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Intellectual Capital and Knowledge Management Dynamic Capabilities: The role of Knowledge Intensity

Capital intelectual y capacidades dinámicas en gestión de conocimiento:
el rol de la intensidad de conocimiento

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Abstract

This study aims to explore, at an empirical level, the relationship between Intellectual Capital (IC) and Knowledge Management Dynamic Capabilities (KMDC) as well as the role of Knowledge Intensity (KI) in this relationship. A quantitative methodology with a descriptive and correlational scope was employed using contingency tables, an adjusted standardized residual test, Mann-Whitney test, and a variance-based structural equation model with a sample of 135 organizations in Colombia. The results show a positive relationship between IC and KMDC. Moreover, significant differences were found between firms with high and low KI, suggesting a mediating effect of KI. This research contributes to expanding the literature on understanding the relationship between IC and KMDC. Managers are also suggested to both acknowledge the relevance of IC and prioritize investment in it, promoting the development of KMDC and therefore the creation of competitive advantages.

Keywords: Intellectual capital; Human capital; Structural capital; Relational capital;
Knowledge management dynamic capabilities; Knowledge intensity; Colombia.

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Resumen

El objetivo de este estudio es explorar, a nivel empírico, la relación entre capital intelectual (IC) y capacidades dinámicas en gestión de conocimiento (KMDC), así como el rol de la intensidad de conocimiento (IK) en esta relación. Se abordó una metodología cuantitativa con alcance descriptivo y correlacional utilizando tablas de contingencia, test de residuos tipificados corregidos, test de *Mann-Whitney* y modelo de ecuaciones estructurales basados en la varianza, en una muestra de 135 organizaciones en Colombia. Los resultados evidencian una relación positiva entre IC y KMDC, además se encontraron diferencias significativas entre empresas con alta y baja IK, lo que sugiere un efecto mediador de IK. La presente investigación aporta al desarrollo de la literatura en cuanto a la comprensión de la relación entre IC y KMDC. Adicionalmente, se propone a los gerentes reconocer la importancia y priorizar la inversión en IC, promoviendo el desarrollo de KMDC y por tanto la generación de ventajas competitivas.

Palabras Clave: Capital intelectual; Capital humano; Capital estructural; Capital relacional; Capacidades dinámicas en gestión de conocimiento; Intensidad de conocimiento; Colombia.

1. Introduction

Tangible assets were viewed as wealth-creating resources in organizations during the industrial era. However, in today's knowledge and information age, intangible assets have grown in importance in organizations (Dadashinasab and Sofian, 2014; Gan and Saleh, 2008; Hsu and Wang, 2012; Lev and Daum, 2004). As a result, if these resources are properly managed, they will become a source of sustainable competitive advantage capable of providing value, which will be translated into benefits for the organization (González, 2015).

Intangible assets are divided into two categories: visible assets, which are regulated and can thus be quantified and recorded in financial statements; and hidden assets, which are not recorded in financial statements due to a lack of regulations, of which IC is the most significant (Viloria *et al.*, 2008).

As a result, IC is a hidden intangible asset linked to knowledge that can provide future benefits to the organization and create a competitive advantage. It

consists of resources such as knowledge, experience, ideas, inventions, technologies, computer programs, designs and processes, information, and relationships, among others (Bontis, 1998; Brooking, 1997; Edvinsson and Malone, 1998; Edvinsson and Sullivan, 1996; Roos and Roos, 1997; Stewart, 1991, 2007; Ordóñez De Pablos, 2003).

In addition, dynamic capabilities refer to the ability to renew skills in order to achieve coherence with changing business environments (Teece, Pisano, and Shuen, 1998). Specifically, KMDC are the capabilities of an organization to reconfigure its knowledge management practices, that is, to integrate them in a novel, specific and flexible way to develop new knowledge management systems that are adaptable to changes in the environment (Alegre, Sengupta, and Lapedra, 2013; Cepeda and Vera, 2007; Easterby-Smith and Prieto, 2008; Tallman, Jenkins, Henry, and Pinch, 2004; Zahra and George, 2002).

Despite the importance of intangible assets in today's knowledge-based era, the presence of intangibles, specifically IC, is insufficient to create competitive advantages in organizations; developing KMDC is also required to enable companies to reconfigure their knowledge management practices in novel ways to adapt to changes in the environment (Acosta Prado *et al.*, 2013; Teece, 2018).

The notion of IC is embedded in the theory of organizations' intangible assets and KMDC are focused on the mechanisms through which these resources are controlled and managed to obtain sustainable competitive advantages (Barkat and Beh, 2018). Therefore, the idea of creating and reconfiguring knowledge in organizations arises from understanding the interaction between these two constructs, IC and KMDC. Although these two concepts have developed in parallel in the literature, empirical studies do not explain how they are linked to create value in an organization (Eisenhardt and Santos, 2002).

Furthermore, knowledge intensity is the extent to which an organization relies on large amounts of complex knowledge to carry out its activities, obtain its products

and guarantee its survival and sustainability (De Meulenaere *et al.*, 2021). Previous literature has also considered knowledge-intensive firms to be those that are most likely to develop processes which support the construction of intangible assets such as IC, creating, integrating and using knowledge to develop KMDC (Andreeva and Kianto, 2011).

Consequently, the aim of this research is to empirically explore the relationship between IC and KMDC as well as the role of knowledge intensity (KI) in this relationship. The following research questions are then put forward:

- What is the relationship between IC and KMDC?
- Are there any significant differences in the relationship between IC and KMDC, depending on firms' KI?

This research makes two contributions. First, it contributes to expanding the literature on the understanding of the link between IC and KMDC – a variable that has received little attention in the literature – which adds originality to the study. Second, it provides empirical evidence on the mediating role of KI in the relationship between IC and KMDC based on a robust empirical study conducted with a sample of 135 Colombian organizations.

Furthermore, the study has practical implications for organizations, as managers are advised to focus their strategic efforts on developing knowledge resources, such as IC, in order to promote the creation of KMDC. This is a distinguishing feature that may help to create competitive advantages.

The sections of this paper are as follows. Following this Introduction Section, which details the study's objectives and research questions, Section 2 presents a review of the literature. Section 3 describes the methodology used, followed by Section 4, in which the results are presented and analyzed. Section 5 contains a discussion of the findings. Section 6 discusses the conclusions, implications, limitations, and future research directions. Lastly, in the final section, the bibliographic references are listed.

2. Literature review

2.1. Intellectual Capital (IC)

Intangible assets are considered immaterial assets –with no physical appearance, arising from discoveries, organizational practices and human resources– whose value is defined by the expected rights and benefits that can be exploited and controlled by the organization (Brooking, 1996; Edvinsson and Malone, 1998; Lev, 2000).

Within the field of intangible assets, those that are identifiable, separable, and controllable are distinguished from the ones that are not. In turn, these assets are classified into two large groups: a) visible assets, those for which rules and regulations are in place, including concessions, industrial property rights, intellectual property rights, computer applications, franchises, and R&D expenses, among others; and b) hidden assets, or those that are not currently recorded in the accounting systems due to the lack of legislation on the matter and among which IC is the most significant (Nevado and López, 2002; Vilorio *et al.*, 2008).

The concept of IC is defined as the sum of all the firm's knowledge which provides it a competitive advantage in the market (Stewart, 1991, 2007).

The origins of this construct are associated with the failure to explain the paradox of value, especially in knowledge-based organizations where there are significant differences between the commercial value and the book value of the company. In this sense, intellectual capital constitutes a trigger for the creation of value in firms and is established as a key factor in measuring firms' performance and financial valuation in the knowledge economy (Salvi, Vitolla, Giakoumelou, Raimo, and Rubino, 2020).

However, it was only until the mid-nineties that the definition of IC as such emerged, asserting it as a concept that entails relationships with customers and partners, innovation efforts, the infrastructure of the firm and the knowledge and skills of the members of the organization (Edvinsson and Malone, 1998).

In detail, IC empowers the organization to transform other tangible assets and overall production resources into valuable assets (Zwaid, Mohammed, and Saleh, 2018) fueling the development of a competitive advantage that enhances its competitive performance.

Accordingly, in the literature IC is argued to influence organizational performance significantly (Barkat and Beh, 2018; Subramaniam and Youndt, 2005). Nonetheless, possessing intangible resources does not guarantee a sustainable competitive advantage in most cases: it is important to know how to use and process such resources across the organization (Barkat and Beh, 2018).

IC comprises the following elements: human capital, structural capital and relational capital (Bontis, 1998; Brooking, 1997; Edvinsson and Malone, 1998; Edvinsson and Sullivan, 1996; Roos and Roos, 1997; Stewart, 1991, 2007).

Human capital alludes to the individual capacities, knowledge, skills and experience of a firm's employees (Edvinsson and Malone, 1998; Garcia-Parra, 2004; OCDE, 2006; Roos, 1998). Conversely, structural capital is associated with organizational capability, including the physical systems used to transmit and store intellectual material, as well as encompassing organizational routines, procedures, systems, cultures and databases (Edvinsson and Malone, 1998; OCDE, 2008; Ordoñez, 2004). Similarly, relational capital deals with resources deriving from the firm's relationships with its internal and external stakeholders and includes human and structural capital involved in business relationships (Garcia-Parra, 2004; OCDE, 2008; Alama Salazar, Martín de Castro, and López Sáez, 2006; Viedma, 2007).

Recent studies have analyzed the connection of each one of these elements that make up IC with KMDC, finding significant interactions between these concepts in addition to positive effects on organizational performance. Therefore, it is suggested that managing IC adequately within each one of its components can constitute a source of competitive advantages and hence create value for the organization (Barkat and Beh, 2018).

2.2. Knowledge Management Dynamic Capabilities (KMDC)

The notion of dynamic capabilities proposes that resources and capabilities are continuously adapting, integrating and / or reconfiguring themselves to other resources and capabilities (Eisenhardt and Martin, 2000; Teece, Pisano, and Shuen, 1997). In line with this dynamic viewpoint, more attention has been paid to the relationship between resources and strategy implementation (Hitt, Biermant, Shimizu, and Kochhar, 2001; Newbert, 2013; Teece *et al.*, 1997).

An emerging perspective in the literature sees strategy as a dynamic capability which allows the organization to rapidly adapt its capabilities and its tangible and intangible resources to respond to changes in the market (Haarhaus and Lienen, 2020).

As such, the dynamic capabilities approach emphasizes the development of integrated and research-based management capabilities and organizational, functional and technological skills in areas such as R&D management, product and process development, technology transfer, intellectual property, production, human resources and organizational learning (Nelson and Winter, 1982; Prahalad and Hamel, 1990; Teece *et al.*, 1997; Teece, 1998, 2007; Wheelwright and Clark, 1988).

Thus, the literature has acknowledged the influence of some elements associated with intellectual capital on the dynamism of the organization's resources and capabilities, as both cognitive skills - at an individual level - and establishing relationships - at an internal and external level - become fundamental mechanisms to enable the organization to appropriate the capabilities and knowledge of its members to face market change processes and to be able to systematize it as an organizational asset (Salvato and Vassolo, 2017).

Specifically, KMDC refer to an organization's capabilities to reconfigure its knowledge management practices, that is, to integrate them in a new, specific and flexible way to develop new knowledge management systems that adapt to changes in the environment (Alegre *et al.*, 2013; Cepeda and Vera, 2007; Easterby-Smith and Prieto,

2008; Tallman *et al.*, 2004; Zahra and George, 2002). In other words, they are connected with the ability to make use of the knowledge acquired through continuous learning and produce new knowledge (Gonzalez and Melo, 2017; Patterson and Ambrosini, 2015).

In this regard, Alegre *et al.* (2013) propose two dimensions to capture the key aspects of a firm's KMDC: external learning competencies and internal learning competencies.

External learning competencies are the firm's capabilities to create and integrate new knowledge by interacting with the environment and other organizations. Conversely, internal learning competencies pertain to the new knowledge created by the firm from accumulated experience, using its own resources. Internal learning occurs mainly through R&D activities and the implementation of best practices (Alegre *et al.*, 2013).

2.3. Intellectual Capital (IC), Knowledge Management Dynamic Capabilities (KMDC) and Knowledge Intensity (KI)

The relationships between the variables considered in this study were analyzed in light of the Resource-based theory (Barney, 1991; Penrose, 1959; Peteraf, 1993; Wernerfelt, 1984) and, in particular, taking into account the most recent approach to dynamic capabilities (Eisenhardt and Martin, 2000; Teece *et al.*, 1997). This emerging paradigm proposes that the firm's resources and capabilities are continuously adapting, integrating and reconfiguring themselves to respond effectively to situations that involve dynamic and competitive environments (Eisenhardt and Martin, 2000; Lin and Wu, 2014; Makadok, 2001; Teece *et al.*, 1997; Wu, 2010; Zollo and Winter, 2002).

Besides, the nature and evolution of dynamic capabilities is knowledge-based (Eisenhardt and Martin, 2000). In other words, the ability to create, integrate, transfer and use knowledge continuously underpins the firm's capabilities and allows it to obtain competitive advantages (Teece, 1998).

From this perspective, the existing literature provides empirical evidence of the

impact of IC on organizations' performance, such as Bontis *et al.* (2018), Dzenopoljac *et al.* (2017), and Khalique, Bontis, Bin Shaari, Yaacob, and Ngah (2018). However, IC alone is not sufficient to generate an impact on performance, especially in highly competitive environments such as the current ones, so it is imperative to develop dynamic capabilities that allow for permanently reconfiguring the firm's resources and capabilities in order to obtain competitive advantages (Eisenhardt and Martin, 2000; Han and Li, 2015; Hsu and Wang, 2012).

IC as a knowledge-based intangible asset (Bontis, 1998; Brooking, 1997; Edvinsson and Malone, 1998; Edvinsson and Sullivan, 1996; Roos and Roos, 1997; Stewart, 1991, 2007; Ordóñez De Pablos, 2003) constitutes a significant factor in the development of dynamic capabilities (Eisenhardt and Martin, 2000; Singh and Rao, 2016; Teece *et al.*, 1997).

As a result, following the Resource-based view, scholarly literature has begun to examine knowledge from the IC perspective (Singh and Rao, 2016). In this regard, it is proposed that knowledge resources, such as IC, improve firms' ability to renew their resource base and enable them to develop dynamic capabilities, namely KMDC, in order to gain a competitive advantage (Hsu and Sabherwal, 2012; Hsu and Wang, 2012; Nieves and Haller, 2014; Singh and Rao, 2016).

With regard to IC components, human capital represents an important source of knowledge creation; the organization must promote an open and supportive learning environment for its employees to develop their skills and abilities (Barkat and Beh, 2018). In this way, knowledgeable and experienced employees have the capacity to identify changes in the industry and contribute to decision-making, enabling firms to efficiently allocate resources and attain competitive advantages (Singh and Rao, 2016). Consequently, the reconfiguration of the firm's capabilities and resources rests, to a great extent, on the knowledge, skills and experience of employees (Ambrosini and Bowman, 2009; Hsu and Wang, 2012; Singh and Rao, 2016; Teece, 2007).

Similarly, firms' structural capital supports knowledge creation, so when

Table 1. Variables analyzed

Variables	Dimensions	Number of items	Measurement scale	Referenced authors
Knowledge Intensity: KI		3	Likert scale: 1: Totally disagree 5: Totally agree	Yli-Renko <i>et al.</i> , 2002
Intellectual Capital: IC	Human Capital: HC	5	Likert scale: 1: Totally disagree 5: Totally agree	Bontis,1998; Wang, Z., Wang, N., Cao, J., & Ye, X. (2016)
	Structural Capital: SC	7		
	Relational Capital: RC	4		
Knowledge Management Dynamic Capabilities: KMDC	External Learning Capabilities: ELC	5	Likert scale: 1: Totally disagree 5: Totally agree	Alegre, <i>et al.</i> , 2013
	Internal Learning Capabilities: ILC	6		

Source: Authors' own elaboration.

organizations provide an adequate infrastructure, knowledge creation by employees is encouraged (Barkat and Beh, 2018). In this vein, insofar as knowledge is formalized through processes, manuals and routines, among others, both the flow of communication and learning are facilitated (Singh and Rao, 2016; Youndt and Snell, 2004). This suggests that organizational structure and processes act as a formal mechanism to promote learning and improve the firm's capabilities (Singh and Rao, 2016; Zollo and Winter, 2002).

As for relational capital, stakeholders such as customers and suppliers, to name a few, have knowledge that must be used by the organization effectively in order to accomplish the desired objectives (Barkat and Beh, 2018). Developing alliances and networks thus plays a vital role in the creation of knowledge and experience which make it possible to enhance the organization's capabilities (Ambrosini and Bowman, 2009; Eisenhardt and Martin, 2000; Grant, 1996; Singh and Rao, 2016; Zollo and Winter, 2002). This means that network relationships facilitate the acquisition and integration of resources as a strategic factor for developing dynamic capabilities (Eisenhardt and Martin, 2000; Singh and Rao, 2016).

In sum, in today's dynamic and competitive environments, the relationship between IC and KMDC stands as an important source for the creation of competitive advantages

in organizations (Han and Li, 2015; Hsu and Wang, 2012), along with the role of knowledge intensity (KI) in this relationship.

Correspondingly, the following hypotheses are proposed:

H1: *There is a significant relationship between IC and KMDC.*

H2: *KI plays a mediating role in the relationship between IC and KMDC.*

3. Methodology

3.1. Sample and data collection

3.1.1 Sample characteristics. The study's population consists of 1500 organizations chosen at random from Colombian public databases. Stratified random sampling based on size, location, and economic sector was employed.

3.1.2. Data collection. An online questionnaire was used to collect data from general managers of Colombian companies. The instrument included general information about the company and the respondent, as well as items about the constructs to be analyzed: IC, KMDC, and KI. A total of 135 valid responses made up the final sample, which accounts for a response rate of 9%.

Table 1 contains a description of the variables analyzed.

Table 2. IC and KMDC

Intellectual Capital: IC		Knowledge Management Dynamic Capabilities: KMDC	
		Low	High
Low	Count	9	2
	SR	1.6	-1.6
	ASR	2.3	-2.3
High	Count	56	68
	SR	-0.5	0.5
	ASR	-2.3	2.3

Source: Own elaboration with the IBM SPSS 22 software

3.2. Procedure

The study employed a cross-sectional design (Hernández, (Hernández, Fernández and Baptista, 2010), with a descriptive and correlational scope. Non-parametric quantitative techniques such as contingency tables, adjusted standardized residual test (ASR), and Mann-Whitney test were used in the first phase. For data processing, the IBM SPSS 22 software was used.

In the second phase, variance-based structural equation modeling [Partial Least Squares (PLS)] was carried out using partial least squares estimation (Hair Jr, Hult, Ringle, and Sarstedt, 2017; Hair *et al.*, 2010). SmartPLS (v. 3.3.3) was the software used.

The scales' quality was assessed using measures of reliability, convergent validity, and discriminant validity.

Cronbach's alpha, the Dijkstra-Henseler index (A), and the Dillon-Goldstein index (c) were used to assess reliability, with values greater than 0.7 deemed as acceptable for constructs with extensive theoretical development (Hair Jr *et al.*, 2017).

The average variance extracted (AVE) was used to test convergent validity, with values equal to or greater than 50% accepted (Fornell and Larcker, 1981). Regarding discriminant validity, the Fornell and Larcker criterion was used, which determined that the AVE was greater than the squared correlation between factors (Fornell and Larcker, 1981), as well as the Heterotrait-Monotrait (HTMT) criterion, which established that all values were less than or equal to 0.9 (Henseler, Hubona, and Ray 2016).

To contrast the mediating effect of KI, this construct was included in the previously established direct model and evaluated using the partial least squares method by examining the T-statistics values obtained, the β and the p-values to determine statistical significance (Hair Jr. *et al.*, 2017).

4. Results

4.1. Intellectual Capital (IC) and Knowledge Management Dynamic Capabilities (KMDC)

According to the findings, 92% of the companies in the sample have high levels of IC, while 52% have high levels of KMDC.

With regard to the statistical analysis, there is a relationship between IC and KMDC, so companies with high levels of IC also have high levels of KMDC. This is consistent with the literature because companies with a certain level of human capital, structural capital, and relational capital resources encourage the development of capabilities accordingly to reconfigure their knowledge management practices in novel ways and thus be able to adapt to changes in the environment. This is reflected in the ASR results (2.3), as well as in the significance of the χ^2 test (2%), as shown in Table 2.

Similarly, each of the IC components, namely human capital (HC), structural capital (SC), and relational capital (RC), was examined individually, and evidence of a relationship with KMDC was found in all cases.

Table 3. IC and KI

Intellectual Capital: IC		Knowledge Intensity: KI	
		Low	High
Low	Count	8	3
	SR	5.4	-2.1
	ASR	6	-6
High	Count	10	114
	SR	-1.6	0.6
	ASR	-6	6

Source: Authors' own elaboration with the IBM SPSS 22 software.

Thus, a link was discovered between HC, i.e., employees' individual capabilities, knowledge, skills, and experience, and the development of KMDC in the company χ^2 (0%).

Furthermore, a relationship is observed between the organizational capacity to transmit and store intellectual material, as well as understanding of organizational routines, procedures, systems, cultures, and databases, i.e., SC, and the development of KMDC in the company: χ^2 (0%).

Finally, there is evidence of a link between the company's external relations with various stakeholders, namely RC, and the development of KMDC within the company: χ^2 (0%).

4.3. Knowledge Intensity (KI) and Intellectual Capital (IC)

Knowledge intensity reflects how heavily a company relies on the knowledge inherent in its activities and results as a source of competitive advantage, as well as the accumulation of learning (Autio, Sapienza, and Almeida, 2000; Yli-Renko, Autio, and Tontti, 2002).

87% of the companies analyzed studied have a high level of knowledge intensity. In this sense, the findings reflect a relationship between IC and KI, i.e., knowledge-intensive firms have high levels of IC, as confirmed by the ASR (6) results and the significance of the χ^2 test (0.0%), as shown in Table 3.

This is supported by the Mann-Whitney U test results for median difference. Table 4

shows that CI levels are significantly higher in knowledge-intensive companies (Median= 5.50, U=612.00, $p < 0.05$) than in companies with a low level of KI (Median=3.67).

Table 4. Mann-Whitney U test for CI and KI

Test statistics ¹	IC
Mann-Whitney U	612.000
Wilcoxon W	783.000
Z	-6.024
Asymptotic sig. (bilateral)	0.000
Medians:	
High KI	5.50
Low KI	3.67

Source: Authors' own elaboration with the IBM SPSS 22 software.

4.4. Knowledge Intensity (KI) and Knowledge Management Dynamic Capabilities (KMDC)

Statistical analysis suggests a relationship between KI and KMDC, indicating that knowledge-intensive firms develop high levels of KMDC, including external and internal learning competencies. This is reflected in the ASR results (2.7) and the significance of the χ^2 test (0.7%), as shown in Table 5.

This is supported by the Mann-Whitney U test results for difference of medians, as shown in Table 6. KMDC levels are significantly higher for knowledge-intensive companies (Median= 3.87, U=693.00, $p < 0.05$) than for companies with a low level of KI (Median=2.66) Table 6.

¹ Grouping variable: KI.

Table 5. KMDC and KI

Knowledge Management Dynamic Capabilities: KMDC		Knowledge Intensity: KI	
		Low	High
Low	Count	14	51
	SR	1.8	-0.7
	ASR	2.7	-2.7
High	Count	4	66
	SR	-1.7	0.7
	ASR	-2.7	2.7

Source: Authors' own elaboration with the IBM SPSS 22 software.

Table 6. Mann-Whitney U test for KMDC and KI

Test statistics ²	KMDC
Mann-Whitney U	693.000
Wilcoxon W	864.000
Z	-2.692
Asymptotic sig. (bilateral)	0.007
Medians:	
High KI	3.87
Low KI	2.66

Source: Authors' own elaboration with the IBM SPSS 22 software.

4.5. Structural equations modeling

Table 7 contains information about the scales' reliability and validity.

The loadings of the indicators are shown in the table, indicating that, in most cases, values greater than 0.7 show that the indicators have a significant absolute

contribution to the construct. When the loadings are less than 0.7, the items are kept in the model, respecting the content validity and ensuring that their inclusion does not affect the scale's reliability and validity. Furthermore, Cronbach's Alpha, Rho A, the composite reliability, and the average variance extracted show that the items have internal consistency.

Table 7. Reliability and validity

Construct	Loadings	Cronbach's Alpha	Rho_a	Composite reliability	Average variance extracted
IC		0.946	0.949	0.953	0.574
IC1	0.678				
IC2	0.751				
IC3	0.653				
IC4	0.818				
IC5	0.796				
IC6	0.820				
IC7	0.820				
IC8	0.721				
IC9	0.862				
IC10	0.759				
IC11	0.740				
IC12	0.766				
IC13	0.763				
IC 14	0.677				

² Grouping variable: KI.

KMDC		0.968	0.97	0.972	0.759
KMDC1	0.844				
KMDC2	0.855				
KMDC3	0.848				
KMDC4	0.836				
KMDC5	0.788				
KMDC6	0.871				
KMDC7	0.913				
KMDC8	0.880				
KMDC9	0.907				
KMDC10	0.906				
KMDC11	0.925				
KI		0.826	0.828	0.896	0.742
KI1	0.828				
KI2	0.886				
KI3	0.868				

Source: Authors' own elaboration.

Table 8. Discriminant validity

Constructs	Fornell-Larcker			HTMT		
	1	2	3	1	2	3
1. Knowledge Management Dynamic Capabilities	0.871					
2. Intellectual Capital	0.601	0.757		0.613		
3. Knowledge Intensity	0.509	0.627	0.861	0.561	0.701	

Source: Authors' own elaboration.

Table 8 displays the Fornell-Larcker and Heterotrait-Monotrait ratio (HTMT) values used to test discriminant validity.

It is clear from the Fornell-Larcker criterion that the variance of the construct, represented by the diagonal, is greater than the variance between constructs in all cases. Similarly, the HTMT criterion yields values well below 1 in all cases, indicating that discriminant validity has been established.

Table 9 shows the direct effect of IC on KMDC as well as the mediating effect of KI on the previously established relationship.

As a result, it was determined that IC has a significant positive effect on KMDC and that KI provides partial mediation, which

means that only a portion of the direct effect between IC and KMDC can be attributed to knowledge intensity.

Table 9. Effect of IC on KMDC

Paths	β	T values
Direct effects		
IC →KMDC	0.464***	5.363
Mediating effect		
IC→KI →KMDC	0.137**	2.854

Note: ***p<0.0001, **p<0.01, *p<0.05.

Source: Authors' own elaboration.

5. Discussion

IC is a widely studied construct in the literature. Previous studies have examined the relationship between IC and organizational performance variables, finding significant evidence of this relationship (Alves, Cepeda-Carrion, Ortega-Gutierrez, and Edvardsson, 2020; Asiaei, Barani, Bontis, and Arabahmadi, 2020; Corvino, Caputo, Pironti, Doni, and Bianchi Martini, 2019). Likewise, dynamic capabilities have been regarded as a determining factor for the creation of competitive advantages in the organization (de Medeiros, Magalhães Christino, Gonçalves, Gonçalves, 2020). In particular, the concepts of dynamic capabilities and knowledge management are linked by KMDC (Alegre *et al.*, 2013; Easterby-Smith and Prieto, 2008), a construct that has been little addressed in the literature. This adds originality and value to the present study.

Therefore, the findings of this research suggest that IC, in each of its dimensions (human capital, structural capital and relational capital), influences the development of dynamic capabilities in Colombian firms, allowing them to reconfigure their knowledge management practices to adapt to changes in the environment and thus attain competitive advantages (Murcia and Campos, 2017).

In addition, the results contribute to theoretical developments focusing on the need to recognize IC as a knowledge-based intangible asset that plays a part in enhancing organizations' capabilities to renew their resource base and which allows them to develop dynamic capabilities, specifically KMDC, to obtain competitive advantages (Singh and Rao, 2016).

As a result, the importance of intellectual capital elements as a dynamic source of organizational capabilities is confirmed. Individual conditions such as knowledge, skills, and experience, on the other hand, require an organizational system that allows knowledge to be capitalized and integrated into the organization while also increasing the organization's ability to respond to changing conditions in an environment that fosters the development of both internal and external relationships (Salvato and Vassolo, 2017). Even so, the importance of structural

capital is striking because it is how knowledge becomes institutionalized; it moves from the individual to the organizational level, integrating into the organization's resource base, as the findings of this study and Wu, Lin, and Hsu (2007) suggest.

Drawing on the Resource-based theory, these results thus pose specific challenges for managers of organizations which enable them to obtain competitive advantages and hence have a positive impact on organizational performance. These challenges deal with knowing and managing the firm's resource base and capabilities as well as their permanent reconfiguration to create new resources and capabilities, such as IC and KMDC. This will allow the firm to respond adequately to the current competitive environments, characterized by their highly dynamic and turbulent nature. In short, in the face of capabilities, managers' task is to facilitate the rearrangement of certain organizational predispositions in order to dynamize their capabilities and show competency and speed of response (Teece, 2007).

6. Conclusions

The present study analyzed, at an empirical level, the relationship between IC and KMDC as well as the role of knowledge intensity (KI) in this relationship.

The results helped to confirm the existence of a significant relationship between IC and KMDC. Also, it was found that in knowledge-intensive companies, IC has a greater effect on KMDC development compared to companies where knowledge intensity is low. This finding supports the existence of a partial moderation of knowledge intensity (KI) in the relationship between IC and KMDC.

The results yield important theoretical contributions, providing empirical evidence that facilitates the understanding of the relationship between IC and KMDC and the role of KI in this relationship.

Furthermore, practical implications also arise because the obtained results provide elements of analysis for managers of organizations in terms of acknowledging

the importance of intangible assets, namely IC, in the development of KMDC as a vital element in creating competitive advantages for the organization.

The study has some limitations. The first concerns the fact that the questionnaire was only answered by a single person in each organization -in this case the general managers of the Colombian organizations from the sample. This may lead to common method variance errors and affect the internal consistency of the data. However, the research used scales that have been previously employed in the literature for the analyzed constructs, hence minimizing said limitation.

Second, since the variables analyzed are categorical (qualitative), whereas the sample is of a probabilistic nature, the proven relationships should not be interpreted as causality and research results should be generalized with caution.

Third, the study used a cross-sectional design. Future research works could employ longitudinal studies that allow for a better understanding of the phenomenon under analysis. In addition, future research could analyze the relationship between these variables and firm performance.

Despite these limitations, the results of the study constitute valuable contributions to the advancement of the discipline at both the theoretical and practical levels, also suggesting guidelines to continue advancing in the research.

7. Conflict of interest

The authors declare no conflict of interest.

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