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Knowledge Management and Intellectual Capital: Key Drivers of University Performance in Saudi Arabia

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Abstract:
This study aims to examine the interrelationships between knowledge management infrastructure, knowledge management processes, intellectual capital, and organizational performance. To achieve this objective, a quantitative approach was employed, utilizing a structured questionnaire to assess our research model with a convenience sample of 185 faculty and staff members from Saudi universities. The findings indicate that knowledge management infrastructure has a significant positive effect on knowledge management processes. Moreover, these processes positively impact both intellectual capital and organizational performance, while also strengthening the relationship between knowledge management infrastructure and intellectual capital. However, it is noteworthy that knowledge management infrastructure did not directly correlate with organizational performance. These results underscore the critical role of knowledge management processes as mediators and highlight the limitations of relying solely on infrastructure to directly enhance organizational performance.

Keywords: Intellectual capital, knowledge management infrastructure, knowledge management process, organizational performance, Saudi Universities**.**

1. Introduction

This study seeks to assess the interconnections between knowledge management infrastructure, knowledge management processes, intellectual capital, and university performance in Saudi Arabia. Specifically, the focus is on exploring the relationship between knowledge resources within organizations—represented by key processes of knowledge management, including knowledge generation, sharing, storage, and application—and intellectual capital, which encompasses human, structural, and relational capital. Additionally, this research examines the role of knowledge management infrastructure as a fundamental determinant that supports the development of knowledge resources, knowledge management processes, and intellectual capital within the context of Saudi universities.

In an increasingly complex economic environment characterized by intense competition, organizations have come to recognize the critical role that intangible assets play in establishing a competitive edge (Abualloush et al., 2017; Chien et al., 2015; Jarboui, 2016; Hussinki & Ritala, 2015; Ben Mohammed & Jarboui, 2017; Vanhala & Kianto, 2017). Intellectual capital is now viewed as a primary driver of creativity and innovation, catalyzing organizational growth and success. For organizations to remain competitive, they must attract and nurture intellectual capital, ensuring that it is developed and sustained in ways that differentiate them from competitors and contribute to their long-term resilience and continuity (Luiza, 2016). Researchers argue that creativity and innovation, fueled by intellectual capital, are essential for organizations seeking excellence and for delivering effective solutions to both current and future challenges (Chien et al., 2015; Obeidat et al., 2017).

In the context of higher education, where the technological landscape is evolving rapidly, knowledge has become a strategic asset, essential to achieving organizational growth and stability. Knowledge, enriched by human expertise, values, beliefs, and skills, forms one of the most impactful components of organizational management (Jyoti & Rani, 2017; Lee et al., 2010; Guetat et al., 2015; Maruf & Zhou, 2015). Effective knowledge management allows organizations to remain competitive by sharing valuable information, collaborating with external partners, and understanding market trends and best practices (Attia & Salama, 2018). Furthermore, knowledge management processes facilitate the acquisition, interpretation, and utilization of knowledge across functions, enabling the creation of new knowledge (Gharakhani & Mousakhani, 2012; Hussinki et al., 2017). Organizational performance, defined as the ability of organizations to meet stakeholder needs and ensure survival, stability, and growth, relies not only on tangible resources but also on the effective management of intangible assets such as intellectual capital (Obeidat,

2016; Cania, 2014; Richard, Devinney & Yip, 2008).

In Saudi Arabia, universities are increasingly focused on developing strategies to capitalize on market opportunities through optimized use of available resources. This strategic alignment is particularly critical in the face of the information revolution, which demands that universities invest in and retain intellectual capital, especially through knowledge-intensive processes (Al-Ali, 2013; Sweis et al., 2011). Prior research has consistently highlighted the link between intellectual capital and knowledge management, emphasizing its significant impact on organizational performance (Hsu & Sabherwal, 2011; Mehralian et al., 2014; Jarboui et al., 2015; Guetat et al., 2015; Mikkawi et al., 2017). However, existing studies have often overlooked the crucial role of knowledge management infrastructure in supporting and enhancing knowledge management processes and the accumulation of intellectual capital (Ramadan et al., 2017).

Therefore, this study aims to address the following questions: Does knowledge management infrastructure impact the knowledge management processes and performance of Saudi universities? Do knowledge management processes influence the performance of Saudi universities and their intellectual capital? Lastly, does intellectual capital contribute to the performance of Saudi universities?

This article proceeds by reviewing previous studies relevant to our research questions (2), describing the methodological approach adopted (3), presenting and analyzing the results (4), and discussing the findings in light of existing literature (5) to highlight the research implications.

2. Literature Review and Hypothesis Development

In this section, we examine recent research on knowledge management infrastructure (KMI) and its influence on knowledge management processes, organizational performance, and intellectual capital. The review establishes the foundation for hypothesizing about the relationships between these variables.

1.1 Knowledge Management Infrastructure and Knowledge Management Processes

Knowledge management infrastructure (KMI) forms the foundational framework through which organizations can systematically generate, create, acquire, test, organize, use, and distribute knowledge. It serves as a mechanism for transforming an organization's expertise into critical knowledge assets that support administrative activities such as decision-making, strategic planning, learning, and problem-solving (Kushwaha & Rao, 2015). Organizational culture is pivotal within this infrastructure, as it enhances knowledge management by encouraging knowledge creation and sharing while fostering an environment where ideas can flow freely. A strong organizational culture creates a conducive atmosphere for knowledge exchange, encouraging employees to actively participate in generating and applying knowledge to enhance productivity and build a knowledge-sharing community (Chang & Lin, 2015; Valaei, Nikhashemi, & Javan, 2017).

An essential role of organizational culture in knowledge management lies in establishing a supportive, knowledge-centric environment that enhances productivity, engagement, and knowledge-sharing networks. This cultural approach enables the development of effective interpersonal relationships and builds a collaborative knowledge ecosystem within the organization (Sytnik, 2016). The success of knowledge management initiatives heavily depends on a culture that motivates and sustains employee efforts in creating and building organizational knowledge, directly improving work performance (George, 2014). When a collaborative culture is present in the workplace, it positively influences knowledge creation and reinforces knowledge exchange practices (Meihami & Meihami, 2014).

Effective knowledge management also relies on a flexible organizational structure that adapts to both internal and external changes, allowing the organization to respond dynamically to evolving circumstances (Abed Al-Qader, 2014). Structural characteristics such as decentralized, flat hierarchies and open social interaction channels facilitate knowledge creation, transformation, and sharing. Research by Acharya and Mishra (2017) highlights that such structures are particularly advantageous for knowledge management, as they empower employees through communities of practice, providing them access to both internal and external knowledge sources.

Information technology (IT) infrastructure is also a core component of KMI, underpinning knowledge management through internal networks, databases, intranets, and social networking platforms. These IT elements streamline access to information, promote efficient communication, and enhance collaboration among staff members (Imran, 2014; López, Peón & Ordás, 2009). For knowledge management systems to be effective, they require a robust level of technological support that enables seamless employee interactions. This IT support facilitates knowledge sharing and communication, guiding how knowledge flows throughout the organization (Alzou'bi & Al-Zaidy, 2012; Jarboui and Boujelbene, 2012; Hajir et al., 2015; Valaei & Rezaei, 2017). Based on these factors, we propose the following hypothesis:

H1: Knowledge management infrastructure positively impacts knowledge management processes.

1.2 Knowledge Management Infrastructure and Organizational Performance

The influence of knowledge management infrastructure (KMI) on organizational performance is a significant area of study. KMI encompasses the organizational environment that facilitates knowledge creation, sharing, application,

protection, and storage, thereby streamlining the management of knowledge systems, frameworks, and functionalities in an effective and efficient manner (Obeidat et al., 2017). A robust organizational culture is central to KMI as it motivates employees to generate, acquire, and share knowledge, serving as an indicator of an active KMI that enhances knowledge management (KM) and, consequently, reflects organizational performance (Alrowwad et al., 2017).

Competitive advantage and exceptional performance are achievable through effective knowledge management. Organizational culture plays a critical role in determining the value of knowledge, providing a competitive edge. To foster effective KM, organizations should cultivate a collaborative climate where employees support and assist one another in their tasks (Tan & Wong, 2015). Moreover, organizations with broader social networks and a collaborative culture are likely to outperform others, particularly in enhancing KM efficiency, which promotes the processes of socialization and internalization (Imran, 2014).

Information technology (IT) significantly aids organizations in quickly communicating their objectives to staff (Imran, 2014). Zaied et al. (2012) emphasize that organizations equipped with advanced IT capabilities hold a superior competitive advantage over their rivals. Technology is fundamental to the integrated framework of knowledge management, as it enables the generation of new knowledge, facilitates its storage in existing knowledge repositories, aids in knowledge retrieval, and protects against misuse (Imran, 2014).

Numerous researchers have highlighted the necessity for organizations to transition from hierarchical structures to flatter, networked structures. Fewer administrative levels, as seen in flatter models, facilitate the generation, sharing, and transmission of knowledge. Additionally, a flat structure enhances communication among individuals and departments, promoting the free flow of ideas among employees, which increases accountability and encourages participation in creative decision-making (Beveren, 2003; Yadav, 2013). Future high-performing organizations will likely be those characterized by flexible and simple organizational structures (Laudon & Laudon, 2014).

Recent studies reinforce this notion, indicating that organizations with adaptive knowledge management infrastructures and collaborative cultures tend to achieve higher levels of performance and innovation (Dalkir, 2017; Alavi & Leidner, 2001). Based on these insights, we propose the following hypothesis:

H2: Knowledge management infrastructure positively impacts organizational performance.

1.3 Knowledge Management Processes and Organizational Performance

Measuring the effectiveness of knowledge management (KM) processes and their contribution to organizational performance poses a significant challenge for many organizations. The efficiency of KM can be determined by the beneficial outcomes it yields, as highlighted by Tubigi and Alshawi (2015). A company's knowledge base is often regarded as a primary factor influencing performance levels (Yadav, 2013). The strategic importance of knowledge resources has driven organizations to prioritize them as key assets (Masa'deh, 2016). This emphasis is due to their positive impact on achieving competitive advantage and fostering innovation, leading organizations toward exceptional performance (Bouraghda & Dris, 2015; Pension et al., 2013).

KM plays a vital role through its processes and practices aimed at fostering a positive atmosphere within the organizational context, enriching work environments, and promoting productivity (Alzou'bi & Al-Zaidy, 2012). It serves as a priority and an indicator of a clear and comprehensive approach to overcoming restrictions and implementing restructuring that contributes to the development and execution of change necessary for meeting the organization's strategic and operational objectives (Alzou'bi & Al-Zaidy, 2012). Organizations must focus on the key KM processes: creation, conversion, diffusion, and contribution of knowledge, alongside methods for storage, selection, processing, usage, and evaluation to excel in their performance.

Knowledge sharing has become crucial for leveraging knowledge assets effectively. It is essential for organizations to transmit and share knowledge to enhance understanding (Masa'deh et al., 2016). Both explicit and tacit knowledge are fundamental resources for organizations seeking to obtain and sustain a competitive advantage. The sharing and integration of knowledge allow for the amalgamation of dispersed knowledge, promoting innovation and creativity, ultimately leading to performance improvements (Piri, Jasemi, & Abdi, 2013).

Current knowledge-sharing practices encompass various methods, including training and development programs, information systems, official reports and documents, and cross-functional teams. These practices enable the collection of knowledge across a broad spectrum of environments, enhancing product and service quality, responsiveness to customer needs, innovation capacity, and overall organizational performance (Wang et al., 2014). Alzou'bi and Al-Zaidy (2012) reference Hassan (2008), explaining that knowledge generation or creativity can be facilitated through teamwork and collaborative groups that support the creation of new knowledge capital in addressing new problems and practices. This collaborative approach contributes to problem identification and the development of innovative solutions.

Knowledge generation refers to an organization's capacity to develop new ideas and solutions beneficial for various activities, ranging from technological products and processes to administrative practices. It enables organizations to excel in achieving their objectives and securing a prominent market position across diverse domains, including

strategy implementation, initiation of new actions, rapid problem resolution, transfer of best practices, skill development among professionals, and talent retention (Shariatmadari & Forouzandeh, 2015).

Meanwhile, knowledge storage involves the retrieval of knowledge, whether held by individuals or the organization, to facilitate access. An efficient and regulated retrieval process, which allows access to knowledge without needing to contact the original knowledge creator, conserves time and organizational resources, thereby enhancing performance (Mothe, Nguyen-Thi, & Nguyen-Van, 2015). Based on these considerations, we propose the following hypothesis:

H3: Knowledge management processes have a positive effect on organizational performance.

Recent studies also underscore the importance of leveraging KM processes to create a sustainable competitive advantage, emphasizing the role of organizational culture and leadership in enhancing knowledge-sharing practices (Davenport & Prusak, 1998; Nonaka & Takeuchi, 1995; Grant, 1996). These findings suggest that organizations that effectively manage their knowledge processes are better positioned to adapt to changing environments and achieve superior performance outcomes.

1.4. Knowledge Management Processes and Intellectual Capital

A strong association exists between knowledge management (KM) processes and intellectual capital, where each complements the other and together forms the core of an organization's knowledge assets. Intellectual capital, as highlighted by Hsu and Sabherwal (2011) and Wiig (1997), is essential in modern active knowledge management. As a vital organizational resource, intellectual capital represents an organization's cumulative knowledge assets that include human capital, structural capital, and relational capital (Mehralian et al., 2014). Knowledge management processes serve as a key means of enhancing intellectual capital, which in turn contributes to the organization's success. Each KM process—knowledge generation, acquisition, documentation, storage, sharing, and application—directly impacts intellectual capital, reflecting their intertwined roles in the knowledge-based economy (Seleim & Khalil, 2011; Hussinki et al., 2017).

The activities within KM processes, aimed at capturing, acquiring, documenting, and sharing knowledge, alongside their practical applications, have a substantial influence on intellectual capital (Hussinki et al., 2017). For instance, knowledge acquisition represents an organization's capability to identify, organize, and source knowledge from external resources, which is critical for sustaining operational success (Mehralian et al., 2014). This process not only leads to the accumulation of new knowledge but also ensures that existing knowledge remains current and relevant, significantly contributing to human capital development.

In today's knowledge-driven economy, knowledge is increasingly recognized as the primary resource underpinning organizational capability and knowledge-based capital (Wang et al., 2014). However, isolated or siloed knowledge within individuals' minds or limited to specific departments can impede an organization's ability to maximize its intellectual capital potential. Effective application of KM processes, therefore, is fundamental to overcoming this challenge by promoting organizational learning across all levels and fostering the development of human resources and personal experiences. This approach generates new ideas, which are essential for innovation and the commercialization of new products and services, consequently broadening and enhancing the organization's intellectual capital (Ramadan et al., 2017).

Recent studies also suggest that applying KM practices increases the overall value of intellectual capital by fostering knowledge exchange and collaboration, which enrich relational and structural capital (Sáenz, Aramburu, & Rivera, 2019; Serenko & Bontis, 2016). Additionally, knowledge application enables organizations to embed acquired knowledge within organizational routines, further reinforcing intellectual capital (Donate & Pablo, 2015). Consequently, the positive relationship between KM processes and intellectual capital underscores the strategic role of KM in building a sustainable competitive advantage.

Based on these considerations, we propose the following hypothesis:

H4: Knowledge management processes have a positive effect on intellectual capital.

This hypothesis is supported by contemporary studies that emphasize KM's role in building intellectual capital through continuous learning, collaboration, and innovation (Inkinen, 2016; Kianto, Sáenz, & Aramburu, 2017). Together, these studies illustrate the critical role that KM processes play in fostering the intellectual capital necessary for sustaining organizational growth and competitive positioning.

1.5. Intellectual Capital and Organizational Performance

Research has confirmed that competitive advantage arises from the effective utilization of rare, intangible, and firm-specific assets, such as intellectual capital. Kamukama, Ahiauzu, and Ntayi (2011) argue that intellectual capital—comprising human, structural, and relational components—is central to both the current and future competitiveness and growth of an organization. According to Tovstiga and Tulugurova (2009), firms that successfully leverage their intellectual capital, in the form of knowledge, technological skills, experience, and strategic capabilities, gain a sustainable competitive edge. Consequently, intellectual capital represents the distinctive resources and competencies of an organization that are not easily replicable, providing it with long-term competitive advantage and superior performance (Kamukama et al., 2010).

Human capital is considered the most fundamental aspect of intellectual capital, encompassing the intelligence, skills, and expertise that employees bring to an organization, even if these assets are not physically retained once employees leave. This unique human factor is recognized for its pivotal role in organizational distinction and effectiveness (Bontis, 2002). From a macroeconomic perspective, human capital drives national economic activity, enhances organizational competitiveness, and fosters prosperity by serving as the foundation for innovation and strategic renewal (Kamukama et al., 2011).

Intellectual capital also includes social and relational dimensions, which emphasize the quality of relationships and networks among employees within the organization and externally with key stakeholders. Halim (2010) highlights that intellectual capital encompasses the knowledge stock within the organization, which includes information systems, explicit knowledge, product and process innovation, and process optimization. Relational capital is a unique intangible asset that rests on developing and sustaining high-quality relationships with individuals, organizations, or groups that have a significant influence or impact on business performance (Kamukama et al., 2011).

Recent studies further underscore the importance of intellectual capital in enhancing organizational performance through various channels. Human capital has been linked to improved organizational agility, a critical factor in adapting to fast-changing business environments (Subramaniam & Youndt, 2020). Additionally, relational capital, through strong customer and stakeholder relationships, enhances brand reputation and customer loyalty, which are vital in driving financial performance (Wang & Sengupta, 2016). Moreover, structural capital, in the form of efficient knowledge management systems, enables organizations to streamline processes and foster continuous improvement, reinforcing their market position and innovative capacity (Kianto et al., 2017).

Based on these findings, we propose the following hypothesis:

H5: Intellectual capital has a positive effect on organizational performance.

This hypothesis aligns with contemporary research demonstrating the multifaceted role of intellectual capital in boosting organizational effectiveness, resilience, and innovation, thus contributing to a robust and sustainable competitive advantage (Sáenz, Aramburu, & Rivera, 2019; Serenko & Bontis, 2016). These studies collectively suggest that firms with well-developed intellectual capital can achieve superior performance by strategically leveraging human, relational, and structural resources.

3. Methodology

This section outlines the methodological approach adopted for this research, focusing on the measures, pre-testing, and data collection process. To achieve the study's main objective, a survey questionnaire was used as the primary data collection tool to capture information on the selected variables. The questionnaire was divided into two main parts. The first part gathered demographic information from respondents, including gender, educational level, position, and years of experience. The second part focused on examining the selected variables: knowledge management infrastructure, knowledge management processes, intellectual capital, and organizational performance.

A five-point Likert scale was used to measure the variables, ranging from "1" for "strongly disagree" to "5" for "strongly agree." The questionnaire included 43 items designed to measure the constructs of the proposed model, and these items were derived from prior empirical studies with minor adjustments to ensure contextual relevance to a Saudi university environment. The measures were adapted to align with the scales from previous studies: the dimensions of knowledge management infrastructure (organizational culture, IT infrastructure, and organizational structure) were adapted from Mikkawi et al. (2017); knowledge management processes (knowledge creation, storage, sharing, and application) were adapted from Valaei et al. (2017) and Wang et al. (2014); intellectual capital dimensions (human capital, structural capital, and relational capital) were adapted from Abed Al-Qader (2014) and Hsu & Sabherwal (2011); and organizational performance (non-financial and financial performance) was adapted from Tomislav et al. (2012) and Wang et al. (2014).

Using a convenience sampling approach, 185 faculty and staff members from various Saudi universities at different levels (including senior and mid-level management) were selected to participate in this study. The sample was drawn based on employee availability, and a comprehensive survey was administered to all levels of workers with the assistance of the human resources department. A total of 220 questionnaires were distributed, out of which 35 were deemed unacceptable due to inconsistencies in responses. Consequently, 185 fully completed questionnaires were used for data analysis.

The demographic profile of the respondents, shown in Table 1, indicates that the proportion of male respondents exceeded that of females. A majority held a doctoral degree (88.6%), 68.3% occupied senior management positions, and 75.6% reported having between five and ten years of professional experience.

This methodology provides a structured approach to understanding the relationships among knowledge management infrastructure, processes, intellectual capital, and organizational performance in the context of Saudi universities. The adoption of validated scales and structured sampling enhances the reliability and relevance of the findings in relation to the study objectives.

Table 1: Sample description

	number	%		number	%
Gender			***Qualification***		
Female	52	42,3	Higher education	14	11,4
Male	71	57,7	Ph.D.	109	88,6
Position			***Experience***		
Top level	36	29,3	Less than 5 years	30	24,4
Intermediate level	84	68,3	Less than 10 years old	93	75,6
Lower level	3	2,4			

4. Result

The construct validity was assessed using exploratory and confirmatory factor analyses. An exploratory factor analysis was conducted using the Promax rotation method and principal component analysis, with all question items entered simultaneously. As a result, four distinct factors emerged as expected: knowledge management infrastructure (KI), knowledge management processes (KP), intellectual capital (IC), and organizational performance (OP). The eigenvalues for each of these four factors were above 1. Cronbach's alpha coefficient was used to test the reliability of the constructs, showing satisfactory reliability with $\alpha > 0.60$, which indicates acceptable internal consistency (Hair et al., 2010). Subsequently, a confirmatory factor analysis (CFA) was conducted using IBM Amos 21. All items had loadings exceeding 0.50 (Hair et al., 2010). The measurement scale items were also included. Table 2 provides the fit indices for the first-order constructs.

Table 2: Fit indices for first-order constructions

Model	x^2	df	p	x^2/df	GFI	CFI	NFI	NNFI	RMR	RMSEA
Parameter	498.42	275	0.000	1.812	0.988	0.927	0.917	0.932	0..48	0.041

The fit indices for the final model using first-order constructs indicated satisfactory levels ($x^2 = 498.42$; df = 275; x^2/df = 1.812; GFI = 0.988; CFI = 0.927; NFI = 0.917; NNFI = 0.932; RMR = 0.048; and RMSEA = 0.041). The normalized chi-square value of 1.812 was below the maximum threshold of 3.0 (Bollen, 1989). The goodness-of-fit index (GFI), comparative fit index (CFI), normed fit index (NFI), and non-normed fit index (NNFI) all exceeded the recommended minimum of 0.90 (Garver & Mentzer, 1999). The root mean square residual (RMR) was 0.048, and the root mean square error of approximation (RMSEA) was 0.041, indicating satisfactory levels of unidimensionality and convergent validity (Garver & Mentzer, 1999; Hu & Bentler, 1999). Standardized coefficients for all items were greater than twice their standard errors, supporting convergent validity (Anderson & Gerbing, 1988). Factor loadings for all items were above 0.50, and the average variance extracted (AVE) values for all measurement scales were over 0.50, providing further evidence of convergent validity (Fornell & Larcker, 1981). The composite reliability of all scales exceeded 0.70, indicating satisfactory reliability (Fornell & Larcker, 1981; Garver & Mentzer, 1999). Cronbach's alpha values and composite reliability were also reported for both first- and second-order constructs. The CFA analyses were repeated using second-order factors, focusing on intellectual capital and its impact on organizational performance. Table 3 presents the fit indices for the second-order constructs.

Table 3: Fit indices of the second-order construction measurement model

Model	x^2	df	p	x^2/df	GFI	CFI	NFI	NNFI	RMR	RMSEA
Parameter	519.435	272	0,000	1.938	0,945	0,962	0,918	0,943	0,939	0,039

The fit indices for the final model using second-order constructs indicated a good fit with the data ($x^2 = 519.435$; df = 268; x^2/df = 1.938; GFI = 0.945; CFI = 0.962; NFI = 0.918; NNFI = 0.943; RMR = 0.039; and RMSEA = 0.039). These values suggested an acceptable level of unidimensionality and convergent validity. Furthermore, the standardized coefficients for all constructs were greater than twice their standard errors, confirming convergent validity (Anderson & Gerbing, 1988). All factor loadings exceeded 0.50, and the average variance extracted (AVE) values for all constructs were above 0.50, further supporting convergent validity (Fornell & Larcker, 1981). The composite reliability of the second-order constructs was also above 0.70, indicating adequate reliability levels (Fornell & Larcker, 1981; Garver & Mentzer, 1999). Discriminant validity was assessed by ensuring that the square root of each AVE exceeded the absolute correlation value between each scale and the others. All first- and second-order constructs met this criterion, providing sufficient evidence of discriminant validity (Fornell & Larcker, 1981). Each construct's AVE value was also greater than the maximum shared variance (MSV) and the average shared variance (ASV), offering additional evidence for discriminant validity (Hair et al., 2010). Table 4 presents the discriminant validity results for the first-order constructs, and Table 5 shows the final model results with second-order constructs.

Table 4: Means, standard deviations, AVE, MSV, ASV and correlation matrix of first-order constructs

Const.	Means	SD	AVE	MSV	ASV	1	2	3	4	5	6	7
1. KG	2.956	0.987	0.512	0.322	0.245	0.715						
2. KT	3.061	0.867	0.524	0.312	0.224	0.672	0.723					
3. KS	2.947	0.963	0.568	0.32	0.219	0.535	0.672	0.753				
4. KA	2.995	0.684	0.611	0.347	0.232	0.563	0.569	0.652	0.781			
5. OC	3.080	0.684	0.535	0.359	0.198	0.511	0.541	0.567	0.569	0.731		
6. IT	3.229	0.638	0.667	0.258	0.136	0.469	0.421	0.452	0.513	0.579	0.816	
7. OS	3.175	0.629	0.687	0.219	0.139	0.412	0.458	0.411	0.447	0.511	0.622	0.828

Const.: Construction, SD: Standard Deviations, Average variance extracted (AVE), Maximum shared square variance (MSV), Average shared square variance (ASV). The square root value of AVE is on the diagonal.

Table 5: Means, Standard Deviations, AVEs, MSVs, ASVs and second-order construct correlation matrix

Const.	Means	SD	AVE	MSV	ASV	1	2	3	4	5
1. HC	2.727	0.655	0.723	0.423	0.348	0.850				
2. SC	2.823	0.578	0.636	0.412	0.321	0.679	0.797			
3. RC	2.796	0.551	0.619	0.358	0.299	0.544	0.611	0.786		
4. NP	2.994	0.724	0.522	0.389	0.297	0.457	0.602	0.508	0.722	
5. FP	2.997	0.717	0.516	0.401	0.301	0.419	0.409	0.398	0.455	0.718

Const: Construct, SD: Standard Deviations, Average variance extracted (AVE), Maximum shared square variance (MSV), Average shared square variance (ASV). The square root value of AVE is on the diagonal.

Structural equation modeling (SEM) using Amos 20 was conducted to test the study's hypotheses. SEM allows for the simultaneous testing of all hypotheses, including both direct and indirect effects. Additionally, SEM enables the use of a bootstrap resampling method to assess mediating effects. This bootstrap approach is superior to the method described by Baron and Kenny (1986) because it does not require the assumption of a normal distribution for the indirect effect, and the accuracy of the results is not influenced by sample size (Hayes, 2009). Following Hayes's (2013) recommendation, we selected 5,000 bootstrap samples with bias-corrected confidence intervals set at 99%. A mediation hypothesis is accepted if the lower and upper bounds of the confidence intervals do not include zero, indicating that the indirect effect is significant at the 99% confidence level. Conversely, if both bounds include zero, the alternative hypothesis is rejected (Hayes, 2013).

The results for the direct effects indicate that knowledge management infrastructure has a positive and significant relationship with knowledge management processes ($\beta = 0.760$, $p < 0.000$), thus supporting hypothesis H1. Additionally, knowledge management processes are positively and significantly related to organizational performance ($\beta = 0.181$, $p < 0.05$), providing support for hypothesis H3. The direct effect of knowledge management processes on intellectual capital is also positive and significant ($\beta = 0.179$, $p < 0.05$), thereby supporting hypothesis H4. Intellectual capital is positively and significantly associated with organizational performance ($\beta = 0.776$, $p < 0.000$), which means hypothesis H5 is also supported. However, hypothesis H2 was not supported ($\beta = 0.015$). Furthermore, the coefficients of determination (R^2) for knowledge management processes, intellectual capital, and organizational performance were 0.58, 0.32, and 0.68, respectively, indicating that these constructs explain at least a moderate amount of the variance in the proposed model.

5. Discussion

The results of the direct effects indicate that knowledge management infrastructure—including organizational culture, IT infrastructure, and organizational structure—is positively and significantly related to knowledge management processes, thus supporting hypothesis H1. This finding aligns with the conclusions of Theriou et al. (2011), who observed a positive relationship between knowledge management infrastructure and knowledge management processes. An effective knowledge management culture involves rules and practices that facilitate the transfer of information and knowledge among staff at various administrative levels. Kushwaha and Rao (2015) emphasized the crucial role of information technology in knowledge management, highlighting it as a fundamental aspect of the field. IT aids in the processes of sharing, transmitting, disseminating, generating, and documenting knowledge. Moreover, collaborative IT tools enable employees to work together and interactively collaborate, transforming individuals' tacit knowledge into explicit and organizational knowledge through knowledge sharing.

The study also supports findings by Cortés et al. (2007), which indicate that organizational structure is one of the most influential factors in implementing knowledge management processes within organizations. Effective knowledge management should feature flexible organizational structures. Flat structures not only facilitate knowledge sharing but also promote collaboration to create new knowledge across all departments. Organizations need to adopt structures that allow them to generate, share, and transfer knowledge as effectively as possible. However, our results

also revealed that the three dimensions of knowledge management infrastructure (organizational culture, IT infrastructure, and organizational structure) did not have a direct impact on organizational performance.

Thus, hypothesis H2 was not validated. This finding aligns with the study by Mills and Smith (2011), which indicates that there is an indirect impact of knowledge management infrastructure capabilities (organizational culture and IT infrastructure), while the organizational structure has a direct impact on organizational performance. However, not all knowledge resources contribute to enhancing organizational performance. Resources such as information technology and organizational culture are essential for improving knowledge management effectiveness. The knowledge management infrastructure does not directly influence organizational performance; organizations cannot overlook these dimensions—namely, organizational culture, IT infrastructure, and organizational structure—since they operate in conjunction with other organizational resources. Furthermore, organizations cannot underestimate the role of these dimensions as providers of organizational resources in terms of acquiring, applying, and sharing knowledge, which can directly contribute to the organization's success.

The knowledge management process is positively and significantly related to organizational performance. This finding is consistent with the studies by Wang, Wang, Cao, and Ye (2016) and Jyoti and Rani (2017). Knowledge management also contributes to the effective management of organizational knowledge assets, enhancing creativity and innovation in performance. This aligns with the conclusion of Tan and Wong (2015), who asserted that knowledge management is key to improving performance and fostering an efficient production environment. Knowledge assets play a crucial role in the performance and facilitation of daily university activities. Saudi universities have machinery and equipment that require relevant knowledge based on intelligent computer systems to improve the quality of education and scientific research and maintain a regional and global competitive edge.

In addition to various other benefits, knowledge management processes can provide up-to-date production information and solve problems creatively and promptly, as well as enhance and innovate products. Studies by Tubigi and Alshawi (2015) and Shahzad et al. (2016) have also demonstrated that knowledge management processes have a direct positive impact on organizational performance. Knowledge management helps organizations create, share, acquire, and leverage knowledge effectively. Organizational knowledge is a critical asset for achieving a competitive advantage and plays a vital role in the success and survival of organizations in a highly complex business environment. In organizations that heavily rely on their products, services, and knowledge, the creation, generation, and exchange of new knowledge become essential sources of competitive advantage. Consequently, knowledge management enables organizations to outperform their competitors.

Additionally, the direct effect of the knowledge management process on intellectual capital is also positive and significant ($\beta = 0.179$, $p < 0.05$) in our study. The knowledge management process significantly influences and helps to strengthen intellectual capital. This result aligns with the findings of Seleim and Khalil (2011).

Generally, the application of knowledge to human capital and relational capital has shown a positive impact, along with knowledge transfer to relational capital. Notably, the practical application of knowledge emerged as the most influential among the three dimensions of intellectual capital—human, structural, and relational. This finding aligns with Ramadan et al. (2017), who demonstrated that the entire knowledge management process (knowledge acquisition, generation, documentation, and transfer) had significant positive effects on intellectual capital.

Our data analysis results further revealed that intellectual capital was positively and significantly related to organizational performance ($\beta = 0.776$, $p < 0.000$). This finding is supported by a previous study by Uzoma, Ugwoke, and Rita (2017), which confirmed a positive relationship between intellectual capital and organizational performance. The positive relationship between intellectual capital and organizational performance is attributed to the critical role that intellectual capital components play within organizations.

Structural capital plays a crucial role in fostering innovation and enhancing performance, as organizational knowledge embedded in databases, structures, systems, processes, and patents contributes to building on existing knowledge and thus strengthens innovation capabilities. Our findings also align with those of Seleim et al. (2007), who emphasized that the positive relationship between organizational performance and human capital is driven by high levels of intelligence, creative ideas, and ambition. Human capital encompasses the skills, knowledge, and talent necessary to develop unique and smart products and services that meet customer needs.

Intellectual capital can be further developed and utilized through management practices and strategies that create added value within the organization, ultimately impacting long-term organizational performance. The sharing, application, and creation of knowledge are key factors in maximizing the performance benefits derived from intellectual capital. The added value of human, structural, and relational capital can be achieved by sharing knowledge acquired across different functional areas and organizational levels. Managers should eliminate any barriers to knowledge creation and sharing, promote collaboration, and facilitate networking to enhance knowledge application and achieve superior performance.

This study aims to clarify the relationship between knowledge management, intellectual capital, and its impact on organizational performance. We believe that knowledge-based insights form the foundation and drive organizational success. The results of this study are consistent with the findings of Hussinki et al. (2017).

6. Conclusion

This study investigates the relationship between organizations' knowledge resources, represented through knowledge management processes (knowledge creation, sharing, storage, and application), and intellectual capital (human and relational capital). It also explores the role of knowledge management infrastructure as a key determinant of these resources, knowledge management practices, and intellectual capital within organizations.

The findings indicate a direct impact of knowledge management infrastructure on both knowledge management processes and intellectual capital, which, in turn, directly enhance organizational performance. However, knowledge management infrastructure alone has a minimal direct effect on performance, with knowledge management processes and intellectual capital acting as mediators between infrastructure and performance.

The theoretical contribution of this study lies in the development of an integrated model of knowledge resources and its facilitating factors, showing their role in improving organizational performance. This model provides a comprehensive framework for organizations aiming to leverage knowledge resources to drive superior performance. Unlike prior business research, this study presents an integrated model linking knowledge management infrastructure, processes, and intellectual capital to organizational performance.

Practical recommendations are provided for Saudi university leaders and the Ministry of Higher Education, emphasizing the importance of fostering a knowledge-sharing environment, providing advanced technological tools, and creating effective knowledge repositories to support information retrieval and sharing. Studies by Amali and Katili (2018), Masa'deh et al. (2016), and Obeidat et al. (2017) underscore the role of knowledge management capabilities in enhancing organizational performance in both public and private sectors. Managers can adopt this study's model to boost workplace performance outcomes.

The research suggests that Saudi universities could benefit from enhanced structural capital and knowledge management capabilities, which would support research and development departments, drive innovation, and positively impact both financial and non-financial performance.

Future studies could focus on the impact of knowledge management infrastructure on university performance. Organizational culture, comprising complex systems, processes, and formal and informal interactions, plays a significant role in implementing strategic decisions. Shannak, Obeidat, and Masa'deh (2012) argue that managers should rely on employees knowledgeable about their culture to increase strategic decision success. Future research could explore how formal and informal organizational culture dimensions influence knowledge management and performance. Additional studies could also confirm these findings across different contexts, expanding understanding of the interconnections between knowledge management infrastructure, processes, intellectual capital, and organizational performance.

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