement model.

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