

Gestão do Capital Intelectual no setor da Construção Civil

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Dedication

I dedicate this work to the incessant search for knowledge, to the resilience that turns every challenge into learning, and to the inspiration that comes from the academic journey. May these pages contribute to the construction of new horizons in the vast universe of knowledge.

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Acknowledgments

"The only place where success comes before work is in the dictionary."

(Vince Lombardi)

Throughout our lives, it becomes essential to consider the extreme importance that a group of people has in accomplishing countless tasks. Therefore, I use this page to acknowledge the efforts of all those who, in one way or another, have helped me:

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A deep and sincere

Thank You!

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Resumo

Numa economia cada vez mais global e com perspectivas para rápidas mudanças, o meio acadêmico e organizacional enfrentam desafios que quando abordados de forma independente podem ser superados. No entanto, quando abordados com base numa cooperação entre universidades e organizações a capacidade de superar esses mesmos desafios é exponenciada pelo aumento de competitividade, pela implementação de novos meios tecnológicos e pela promoção da inovação. A capacidade de ultrapassar estas diversas barreiras permite incrementar mais valias no contexto organizacional, acadêmico e em contexto social.

Neste sentido, e com o intuito de analisar qual o impacto do capital intelectual na performance organizacional (crescimento da organização) das PME do setor da construção civil, a tese será composta por cinco artigos que salientam a importância do estudo desta temática no setor da construção civil, e de que forma a gestão do conhecimento e as parcerias estratégicas podem influenciar a relação entre o capital intelectual e a performance organizacional.

Desta forma, o primeiro artigo teve por objetivo a identificação e exploração da influência do capital intelectual nas PME do setor da construção. Após a revisão de literatura, e por se enquadrar melhor no estudo, optou-se por olhar para o capital intelectual como um todo dividido em três campos, capital humano, o capital relacional e o capital estrutural. Neste sentido, foram realizadas três entrevistas cujo o guião seguiu o modelo de Matos (2013) e onde foi possível concluir que o capital intelectual exerce bastante influência na performance das PME do setor da construção e onde surgiram indícios da importância da gestão do conhecimento e das parcerias estratégicas na relação anteriormente descrita.

O segundo artigo teve por objetivo confirmar e alargar as bases teóricas relativas às descobertas efetuadas no primeiro artigo. Após se verificar a falta de artigos que explanassem a temática no setor da construção, alargámos o campo de pesquisa e as palavras-chave que nos devolveram 105 artigos são: capital intelectual, PME, empresa e performance organizacional. Neste sentido, executaram-se dois tipos de análise de artigos. Na primeira, recorreu-se ao VOSviewer que excluiu alguns artigos por não se enquadrarem na temática e posteriormente, executou-se uma análise manual que nos levou ao total de 61 artigos. Uma análise cuidada dos artigos levou-nos a concluir a existência de quatro grandes núcleos, onde dois deles abordam a temática do capital

intelectual e da inovação e os restantes abordam as temáticas identificadas no primeiro artigo, isto é, gestão do conhecimento e as parcerias estratégicas. Este artigo culminou na apresentação de uma framework que servirá de base para os próximos dois artigos.

No terceiro artigo, procurou-se analisar a relação entre os construtos performance organizacional, capital intelectual e parcerias estratégicas. Relativamente a este último construto, as dimensões analisadas no questionário respondido por 88 entidades, são a gestão de parcerias, a gestão de relações estratégicas e a identificação de novas parcerias. Também neste artigo, foi possível concluir a forte relação entre os três construtos, onde o capital intelectual e as parcerias estratégicas se influenciam mutuamente e onde ambas influenciam a performance organizacional de forma individual e conjunta. Sendo que da forma conjunta, a influência destes construtos é mais expressiva.

No quarto artigo procurou-se, através de um questionário, verificar se a framework proposta no artigo anterior faria sentido no âmbito das PME no setor da construção. Assim, ao aplicar-mos o questionário a 88 entidades foi possível concluir um forte relacionamento entre a gestão do conhecimento, o capital intelectual, que se influenciam mutuamente e a performance organizacional. Foi possível apurar que os dois primeiros conceitos influenciam de uma forma individual a performance organizacional das PME do setor da construção, mas que de uma forma conjunta tem um maior peso e influência sobre este último conceito. As dimensões em que a gestão do conhecimento foi estudada neste artigo são o armazenamento de conhecimento, a criação de conhecimento e a partilha, ou falta dela, de conhecimento.

No quinto e último artigo, juntou-se a primeira análise ao campo de estudo, a análise à base teórica e os dois estudos onde se corroborou, através da aplicação de um questionário, a base teórica anteriormente identificada. Concluiu-se este artigo com a apresentação de uma framework final cujo intuito é ajudar empresas, especialmente do setor da construção, a analisarem o seu meio envolvente e a exponenciarem a sua performance organizacional. Este trabalho de investigação contribui também com futuras linhas de investigação relacionadas com o tema em estudo e com contribuições para a base teórica.

Palavras-chave:

Capital Intelectual, Gestão do Conhecimento, Parcerias Estratégicas, Performance Organizacional, Construção Civil.

Abstract

In a global economy that is constantly changing, academia and organizations face challenges that can be overcome independently. However, cooperation between universities and organizations can enhance their ability to overcome these challenges by increasing competitiveness, implementing new technology, and promoting innovation. The capacity to overcome these barriers can provide value in organisational, academic, and social contexts.

With the aim of analyzing the impact of intellectual capital on the organisational performance (growth of the organization) of SMEs in the construction sector, this thesis will consist of five articles. These articles will highlight the importance of studying this issue in the construction sector and how knowledge management and strategic partnerships can influence the relationship between intellectual capital and organisational performance.

The objective of the initial article was to examine the impact of intellectual capital on small and medium-sized enterprises (SMEs) in the construction industry. After reviewing the literature, it was determined that the most appropriate approach was to consider intellectual capital as a whole, which is divided into three categories: human capital, relational capital, and structural capital. Three interviews were conducted following the Matos (2013) model. The results indicate that intellectual capital significantly impacts the performance of SMEs in the construction sector. The evidence highlights the importance of knowledge management and strategic partnerships in this relationship.

The objective of the second article was to confirm and expand upon the theoretical basis of the findings presented in the first article. After identifying a lack of literature on the subject within the construction sector, we broadened our search parameters and utilized the keywords 'intellectual capital', 'SME', 'company', and 'organisational performance', which yielded 105 articles. Two types of article analysis were conducted. First, we utilized VOSviewer to exclude articles that did not fit the theme. Then, we conducted a manual analysis, resulting in a total of 61 articles. After a thorough analysis, we identified four main clusters. Two of these clusters focused on intellectual capital and innovation, while the other two addressed knowledge management and strategic partnerships, as identified in the first article. This article presents a framework that will serve as the basis for the next two articles.

The third article aims to analyze the relationship between organisational performance, intellectual capital, and strategic partnerships, similar to the previous article. The questionnaire answered by 88 companies analyzed the dimensions of partnership management, strategic relationship management, and identification of new partnerships. The article concludes that there is a strong relationship between three constructs: intellectual capital, strategic partnerships, and organisational performance. These constructs influence each other and have a joint influence on organisational performance. The language used is clear, objective, and value-neutral, and the text is free from grammatical errors, spelling mistakes, and punctuation errors. The content of the improved text is as close as possible to the source text, and no new aspects have been added.

The fourth article employed a questionnaire to assess the applicability of the previously proposed framework in the context of SMEs in the construction sector. The questionnaire was administered to 88 entities, and the results indicated a significant correlation between knowledge management, intellectual capital, and organisational performance, with each factor influencing the others. The study found that the first two concepts individually influence the organisational performance of SMEs in the construction sector. However, when considered together, they have a greater impact on the latter concept. The article examines knowledge management in terms of knowledge storage, creation, and sharing.

The framework is based on the first analysis of the field of study, the analysis of the theoretical basis, and two studies that confirmed the previously identified theoretical basis through a questionnaire. The fifth and final article presents a framework for companies, particularly in the construction sector, to analyze their environment and enhance their organisational performance.

This research contributes to future research related to the topic under study and to the theoretical base.

Keywords:

Intellectual Capital, Knowledge Management, Strategic Partnerships, Organisational Performance, Construction.

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Chapter 1

Introduction

Numerous authors have underscored the critical importance of managing intangible assets, particularly Intellectual Capital (IC), as a key determinant of corporate competitiveness and sustainability (Matos et al., 2018). The absence of IC management policies poses a significant threat to the future of companies, especially in contemporary contexts where employee turnover and job-seeking behavior are prevalent. Effective management of IC is essential for organisational stability and growth.

Human capital, a crucial component of IC, must be retained within organizations (Edvinsson and Malone, 1997). Implementing measures to ensure employee satisfaction in the workplace is paramount, given that employees often spend more time at work than at home. Failure to address workplace discomfort compromises employee well-being and highlights a company's neglect in implementing necessary human capital retention policies. Such oversight jeopardizes the company's investment in its workforce and the accumulated knowledge, leading to a loss of the value added in the short term, as this knowledge is not retained or adequately transferred to other members of the organization (Matos & Lopes, 2009).

SMEs (Small and Medium Enterprises) often struggle with retaining human capital due to factors such as the absence of career plans, poor communication, undervaluation of employee skills, lack of organisational climate, an adverse working environment, and a mismatch between responsibilities and remuneration (European Commission, 2018). The construction sector, which faced a severe crisis between 2008 and 2011 leading to numerous company closures and widespread unemployment, is the focus of this study.

Taking into account the above, the main objective of this research is to understand how IC management influences SME performance in the construction sector. The strength of the relationship between IC and SMEs enables organizations to dynamically adapt and foster internal learning (Pigola et al., 2022). Mehralian et al. (2018) emphasize the importance of organizations engaging in practices that develop IC, as this investment enhances competitive advantage and organisational performance. Over the past two decades, the relationship between IC and SMEs has increasingly incorporated the component of organisational performance, highlighting the synergy between these elements and their impact on competitive advantage (Asiaei and Jusoh, 2017).

Despite the lack of consensus on the definition of IC, it is widely recognized as a crucial resource for enhancing company performance, a recognition solidified by early works such as those by Sveiby (1990) and later Edvinsson and Malone (1997). IC is defined as an asset generated through a combination of genetics, education, life, and business experiences (Hudson, 1993), or as an

individual's knowledge, social, and collective capacity (Nahapiet, 1998; Matos and Lopes, 2009). Effective IC management can significantly enhance a company's competitive capacity (Korsakiene et al., 2017), encompassing Structural Capital and Human Capital (Edvinsson and Malone, 1997).

The discrepancy between book value and non-financial capital, as defined by Daryaei et al. (2011) and Burstien and Zyngier (2012), underscores the critical role of IC in achieving corporate success. Guthrie and Petty (2000) and Wiig (1997) provide clear definitions of IC and its benefits, emphasizing its role in fostering knowledge advantage and accelerating innovation. IC is intangible, difficult to measure, and not reflected in financial statements, necessitating collective effort for its effective implementation (Guthrie and Petty, 2000).

Measuring IC remains challenging, with no method encompassing all its aspects. Organisational performance, linked to effective strategy implementation and leadership skills, is crucial for motivating employees and promoting knowledge-sharing (Bhatti and Christofi, 2020).

In the construction industry, technological advancements and global competition necessitate a focus on IC development and strategic partnerships (Asiaei & Jusoh, 2017). IC, including knowledge, skills, and expertise, drives organisational performance and competitiveness, while strategic partnerships enable firms to access external resources and knowledge (Ali et al., 2021).

The construction industry, comprising a network of contractors, sub-contractors, architects, engineers, suppliers, and clients, is highly regulated and fraught with risks and uncertainties. Effective resource management is crucial for sustained competitiveness and long-term success. This investigation also explores the roles of IC and knowledge management, revealing their profound impacts on organisational performance.

IC, defined by Edvinsson and Malone (1997), includes intangible assets like collective wisdom, skills, experience, and expertise, along with relationships, culture, brand, and reputation. Knowledge management, described by Alavi and Leidner (2001), involves creating, sharing, using, and managing knowledge to foster innovation and collaboration. In construction, effective knowledge management optimizes project performance (Tezel and Koskela, 2017).

Project-based work and significant uncertainties in construction pose challenges for IC management, making strategic deployment of knowledge management practices crucial (Agyekum et al., 2020). As the industry evolves with technological advancements and sustainability imperatives, the role of IC and knowledge management becomes increasingly critical for innovation and strategic advantage.

Moreover, the emphasis on sustainability and responsible business practices has grown, evaluating construction companies on environmental impact, social responsibility, and ethical considerations. IC, encompassing human, relational, and structural aspects, is essential for navigating this landscape successfully.

The construction industry, characterized by its complexity and project-based nature, plays a pivotal role in economic development. Construction SMEs, facing technological advances, competition, and global shifts, must strategically navigate these challenges. Exploring the links between IC, knowledge management, strategic partnerships, and organisational performance, focusing on construction SMEs is rather important.

IC, encompassing knowledge, skills, and innovations, is crucial for competitiveness and adaptability in construction SMEs. Effective knowledge management strategies enhance operational efficiency and foster a culture of continuous learning and innovation. Strategic partnerships introduce external dynamics, enriching IC and knowledge management practices, and enhancing organisational performance.

This chapter provides an introduction to the thesis, following an exploratory study that explains the topic's importance, objectives, research questions, methodology, and potential research paths. The subsequent chapter presents an in-depth literature review, which identifies gaps in the existing research and leads to two research arms. Chapters 4 and 5 explore the latter through quantitative data analysis, associating theory with findings in the business environment. The thesis concludes with Chapter 6 and 7, which presents a model proposed by the authors and the study's general conclusions.

Chapter 2

Intellectual Capital and Performance: A Case Study of Construction Companies

Abstract

Intellectual Capital Management is a key element for a company's development and value creation in achieving sustainable competitive advantage. Since intellectual capital is unique in the marketplace, companies retaining and transferring internally generated knowledge can face the external environment with more agility.

Due to the importance of civil construction in the Portuguese economy, this exploratory research uses a case study methodology applied to construction companies in Portugal.

The findings of this research evidenced that intellectual capital management influences the performance of construction companies.

By recognising the importance of intellectual capital management and how it influences the performance of companies, it is possible to trigger a set of investments in human capital that will become structural capital through the transfer of their competencies and, finally, relational capital. Therefore, higher performances are achieved without losing the knowledge acquired over the years.

This research can help to understand the importance of investing in intellectual capital management competencies in civil construction companies to leverage their competitive strategic development.

Keywords: Intellectual Capital Management, Human Capital, Construction Companies, Performance

Motivation to do Research in the Field.

Several authors have demonstrated the importance of intangible asset management, particularly Intellectual Capital management, as a factor in the competitiveness and sustainability of companies (Matos et al., 2018). Without applying intellectual capital management policies, companies' future is threatened, even more so nowadays, when workers have significant volatility regarding the search for new jobs and consequent exchange between companies.

On the other hand, the human capital, as one of the components of the intellectual capital, must be retained in the companies (Edvinson, 1997). It is necessary to implement measures to prevent the workers' discomfort in the surroundings of their companies, a space where most of the time the worker spends more time than at home. Otherwise, the worker's well-being in the company is

compromised, making it clear that the company did not foresee or implement the necessary policies to retain the human capital. The company's investment in its worker and all his knowledge about the company is at risk. The added value that was added to the company, in the short term, is no longer reflected in the medium-long term because the knowledge created ends up not being retained, nor is there a concern to transfer it to other members of the company (Matos & Lopes, 2009).

It appears that many the SMEs (Small and Medium Enterprises) have difficulty retaining this human capital, largely due to the lack of career plans, the lack of communication, the devaluation of the worker's abilities, the lack of organisational climate, the poor environment of work that is felt and the fact that the responsibilities do not correspond to the worker's remuneration and prospects for growth (European Commission, 2018).

This exploratory research uses a convenience sample to analyze companies in the civil construction sector, whose weight in the Portuguese economy is very relevant. According to INE – Statistics Portugal data in 2019, the civil construction sector had a 4.2% share of the Portuguese GDP. It is possible to say that over the years, civil construction has been revealed to be one of the most critical sectors in the country.

This sector suffered a crisis from 2008 to 2011, which meant the closure of numerous companies and the mass displacement of workers in the area towards unemployment.

This research's main objective is to understand how intellectual capital management influences the performance of SMEs.

Based on these objectives and the problems already identified, some questions are raised that will serve as a starting point for this investigation:

- I. What is the capacity of companies to implement intellectual capital management policies that facilitate the retention and transmission of knowledge created and accumulated?
- II. Will it be possible to associate companies' increased success and competitiveness with applying intellectual capital management policies?

In this paper, when referring to the concept of performance, we refer to the evaluation of the efficiency and effectiveness of a company in carrying out the economic activity because, according to Dumay (2016), measuring the performance of a company is a way to quantify the efficiency and effectiveness with which it carries out its business activities.

Literature Review and Purpose of Research

The lack of consensus regarding the definition of Intellectual Capital is one of the themes that has been dragging along over time and has led countless authors and scholars to come up with various hypotheses. However, everyone recognizes Intellectual Capital as an important resource supporting companies' performance. Recognition was mainly acquired after the work developed by Sveiby (1990) and later by Edvinsson and Malone (1997), among others.

Intellectual Capital begins by being defined as an asset of each individual, a characteristic generated through a genetic combination with education, life and business experience (Hudson, 1993). Other authors, such as Nahapiet (1998), reject a more personal definition of Intellectual Capital and prefer associating the term with each person's knowledge, social and collective capacity. On the other hand, Matos and Lopes (2009) and Korsakiene et al. (2017) reiterate that a good perception of the importance of Intellectual Capital by companies and consequent good management of it can boost their competitive capacity.

Thus, it becomes possible to divide Intellectual Capital into two types of economic value. The first intangible asset of companies, Structural Capital, essentially encompasses everything that is owned by a company but is not measurable, such as administrative systems, computer systems and patents. Second, Human Capital, which includes all internal and external human resources (Edvinsson & Malone 1997).

Daryaei et al. (2011) and Burstien and Zyngier (2012) consider Intellectual Capital as the difference between book value and non-financial capital, arguing that good management of Intellectual Capital is critical for companies to achieve success.

The authors who best provide a more perfect and timely definition to achieve the objectives of this paper are Guthrie and Petty (2000) and Wiig (1997), for whom the correct implementation of intellectual capital not only provides a great knowledge advantage. Additionally, these authors reiterate that knowledge, and the consequent Intellectual Capital, can accelerate the innovation capacity of companies if a dialogue is promoted that encourages the learning of all those involved in the company (Guthrie & Petty, 2000; Wiig, 1997).

From the definitions attributed by these authors, it is possible to verify some common characteristics of the definition of Intellectual Capital: a) as it is intangible and therefore difficult to measure, it is not possible to find this asset reflected in the statements financial; b) it is a dynamic process that requires, in a collective way, the practice of several people and; c) companies are only given a competitive advantage when Intellectual Capital is well implemented (Guthrie & Petty, 2000).

It is possible to conclude that a consensus has not yet been reached for a correct method to measure Intellectual Capital because of all the methods presented, none can cover the most varied

aspects of Intellectual Capital. However, Intellectual Capital is still an of the key elements for the success of any company in today's economy (Matos et al., 2020).

SMEs can use Intellectual Capital to create internal awareness and promote a financial boost (Khalique, 2014) and sustainable growth (Rastogi, 2003).

For SMEs this means greater availability to make investments of greater magnitude in Intellectual Capital which, in addition to improving the performance of SMEs, directly affects their development strategy, indirectly influencing its financial and non-financial components (Orlitzky et al., 2003). This type of investment allows for the creation of internal learning, where it is possible to acquire, create and transfer knowledge among all those involved in the company (Garvin et al., 2008).

Therefore, Intellectual Capital affects the ability to transmit and retain knowledge within SMEs, particularly human capacity and social and organisational capital (Corvelho & Migliarese, 2014). Several authors support the theory that Intellectual Capital is a fundamental pillar for SMEs because it supports their ability to innovate and provide better solutions to their customers (Matos et al., 2020). Intellectual Capital is one of the pillars that allow companies to have a competitive advantage over their direct competitors and consequently improve their performance in the market.

Matos and Lopes (2009) developed the ICM - Intellectual Capital Management Model to study intellectual capital management in SMEs. Later, in 2013, this model was developed, and an updated version of the model was presented (Matos, 2013). The various studies referred to by these authors demonstrate the operationalization of the model to audit the intellectual capital management in SMEs in the Portuguese context (Matos & Lopes, 2009; Matos et al., 2011, Matos, 2013). These authors believe that, compared to other models, the ICM - Intellectual Capital Management model has a greater capacity to deal with the complexity of factors that constitute intellectual capital and organisational knowledge (Matos, 2013).

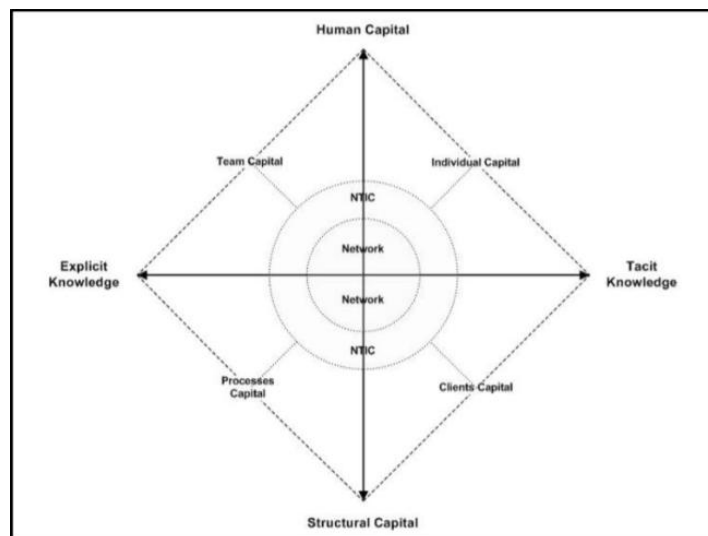


Figure 1 ICM - Intellectual Capital Model (Matos, 2013, p. 343)

The model in Figure 1 focuses on the analysis of more detailed information about the company's internal management, not disregarding the development quadrants and parameters so that it is possible to determine the complexity of organisational knowledge factors (Matos, 2013) and, in general, all components of Intellectual Capital Management.

According to Matos (2013), this is divided into four quadrants, each of which has its own set of analysis parameters: Personal Capital, Team Capital, Process Capital and Customer Capital. The network and new information and communication technologies are also part of this model and are common to all quadrants (Matos, 2013).

Here, the knowledge generated from the company's workers stands out, that is, the company's source of value, which is obtained through the talents and abilities demonstrated by each worker (Matos, 2013).

In the Team Capital quadrant, the combination of skills and talents of workers in each company is reinforced when performing a task assigned to them. By fulfilling this objective, they are adding value to the company and creating links among themselves; when there is teamwork in each company, it becomes easier to create value, produce and share tacit knowledge that, later, when operationalized, makes it into explicit knowledge. Matos (2013) reiterates that when explicit knowledge is formalized in a company's regulated system, it is easier to acquire value for the company and consequently for the knowledge of workers.

On the other hand, Process Capital focuses on organisational knowledge, which can be understood as the organisational memory of companies, that is, the recording of information within the scope of the economic activity of companies and may be similar to the transformation process of business.

Finally, Client Capital is directly related to the interaction between workers and clients, or if we consider the interaction between the research object and its audience. It is important to understand how the provision of services and products are presented to customers and how the issues raised by them are resolved. This knowledge and concerns often arise from the way the market is analyzed, and the response that is given regarding the investment that should be made so that innovation helps to improve customer satisfaction (Matos, 2013). Since the main objective is to maintain a healthy relationship with customers, customer satisfaction is essential, as it is through them that the company's image is reflected.

As for the two shared quadrants, namely new information and communication technologies and networks, it can be assumed that they can establish a relationship between the four main quadrants. Its main role is to support as many management positions as possible to help resolve issues. In addition, it appears that this is an asset for the company, as it promotes worker productivity and service quality (Matos, 2013).

Through the literature review, it was impossible to identify a model that would best apply to Portuguese SMEs and more specifically to the civil construction area, even though several models have emerged, suggested by numerous authors over the years. Thus, the model ICM - Intellectual Capital Management (Matos, 2013) is the model that best fits, as it is an audit model of intellectual capital management that has already been adapted to the reality of Portuguese SMEs.

Research Structure and Methodology

Through the application of the ICM – Intellectual Capital Management model developed by Matos (2013), the objective of this investigation is to understand how Intellectual Capital Management influences the development of companies in the civil construction area and how it reflects, whether positively or negatively, relative to its most direct competitors.

Considering the scope of this investigation and the proposed objectives, complemented by the starting questions for this investigation, the instrument best suited for data collection is the interview survey (Bardin, 1977).

All interviews were conducted through a script preliminarily structured and tested in companies operating in the civil construction area, acting as a coordinating axis for them and reflecting on the literature review exposed above. In the last step, the transcription and content analysis of the collected responses was performed.

In this research, three companies in the civil construction sector will be analysed. These companies have in common the fact that they work as clients and suppliers among themselves, creating a kind of unofficial consortium.

The preparation of the guide for the interview survey was based on several sources with similar research related to Intellectual Capital and its influence on companies. Once elaborated, the script was tested and revised based on an interview conducted with a small civil construction company with characteristics similar to those in the case study.

To fulfil the research objectives, a set of questions were constructed and organised in a script, which served as the basis for the interviews carried out with the three managing partners of the three companies in the sample. By the end of May 2021, the interviews and gathering of all the information necessary to carry out this investigation were established.

The questions asked in the survey used in the interviews contemplate the reality of companies in a time frame from 2019 to 2020 and the projection for the following two years (2021 to 2022). The questions focus on the decisions taken by companies and how they are reflected in their activity. There is also a set of issues to define its workers and the direct relationship they have with the increase in the competitive capacity of companies.

According to Bardin (1977), one of the interview analysis techniques is content analysis, where a systematic and objective process is developed to describe the content of one of the transmitted information; content analysis is a technique used for analysing data.

Analysis of Results

Presentation of the Companies

The companies that participated in the study comprise the following criteria:

1. Companies whose economic activity is aimed at civil construction.
2. Headquartered nationwide and with a turnover above €50 000.00.
3. High level of specialization in its areas of intervention.
4. High aptitude and growth prospects of companies.

Founded in 2015, Company A gave continuity to other companies founded by the current management partner during the 1990s. Company A is one of the companies with the greatest presence in the construction and remodeling market in Lisbon, establishing several private partnerships.

Company B, also founded in the last decades of the 20th century, presented itself in the market as one of the most specialized carpenters in Lisbon. Over the last few years, Company B has been consolidating its position in the market. The current carpenter manager by profession is responsible for the growth of the family project started by his father, to whom he succeeded as managing partner.

Company C is a sole proprietorship company founded by its current managing partner during the 1990s. Company C, presents itself in the market as one of the most specialized companies in the area of electrical installations carrying out numerous works in mainland Portugal.

Case Study Results Synthesis

For the preparation of this case study, the researcher developed a questionnaire based on the ICM model (Matos, 2013) to try to understand the level of intellectual capital management of the three companies that participated in the study and at what times they privilege Intellectual Capital Management. In addition, the questionnaire aims to obtain these three companies' strategic positions concerning Intellectual Capital.

The investigation will be conducted through a qualitative method. Data was obtained through an interview, lasting approximately thirty minutes, carried out with the managing partners of the three participating companies. To facilitate the content analysis, the results of these interviews were summarized in the table below (Table 1) and commented quadrant by quadrant according to the ICM – Intellectual Capital Management model developed by Matos (2013).

A color-based answer classification system will be used. This graphic is intended to facilitate the reader's understanding when analyzing this research.

Table 1 Results of the treatment of interviews conducted with the Managing Partners of the three companies.

Question	Interviewee 1: Company A	Interviewee 2: Company C	Interviewee 3: Company B
Does the company carry out intellectual capital management?			
Were there hirings in the period 2019 and 2020?			
Did you carry out redundancies in the period 2019 and 2020?			
Is it valued and facilitated the acquisition of knowledge by workers?			
Do talented workers be valued and compensated?			
Is vocational training recognized as an instrument for acquiring new skills?			
Are workers encouraged to share their individual knowledge and knowledge?			
Are there rewards for employees who share their individual knowledge?			
Are workers encouraged to be innovative?			
Are workers who are innovative/creative rewarded?			

Are there innovations related to internal organization processes?			
Are there innovations at the organisational level?			
Does the company have more certifications in addition to those imposed for carrying out the activity?			
Are workers dedicated to the work they do?			
Are workers creative or spontaneous?			
Are the senses of team elevated on the part of the workers?			
Is all the knowledge acquired by workers passed on to new colleagues?			
Is the development of teamwork skills privileged in the company?			
Does the company use new technologies to record and systematize all internal and external organization processes?			
Are new technologies a tool to improve the quality of internal organization processes?			
Are employees' important knowledge computerized?			
Are employees' important knowledge saved in paper format?			
Are employees' important knowledge stored in each employee's individual memory and not recorded?			
Does the company have a certification system? If yes, which one?			
Have partnerships been developed in this company with other companies or institutions at national level?			

Have partnerships been developed in this company with other companies or institutions at an international level?			
Have the developed partnerships been creating more value for the company and consequently improving internal dynamics?			
Have the developed partnerships been improving economic results?			
Does the company carry out market studies? If yes, how often?			
Are the innovations developed mainly the result of customer needs?			
Are the developed innovations mostly the result of workers' ideas about the market?			
Are team ideas a source of innovation to bring new solutions to the market?			
Does the company favor the relationship with customers?			

Source: Self elaboration.

Subtitle:

Negative answer	Positive response	Not applicable
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Intellectual Capital Management Graphics Synthesis

Analyzing Figure 2 it is possible to observe which quadrants have the most significant weight in any of the three companies.

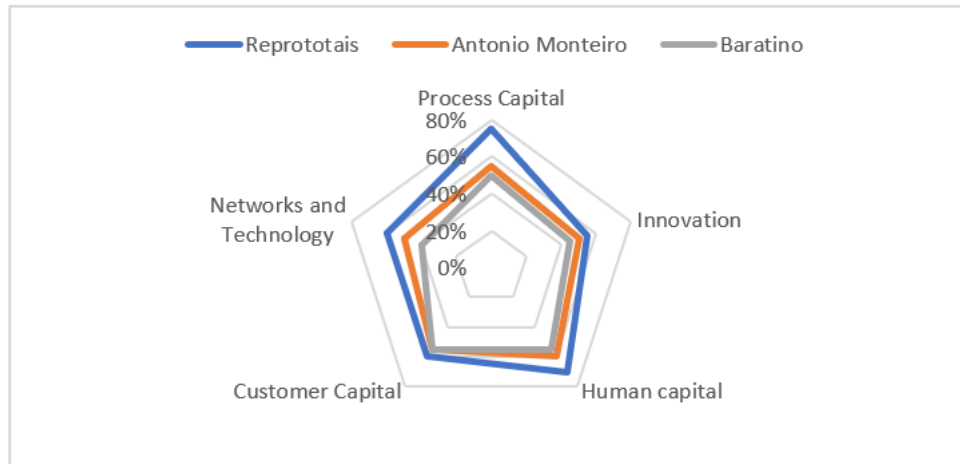


Figure 2 Graphical Synthesis of GCI in the three companies surveyed.

Source: Self elaboration.

In the case of Company A, the Human Capital and Process Capital quadrants are the quadrants with the most significant weight in the company, followed later by the Networks and Technology quadrant, which, like the Innovation quadrant, requires greater investment.

The remaining two companies follow the same investment pattern in the five quadrants but do so with less intensity than Company A.

It should be noted that Company B presents a higher investment grade than Company C in all quadrants, except for the Customer Capital quadrant, which is at a very similar level for both companies.

Customer Capital, Innovation and Networks and Technology quadrants most need greater investment on the part of the three companies, which can mark the growth of these SMEs, thus directing them towards more sustainable development, a more significant competitive capacity and consequently better results.

Trend analysis of responses to the Quadrants of the ICM Model

To facilitate the interpretation of the data obtained through the interviews carried out with the companies, all of them represented by their managing partners, individual analysis of the responses obtained in the three interviews was carried out for each of the five quadrants that

constitute the ICM model used in this case study and an analysis of the relationship between all quadrants according to the responses obtained.

By analyzing the same set of questions, it is proven that, for the three companies, their employees are a source of concern and, consequently, investment, the sharing of knowledge, the acquisition of knowledge and/or new skills are encouraged by the company.

However, two of the three companies say they do not reward employees who share their own knowledge. Company B also adds that professional training is not a fundamental element for acquiring new knowledge and reiterates that by working daily in the art, much more skills are acquired, accompanied by experience.

The second quadrant forces us to focus on the collective, putting the individual aside, and on the consequent internal relationships among all workers.

In this quadrant, the expectation of answers is much higher than in the previous quadrant since the research focuses on one of the economic sectors where the percentage of teamwork is much higher than individual work, a fact supported by the human inability to carry out such large projects scale in an individualized way.

Through the respondents' answers, it was noticed that all workers were dedicated and creative in the projects in which they were inserted. They follow the ideals of work defended and put into practice daily by the three companies surveyed.

The development of the companies' internal organization enables their teams, made up of their workers, to put into practice processes aimed at formalizing the companies' knowledge. In this quadrant, civil construction and most companies related to the area (subcontracts) find it very difficult to formalize any type of knowledge. The best and most effective way to combat this problem is to pass on testimony, that is, the commitment to teamwork, which enables the learning of the newest elements of the companies that end up having as mentor's workers with countless years of experience.

Through the analysis of the answers obtained through the interviews, it is easy to verify that, in most companies, the processes they used at the beginning of them and during their growth are the same, companies with about thirty years of experience in the market, they have never changed their processes, nor have they invested in certification beyond what is required by law. Company A is the only company that made drastic changes in its processes and implemented some innovations, evidenced by the current difference in invoicing and the different growth expectations.

The relationship established between customers, workers and the company is one of the ways that companies can improve their services and/or products since, objectively, they intend to present themselves better and better in the market and surpass the customer expectations, thus increasing

their satisfaction. Most companies that participated in this investigation carry out market studies throughout the year; only the company with a lower turnover says, through its managing partner, that it does not carry out any market study. The company that stands out with the highest turnover is also the one that seeks not only to meet the needs of its customers but also to provide them with the most innovative solutions possible. Most companies also declare that the greatest innovations come from the market's needs and not from the workers' proposals

This last quadrant is characterized as a quadrant that interferes with all other quadrants because it manages to establish a relationship between them. By facilitating numerous functions and accelerating various internal and external processes of the company, it allows the level of productivity to increase without changing the variables number of workers and hours worked.

Analyzing the sample surveyed, it is noticed that investment clearly influences certain factors in new technologies and networks. Except for the non-existence of certifications other than the mandatory ones, all companies in this study try to record the important knowledge of employees, whether in paper or electronic format. There is full awareness on the part of all those involved that, unfortunately, there is information that remains only with the workers, and sometimes it is not even passed on to the youngest or registered in the company.

It should be noted that Company A is the only company in the sample that has entered into any partnership. In this specific case, numerous private partnerships were established at the national level and continue to be created. The existence of these partnerships is a very important milestone for this company since, since they were created (about a year and a half ago), they have projected the company's net results to another level and expanded the chances of launching the company to another level in the very near future.

Conclusion and Limitations

The three companies that participated in the study were aware of and concerned about their role in the market. By favoring the acquisition of new knowledge by their workers, companies seek to respond to the challenges that the market poses to them, whether innovative challenges or challenges posed by their customers, who, in some cases, have a particular vision of the result they want for their projects.

Company A stands out from the other companies present in this case study for constantly seeking to be at the forefront of innovations instead of just taking on challenges at the time of customer requests. The great advantage here is the carrying out of market studies which, despite not being carried out as often as desired, are enough for this company to stand out in the market as a company that pays attention to its customers, a reality proven through the results shown in the Customer Capital quadrant (Monciardini and Zambon, 2015).

It confirms, unanimously, the will of these three companies to grow, albeit at different rates, through creating new jobs, maintaining current jobs and realising advantageous partnerships. Then comes the attempt to create greater value for companies where, once again, Company A stands out for vigorously applying Intellectual Capital Management policies, this time very present in the quadrant of new technologies and networks. Despite only carrying out partnerships at the national level, Company A managed to assert itself through its ability to become completely financially independent and with very inviting prospects, which indicate both economic and financial growth and human capital in the short-medium deadline (Dumay, 2016).

The Process Capital quadrant is the most prominent quadrant of the ICM model in the universe of these three companies. The daily reality of these companies is living proof of their ability to promote teamwork and knowledge-sharing among workers. One of the techniques most used by companies in this field is the realisation of mixed teams. These teams combine more experienced and less experienced workers, where teamwork forces the creation, development and transfer of knowledge that, despite often not being registered, ends up not getting lost completely (Matos et al., 2020).

In short, despite the model developed by Matos (2013) being more than a decade old, it is possible to prove its ability to resist time and adapt to different economic scenarios. As a result of the case study on the influence of Intellectual Capital Management in the development of companies, it was proved that the ICM model is suitable for application in companies in the construction industry. Although there are quadrants that are more relevant to the reality registered in the day-to-day of these companies (such as the Team Capital, Process Capital, and the Capital of New Technologies and Networks quadrant), this does not mean that the other quadrants are not similar applied and put into practice by these companies.

During the investigation period, some limitations emerged. First, taking into account the economic activity performed by the three companies scheduling and conducting the interviews was difficult. Authorisation for the application of the questionnaires and processing data collected during the interviews proved to be a setback that the researcher did not expect.

The second limitation concerns the low education level of everyone involved in the interview process. The incomprehension of the questions asked sometimes caused embarrassment during the interviews that were only overcome by the meticulous and occasionally repetitive explanation of the concepts.

Finally, the reduced number of interviews since the adherence and availability of companies in the construction industry are reduced. In view of these limitations, this research can only be seen as exploratory, and the conclusions cannot be extrapolated. This exploratory research is a test for future research. To reduce the limitations, in future research, we will directly involve an association representing the sector with greater institutional weight in the mobilization of

companies. A detailed interview guide will also be prepared with explanations of each concept, thus facilitating the understanding of concepts and reducing subjectivity.

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Chapter 3

Intellectual Capital in Construction SMEs: A Systematic Literature Review

Abstract

The present study aims to provide an overview of the topic of intellectual capital in SMEs in the construction industry. Identifying the different research paths based on a systematic literature review will allow effective knowledge of the topics under study and the definition of a research agenda for the future. This Systematic literature review considers articles collected from the Web of Science (WoS) database, a total of 105 scientific articles published in various reference journals without a defined time interval, using two analyses. A co-citation analysis allows the identification of the most influential authors and references cited within the theme, and a bibliographic coupling analysis enables the identification of the most referenced thematic clusters. The systematisation of the available literature through the bibliographic coupling analysis identified four clusters, namely cluster (1) Intellectual Capital and Organisational Performance, cluster (2) Knowledge Management, cluster (3) Innovation, and cluster (4) Strategic Partnerships. The study seeks to provide insights into effective strategies for leveraging intellectual resources to achieve organisational success in the construction industry., The steps that have already been taken are analysed, and the way forward is indicated through a future research agenda to strengthen a poorly explored area.

Keywords: Intellectual Capital, Organisational Performance, SME, Construction Sector, Knowledge Management, Strategic Partnerships.

Introduction

The strength of the relationship between intellectual capital and SMEs (Small and Medium-Sized Enterprises) enables the ability of organisations to adjust dynamically, enabling internal learning (Pigola et al., 2022). The authors Mehralian et al. (2018) report the importance of organisations in practising actions towards developing intellectual capital. This is because it is only through this investment that there is an increase in the competitive advantage of organisations and where organisational performance plays its key role.

Nevertheless, in the last two decades, the relationship between intellectual capital and SMEs has suffered the addition of the component organisational performance. This component has been gaining more prominence in the business area, where the synergy between the components is discussed and compared to the competitive advantage that can be achieved (Asiaei and Jusoh, 2017).

There has been a lack of consensus regarding the definition of Intellectual Capital, which has led to various hypotheses proposed by numerous authors and scholars. However, it is widely recognized that Intellectual Capital is an important resource that supports companies' performance. This recognition was mainly acquired after the work developed by Sveiby (1990) and later by Edvinsson and Malone (1997), among others. Intellectual Capital is defined as an asset of each individual, generated through a combination of genetics, education, life, and business experience (Hudson, 1993). However, Nahapiet (1998) associates the term with each person's knowledge, social, and collective capacity. Matos and Lopes (2009) also have a different definition of Intellectual Capital.

Korsakiene et al. (2017) state that effective management of Intellectual Capital can enhance a company's competitive capacity. Intellectual Capital can be divided into two types of economic value. The first type, Structural Capital, includes all intangible assets owned by a company. Physical Capital, which includes tangible assets such as administrative systems, computer systems, and patents, and Human Capital, which encompasses all internal and external human resources (Edvinsson & Malone 1997).

According to Daryae et al. (2011) and Burstien and Zyngier (2012), Intellectual Capital is the difference between book value and non-financial capital. The text discusses two types of capital: According to Daryae et al. (2011) and Burstien and Zyngier (2012), Intellectual Capital is the difference between book value and non-financial capital. They argue that effective management of Intellectual Capital is crucial for companies to achieve success. Guthrie and Petty (2000) and Wiig (1997) provide a clear definition of intellectual capital and its benefits. They emphasize that the correct implementation of intellectual capital can provide a significant knowledge advantage and accelerate a company's innovation capacity through dialogue.

The concept of Intellectual Capital encourages learning for all individuals involved in the company (Guthrie and Petty, 2000; Wiig, 1997). The definition of Intellectual Capital shares common characteristics as described by these authors. According to these authors, Intellectual Capital is intangible and difficult to measure, and therefore cannot be reflected in financial statements. It is a dynamic process that requires collective effort. The practice of several individuals and companies only provides a competitive advantage when Intellectual Capital is well implemented (Guthrie and Petty, 2000). Therefore, a consensus has not yet been reached.

It is difficult to determine a correct method to measure Intellectual Capital as none of the methods presented can cover all aspects of it. On the other hand, organisational performance implies the"

ability to effectively implement strategies that enhance the organisation and its results “(Kengatharan, 2019). That is, organisational performance is directly linked to leadership skills, which means that the ability to motivate employees and promote knowledge-sharing depends on this type of strategy (Bhatti and Christofi, 2020). In this article, when organisational performance is referred to, it can be considered the ability of organisations to increase their productivity and consequently increase competitive advantage compared to competitors.

By imposition of the existing literature, the breadth of this topic required a more comprehensive investigation where SMEs complement the focus of construction companies. The study aims to fill a gap in literature by providing empirical evidence of the relationship between intellectual capital and organisational performance in construction SMEs. The article seeks to justify its relevance and significance to the construction industry and SMEs.

Understanding the implications of this study is crucial for the construction sector as it can provide valuable insights into how intellectual capital can be leveraged to enhance the performance of SMEs. This information can be useful for managers and decision-makers in the construction industry, as it can assist them in making informed decisions about managing and utilizing intellectual capital.

The study includes bibliometric analysis to establish the importance of the topic within academic literature and provide a comprehensive overview of existing research in this field. Through bibliometric analysis, the authors identify the most influential articles, key authors, and trends in intellectual capital and organisational performance research within the construction SME context. The study's findings could have significant implications for construction SMEs. The study aims to establish a clear link between intellectual capital and organisational performance. This could help SMEs in the construction sector prioritize their investments in intangible assets such as knowledge, expertise, and relationships. As a result, this could lead to improved competitiveness, innovation, and overall business performance.

In addition to empirical evidence, the methodological approach of incorporating bibliometric analysis adds another layer of significance to the study. Understanding the existing body of literature and identifying key trends and influential works in the field of intellectual capital and organisational performance within the construction SME context can provide valuable insights for both researchers and practitioners.

The study takes a holistic approach by combining empirical research with bibliometric analysis. This approach justifies the study's relevance and enriches the existing academic discourse on intellectual capital and organisational performance. The article could serve as a valuable resource for academics, practitioners, and policymakers seeking to enhance their understanding of the role of intellectual capital in the performance of construction SMEs (Novas and Sousa, 2017). Thus, the following research question is posed - what are the impacts of intellectual capital on SMEs/construction firms?

In conclusion, intellectual capital, knowledge management, and strategic partnerships are vital ingredients for organisations seeking to achieve high-performance levels. By recognising and leveraging their intellectual assets, implementing effective knowledge management practices, and forging strategic collaborations, organisations can enhance their competitive advantage, foster innovation, and drive sustainable success in today's rapidly evolving business environment.

Methodology

The literature review aims to create a comprehensive understanding of the topic, identify gaps in knowledge, suggest new avenues of research, and express plans to contribute to the field of study (Donthu et al., 2021). However, it is common to find articles whose reproducibility is limited due to their limited degree of transparency. With these premises in mind, the authors of this article decided to apply a protocol aimed at the transparency and reproducibility of the study, ensured by the use of the PRISMA protocol (Moher et al., 2009). To this end, a bibliometric analysis was performed (Marzi et al., 2020) and the technique of similarity analysis (VOS) was applied (Van Eck and Waltman, 2010). The overall process consisted of 10 steps by following the example of Paul and Dhiman (2021), as described in the following paragraphs.

The first step was an analysis of the existing literature, where the current state of research in the proposed area was reviewed. Based on this analysis, a list of keywords was generated, which, through their different combinations, made it possible to broaden the field of research.

In the second stage, the research question was defined, which, in addition to facilitating the development of the research, allows it to keep pace with the needs of science in the area proposed for research, allowing it to be constantly updated. Similar literature reviews on the topics under analysis were also included. In this way, the final query depended on the equation "(intellectual capital" and "organisational performance" and "SME" " or "firm").

The third stage was characterized by consulting the Web of Science (WoS) database for its quality and scientific rigor (Zha et al., 2020), which is widely recognized in academia. The limitations imposed on this research were the use of the "Topic" operator and the restriction of articles to the fields of management, economics, and administration, without any time limitation.

The fourth and fifth stages took place after the limits of the study were well defined. We then proceeded with the collection of data, which we can summarize as a total of 303 articles. Of these 303 articles, 198 were excluded after individual reading of the titles and abstracts revealed that these articles did not deal with the topics under study and only mentioned some of the keywords in their content. Of the remaining 105 articles, 33 were excluded because they did not fall within the parameters defined for the research areas.

The sixth stage was the bibliographic analysis, where a more careful analysis and the creation of bibliographic constellations were carried out using the VOSviewer, Cadima and Bibliometrix R

software. Through this analysis, as already mentioned, it was possible to generate the similarity matrix in which the articles form small subgroups in which the research areas are identified. During this process, 11 articles were also excluded using VOSviewer and Cadima because they did not fit into any research subgroup.

In the seventh point, by analyzing the articles by groups, the main themes were identified, leading to the theme that summarizes the research carried out in all the articles. Due to the small number of articles, all articles were considered and reviewed.

In the eighth step, the articles with the highest number of citations were selected, following the example of (Turzo et al., 2022), the upper 90th percentile of articles in each cluster was selected, calculated based on normalized citations.

In the final stages, the ninth and tenth, a systematic literature review was carried out following the example of Tranfield et al. (2003) using the PRISMA protocol (Moher et al., 2009). The final clustering of articles made it possible to summarize the best research practices on the central theme and its implications. This analysis not only facilitates the documentation of the main lines of research, but also helps to identify future lines of research.

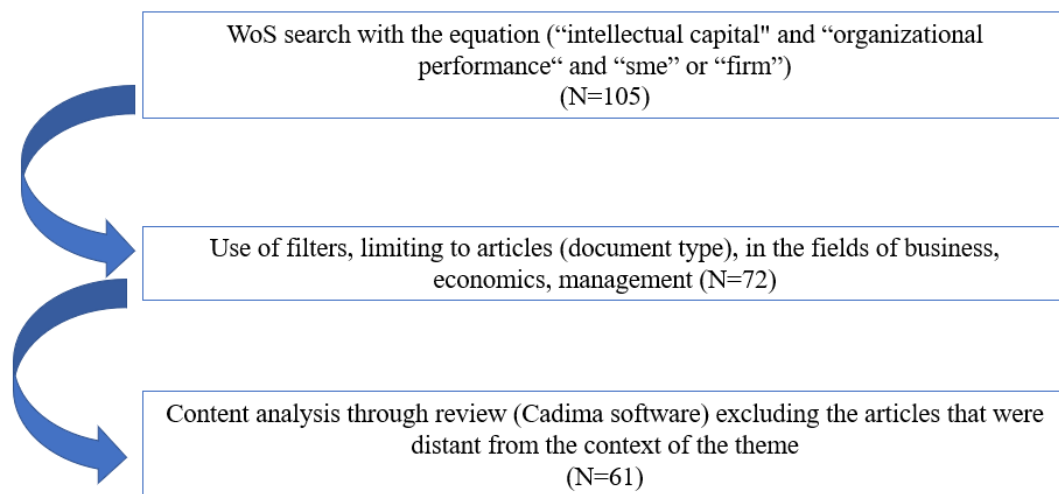


Figure 3 Article selection process for the database.

Characterisation of the sample

The database consists of 61 articles focusing on SME intellectual capital and organisational performance, arranged in the time interval between 1999 and 2022. The database is spread over 26 journals, 172 authors, 4138 references, and 199 keywords, with an average of 38.84 citations per document.

The boom in the number of publications on the relationship between intellectual capital and organisational performance emerged in 2017, and this number has been increasing over the years, except for 2018 and 2019. The number of citations registered more exponential behavior (see Figure 4). The highest peak regarding publications was in 2020, with 13 articles, while the year with the highest number of citations was 2021, with 737 citations, showing that this is a topic of current interest.

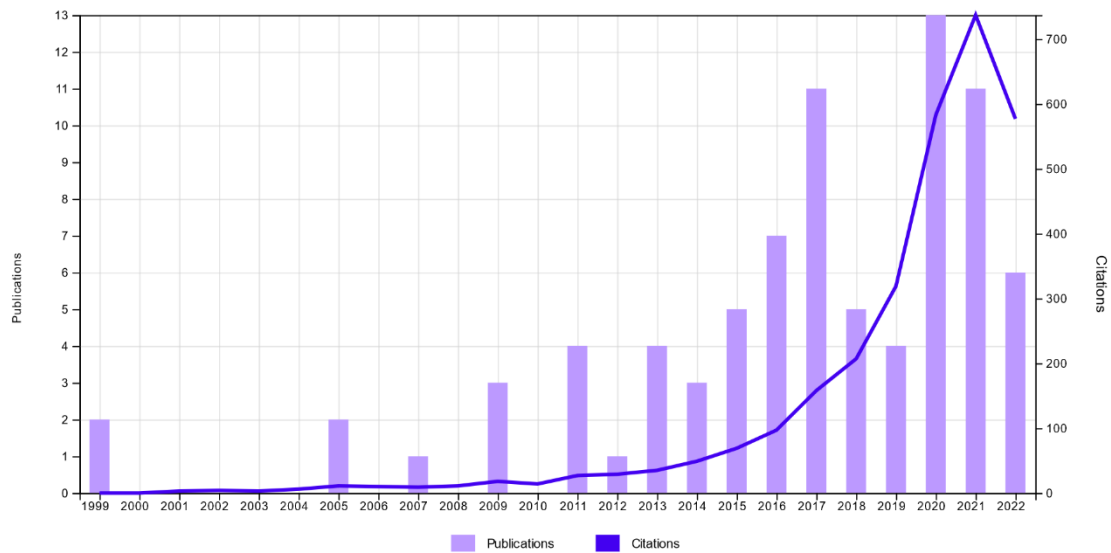


Figure 4. Evolution of the number of articles and citations in the theme "Relationship between Intellectual Capital and Organisational Performance", between 1999 and 2022.
Source: Bibliometrix.

Based on the temporal space in which the bibliographic database is inserted, a graph demonstrating the dynamics and evolution of a set of Keywords on the temporal axis was prepared (see Figure 5). In this graph, it is possible to analyse all the words present since the genesis of the database. However, the words with the highest growth dynamics are "organisational performance", "innovation" and "capabilities".

Word Growth

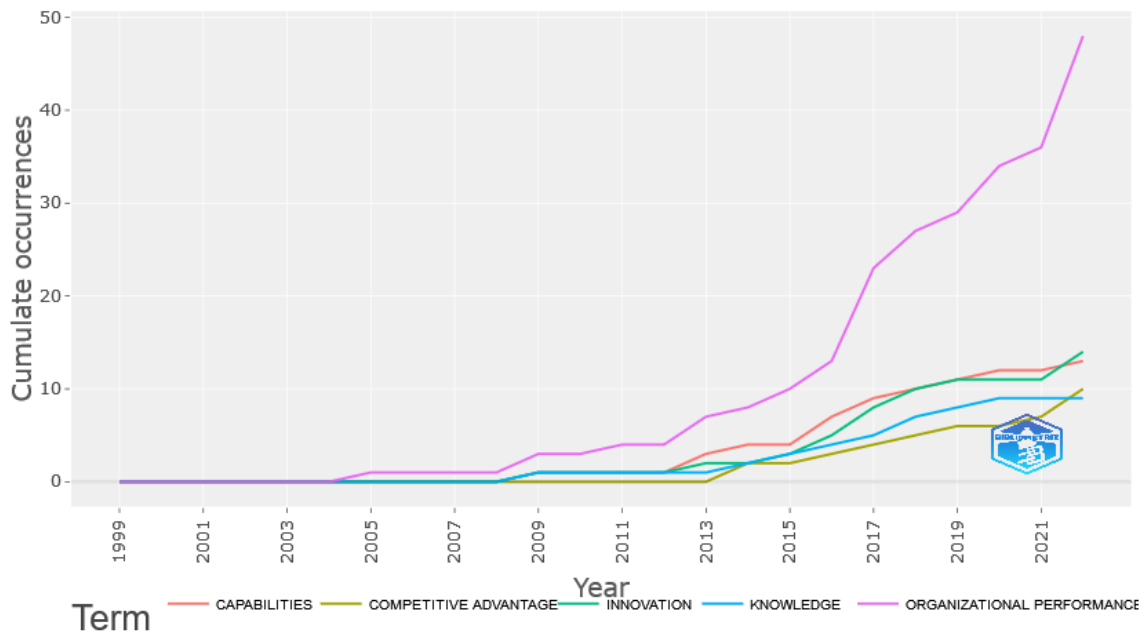


Figure 5 Dynamics and evolution on the use of keywords.

Source: Bibliometrix.

Table 2 displays the variables that were analysed in previous studies across various countries. These variables comprise 'Intellectual Capital', 'Knowledge Management', 'Strategic Partnerships', 'Innovation', and 'Organisational Performance'. Each variable was thoroughly examined to comprehend its correlation with organisational performance in SMEs. The studies analysed the variables that correlated and interacted with each other in various countries. The aim was to provide insights into how companies can optimize their performance through effective management of their intangible resources and strategic partnerships.

Table 2 Previous studies carried out, studied variables, and countries analysed.

Previous Studies	Countries	Studied Variables	Relationship
McDowell et al. (2018)	EUA	Intellectual Capital, Human Capital, Organisational Performance, Innovation	Positive

Mukaro et al. (2023)	Turkey	Intellectual Capital, Human Capital, Organisational Performance	Positive
Yang and Lin (2014)	Taiwan	Intellectual Capital, Human Capital, Relational Capital, Organisational Performance	Positive
Ferreira and Franco (2017)	Portugal	Strategic Partnerships, Intellectual Capital, Organisational Performance	Positive
Gupta (2022)	India	Intellectual Capital, Organisational Performance, Knowledge Management	Positive

The Sankey chart (see Figure 6) was elaborated with a central focus on three pillars (countries, authors, and keywords) to understand and to identify on what theme there is a greater focus on research carried out by the most influential authors within each country. It was possible to ascertain that the countries that produce scientific research on this theme are Malaysia, China, and the USA, with most of the research focused, as expected, on intellectual capital, performance, and innovation.

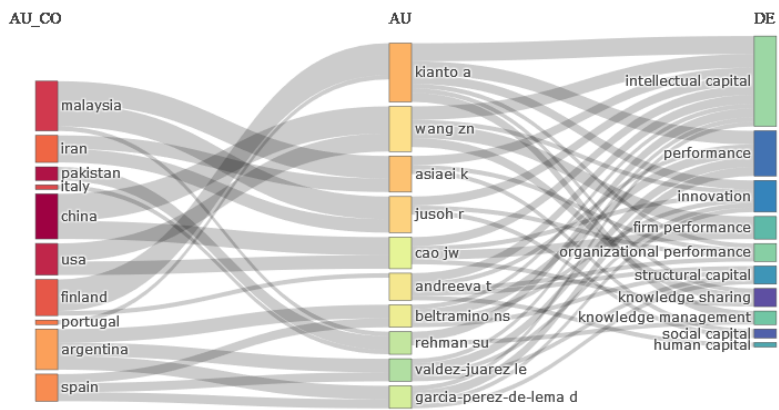


Figure 6. Sankey chart centered on three pillars: country-authors-keywords.

Source: Bibliometrix.

A co-citation analysis and a bibliographic coupling we performed in the current study. Co-citation analysis seeks to reveal both the intellectual framework of a study topic and the common theme of a particular set of bibliographic constructions (clusters) (Hjørland, 2013); (Rossetto et al., 2018). It also allows identifying which authors, journals, and articles are the most influential in the area of knowledge under study (Donthu et al., 2021). Bibliographic coupling analysis complements co-citation analysis and reveals a broad spectrum of topics and all their most recent developments, providing a snapshot of the current state of research. Since bibliographic linkage is more future-oriented and co-citation analysis is more past-oriented (Garfield, 2002), the complementary nature of the two enables a cross-sectional view over time, allowing for a greater understanding and the potential to define future lines of research. Based on this basic principle, the decision to adopt these two analysis techniques is based.

Co-citation analysis

Based on the number of publications, the three most relevant sources are the Journal of Intellectual Capital, with 18 publications, the Journal of Knowledge Management, with 6 and Management Decision, with 5 publications (see Figure 7).

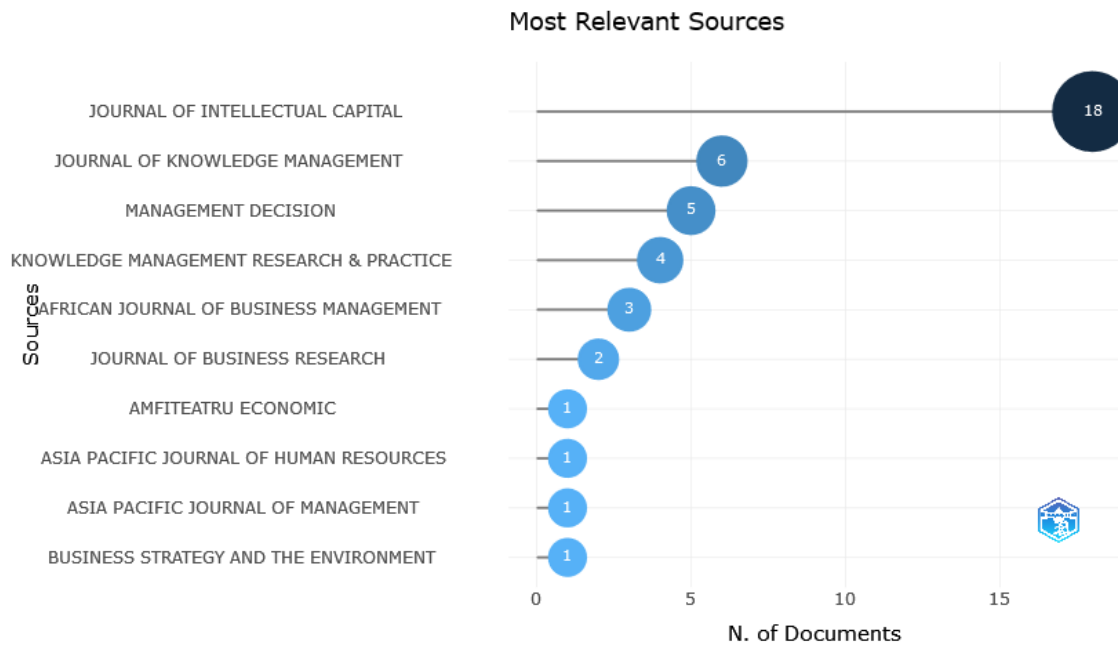


Figure 7. Most Relevant Sources.
Source: Bibliometrix.

Regarding the source of co-citation analysis, with a restriction to the minimum number of 20 source citations, a total of 42 sources distributed by 3 clusters were found (see Figure 8). The influence of the sources remains unchanged since the sources presented in Figure 7 maintains their prominent role. Cluster 1 (in red) has as a most influential source, precisely the Journal of Intellectual Capital, with 586 citations, 41 connections, with total strength of 19190. In cluster 2 (in green), the Journal of Knowledge Management is the most influential source, with 142 citations, 41 connections, with a total strength of 7163. Regarding cluster 3 (blue), it is the source with the least influence of the 3 clusters, Management Decision, with 117 citations, 41 connections and a total strength of 8187.

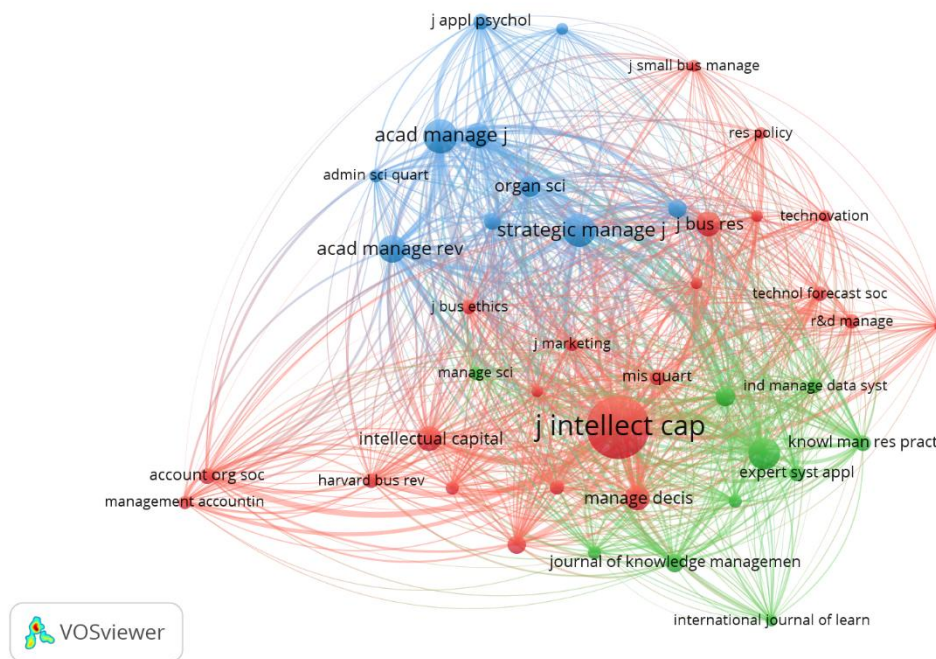


Figure 8 Co-citation analysis of cited sources.

Source: VOSviewer.

Performing an author co-citation analysis allows for identifying the most influential authors in the area of knowledge under study. To this end, an author co-citation analysis was carried out based on the database of 3151 authors, limited to a minimum of 10 citations, reducing the spectrum of the sample to 65 authors. The constellation shown in Figure 9 comprises three clusters with the most cited authors. In cluster 1 (in red), the most cited author is Wang, with 26 citations. Regarding cluster 2 (in green), Bontis Hair Jr. stands out with 89 and 37 citations, respectively. Finally, in cluster 3 (in blue), the dominant author is Kaplan, who has 32 citations.

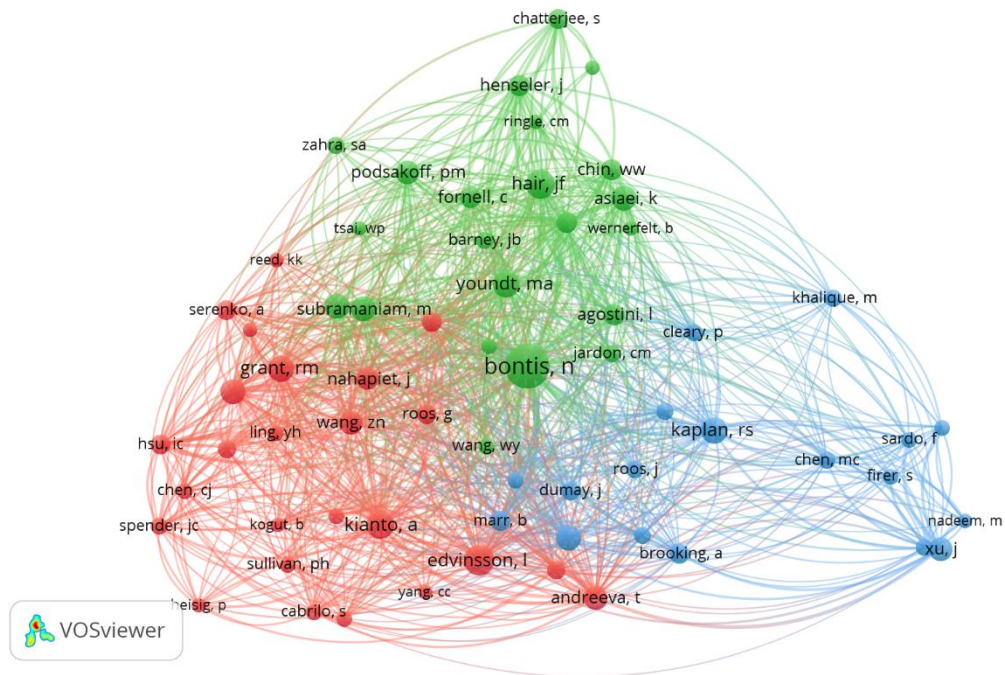


Figure 9 Co-citation analysis of cited authors

Source: VOSviewer.

In the bibliographic reference co-citation analysis, the database comprises 4128 articles applying the limitation of a minimum of 6 citations per document, resulting in 92 documents. This final output resulted in the cloud visible in Figure 10, giving rise to 4 clusters.

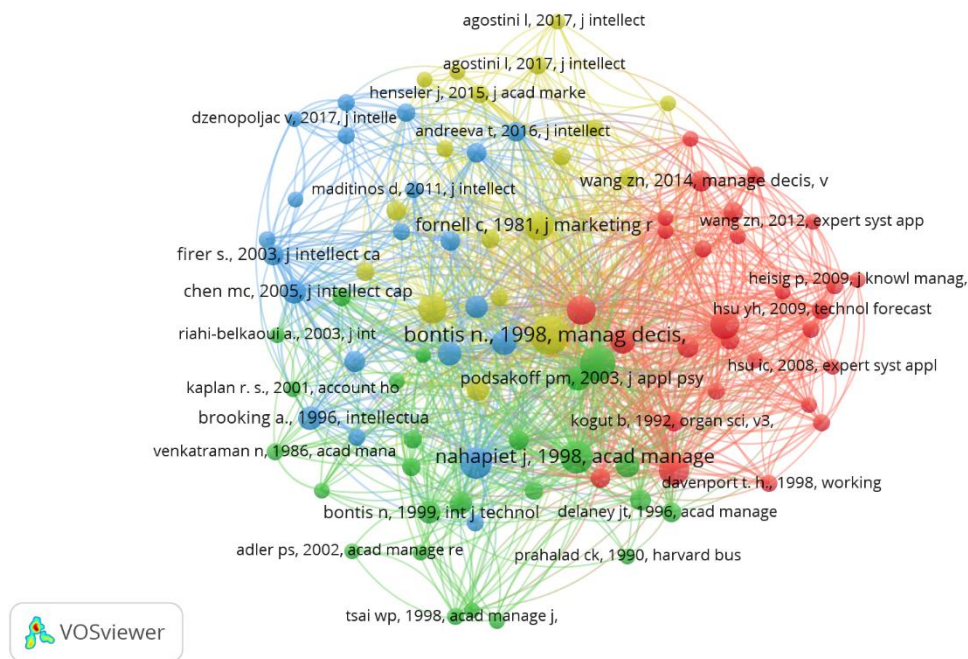


Figure 10. Co-citation analysis of cited references.
Source: VOSviewer.

Bibliographic Coupling Analysis

Bibliographic coupling was performed to ascertain the main research themes on the relationship between intellectual capital and organisational performance in SMEs. It can be concluded that a minimum number of citations per article should not be defined since the entire database is relatively recent. Finally, with a total of 61 articles selected, the number of minimum articles per cluster was limited to 10, resulting in an output of 4 clusters.

The analysis of the 61 articles, separated by 4 clusters, resulted in the cluster network being exposed in detail in Figure 11. The composition of each cluster represents a different approach to the theme under study – cluster (1) Intellectual Capital and Organisational Performance, cluster (2) Knowledge Management, cluster (3) Innovation, and cluster (4) Strategic Partnerships.

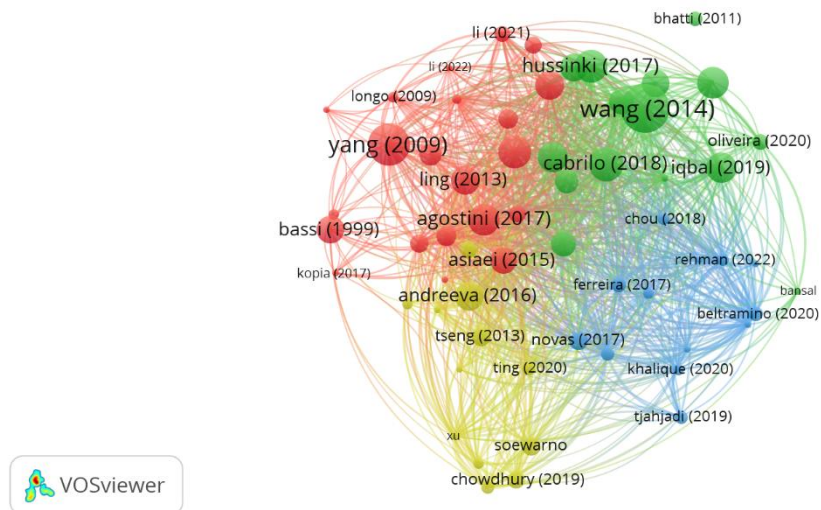


Figure 11 Bibliographic coupling analysis.

Source: VOSviewer.

Cluster 1 | Intellectual Capital and Organisational Performance (N=21) Red

The authors Bassi and Buren (1999) clarify the importance of organisations correctly assessing the importance of intellectual capital in organisational performance. The correct planning and investment in these components ease the achievement of competitive advantage. The problem lies in the organisations that, besides not knowing what provides them with advance and growth, they do not understand how and where to invest for this can happen. As such, and to solve this chronic problem in organisations, the authors Carriere (2009) stress the importance for organisations to define, in a clear way, what their medium-long term intentions are. In other words, stipulating the investment in training, development and career progression of their employees will allow them to bring unquantifiable added value to the organisation. However, there is another fundamental premise: the choice of the right candidates. For this reason, there must be also greater investment in this area. The consistency of these investments will allow the promotion of important organisational messages, such as vision, mission, and values, which will trigger the promotion of organisational culture (Carriere, 2009).

Organisational culture is presented as the foundation that provides the development of the relationship between intellectual capital and organisational performance in SMEs (Asiaei et al., 2015). This phenomenon also enables the development of some constructs of intellectual capital, such as structural and relational capital. That is, the relationship between intellectual capital and organisational performance is not only one-way but two-way. The authors reinforce the importance of leadership in this relationship since good leadership motivates and eases

knowledge sharing. Bhatti and Christofi (2020) corroborates this idea and add human capital as a fundamental construct for leveraging organisational performance. According to Li (2021) and (Nagwan et al., 2021), with the correct use of human capital in conjunction with the emotional capabilities of organisations, it is possible to continue improving SMEs' performance. Thus, for this resource to significantly impact organisations, it is necessary to create investment mechanisms that allow its development (Chen and Zhu, 2020).

The development of intellectual capital also facilitates the mediation of the relationship between knowledge management and organisational performance (Daud et al., 2011). Knowledge management is characterised as one of the key elements that help SMEs improve their performance. Another way to justify this result is to consider what Ling (2013) highlights in his research. Thus, (Agostini and Nosella, 2017) presents two ways to achieve this goal. Intellectual capital is present in all organisations. However, we can either consider it and invest in it or not. This is where organisations are divided into two sets. The first set is where intellectual capital is not invested and ends up being underutilised. The second one is where investment and intellectual capital maintenance are considered, boosting organisational performance. This also benefits from the improvement in the internal organisation of SMEs, which directly relates to their performance but is not directly linked to their economic success (Jardon et al., 2014).

Therefore, it is safer to say that good organisational planning benefits the achievement of better performance through the correct use of intellectual capital (Asiaei and Jusoh, 2017) and allows to make strides towards organisational sustainability. Other authors, such as Han and Li (2015) reinforce the importance of intellectual capital by emphasising that organisational performance depends on organisations' ability to make correct and timely decisions through their perception of opportunities and threats they face. Only in this way is it possible, in an efficient way, to improve SMEs' productivity, an element directly related to the performance of organisations (Kengatharan, 2019).

In conclusion, intellectual capital is crucial for enhancing organisational performance in various sectors. It comprises intangible assets such as knowledge, skills, experience, and relationships, which enable organizations to innovate, adapt to change, and gain a competitive edge in the market. Effective management of intellectual capital allows companies to utilize their internal resources and external networks to improve productivity, encourage innovation, and accomplish strategic objectives.

Cluster 2 | Knowledge Management (N=15) Green

Besides being dependent on the productive capacity of the employees, the productivity of an organisation is linked to the performance of the intellectual capital that, in turn, eases organisational performance (Ahangar, 2011). In this way, it becomes essential that SMEs become increasingly aware of the strategic asset, that is, knowledge management (Bhatti et al., 2011).

Some organisations' underlying problem is their inability to apply knowledge management policies appropriate to their contexts and environments. Authors like Mehralian et al. (2018) reiterate the importance of developing and investing in intellectual capital and knowledge management concepts from the very beginning of organisations' lives and throughout their time in business. Only in this way can it positively impact organisational environments, thus improving the outlook for future generations of professionals (Pigola et al., 2022).

For knowledge management to play a key role in the relationship between intellectual capital and organisational performance in SMEs, they must strategically plan their social decisions (Archer-brown et al., 2018). That is, the increasing preponderance of SMEs in the social environment forces them to respond to these issues seriously, as the advantages they can enjoy are pending their social action. Strategic knowledge management directly affects the components of the intellectual capital of the relational capital, the structural capital (Heisig et al., 2016), (Cabrilo et al., 2018) and knowledge sharing (Oliveira et al., 2020) stand out.

Knowledge management emerges as a mediator of the relationship between intellectual capital and organisational performance, where it starts to register a positive variation, improving all operational dynamics of SMEs (Hussinki et al., 2017) due to the ability of employees to share knowledge (Wang et al., 2015; Wang et al., 2016). Knowledge management can positively affect organisational performance due to its direct and indirect interactions with intellectual capital (Amjad et al., 2019). Later, the authors Bansal et al. (2022) went further and strengthened the theory by presenting more objective findings. They concluded that when high levels of intellectual capital and knowledge management exist in each organisation, it tends to perform well above its competitors.

However, Kianto et al. (2013) warns against conducting too direct analysis. The author recalls that, despite the positive mediation of knowledge management in the relationship between intellectual capital and organisational performance, the latter is dependent on good intellectual capital management policies. That is, if SMEs, as mentioned above, do not invest in the management of intellectual capital, and do not adapt their policies, the possibility of positively affecting their performance is drastically reduced (Wang et al., 2016).

In conclusion the relationship between intellectual capital and knowledge management is crucial for enhancing organisational performance. Intellectual capital refers to the intangible assets, knowledge, and expertise embedded within an organization. Knowledge management involves systematic processes for creating, sharing, and utilizing this knowledge effectively. By aligning intellectual capital with knowledge management practices, organizations can optimize the utilization of their intellectual resources, enhance decision-making processes, and foster innovation. This synergy enables organizations to adapt to changing environments, capitalize on emerging opportunities, and sustain competitive advantage in the long term.

Cluster 3 | Innovation (N=13) Blue

A good organisational structure allows the creation of better conditions for the performance of SMEs. Articulating intellectual capital with knowledge management improves organisational performance through the impact of innovation (Beltramino et al., 2022). Although process innovation is directly affected by an organisation's communication style, it allows for improving intangible components of organisations, such as culture and organisational capital (Tjahjadi et al., 2019). Depending on the technology embedded in an organisation, the level of employee engagement can vary, facilitating the consumer experience (Chou et al., 2018). Customer acquisition is a fundamental step in the life of organisations. In essence, their performance depends on consumer behaviour and the ease with which they accept and interact with innovations, in this case, technological innovations, implemented by organisations.

Thereby, let's consider that organisations plan and seek to improve their organisational performance. The investment in technology-based innovations represents a strong link to the basic constructs of intellectual capital (Novas and Sousa, 2017). The strategy of each organisation is intrinsic to each one of them. However, the constructs of intellectual capital and strategic partnerships are mainly responsible for improving performance (Ferreira and Franco, 2017). That is the correct investment in innovation and using resources, such as intellectual capital and strategic partnerships, will enhance SMEs' resources and dynamics, eliminating some gaps and clearly improving their performance (Khalique and Abdul, 2020).

More recently, authors like Asiaei et al. (2015) and Beltramino et al. (2022) have demonstrated the importance of investing in innovation and the impact of this action on some of the components of intellectual capital. Human capital and structural capital are the two constructs most affected by investment in innovation; it is possible to associate this investment with a more sustainable environmental performance (Chatterjee et al., 2022). In other words, for SMEs to reap the maximum benefits associated with green resources, it is necessary to synchronise adequate organisational control with intellectual capital valences (Rehman et al., 2022). Thus, it is possible to state that organisational performance and competitive advantage are directly affected by innovation and the repercussions it has on intellectual capital and knowledge management (Rehman et al., 2022).

In conclusion innovation is essential for driving organisational performance and achieving long-term success. By continuously innovating products, services, processes, and business models, organizations can adapt to changing market dynamics, meet evolving customer needs, and gain a competitive edge. Innovation enhances efficiency, productivity, and profitability while enabling organizations to stay ahead of the curve and differentiate themselves from competitors. Moreover, adopting a culture of innovation promotes creativity, collaboration, and employee engagement, resulting in improved performance and organisational resilience.

Cluster 4 | Strategic Partnerships (N=12) Yellow

Considering an approach that began to gain momentum in the early 10s of the XXI century (Yitmen, 2015), strategic partnerships have come to the forefront where the scrutiny of this construct has been gaining increasing importance. According to Andreeva (2016), organisational performance tends to suffer a more significant impact when there is a greater bet on intellectual capital, mainly structural and relational capital. This bet will allow the creation of better opportunities for the development of bilateral relationships (Xu and Liu, 2022). The ability to unite the human capital of two or more organisations for the sake of organisational efficiency turns out to be scarce (Afroz et al., 2019). That is, some SMEs still need to internalise how much better their organisational performance could be if they worked together with several organisations (Afroz et al., 2019).

The better the access to information, the greater the ability of SMEs to achieve better organisational performance through intellectual capital investment and strategic partnerships (Gravili et al., 2020). Although investment in intellectual capital points to the various constructs, structural and relational capital will stand out the most (Özer and Ergun, 2015). Thus, the possibility of leveraging strategic partnerships becomes a reality with grounds to happen; that is, the relationship between intellectual capital and organisational performance in SMEs exists, and both constructs influence each other (Soewarno and Tjahjadi, 2017).

However, strategic partnerships should emerge as moderators of this relationship, developing organisations both structurally and economically, as well as creating a more significant competitive advantage that will allow for greater longevity and growth of SMEs (Tseng et al., 2013; Ting et al., 2020). By using strategic partnerships as a moderator of the relationship between intellectual capital and organisational performance, it is possible to leverage both constructs and improve organisations' results in the medium to long term (Xu and Li, 2019).

In conclusion the connection between intellectual capital and strategic partnerships is crucial for improving organisational performance. Intellectual capital refers to an organization's knowledge, expertise, and intangible assets, while strategic partnerships involve collaborative relationships with external entities to achieve mutual goals. Organizations can enhance their competitive position and fuel growth by leveraging intellectual capital through strategic partnerships. These partnerships facilitate knowledge exchange, innovation, and the creation of new opportunities, enabling organizations to expand their market reach, mitigate risks, and capitalize on emerging trends.

Framework - Intellectual Capital and Organisational Performance in the Construction Sector

Considering the clusters identified through the bibliographic coupling of the 61 articles, Figure 10 shows the proposed framework for the theme "Intellectual Capital and Organisational Performance in SMEs/Construction Companies". In general, the relationship between intellectual capital and organisational performance has positive aspects for organisations. The correct investment in intellectual capital always enhances organisational performance, which can benefit from the correct knowledge management that requires applying policies that allow development. This way, knowledge management can mediate the relationship between intellectual capital and organisational performance. On the other hand, strategic partnerships emerge as a differentiating element where their ability to moderate the relationship described above improves organisational performance and creating more significant competitive advantage.

These two processes of mediation and moderation can be analysed independently; that is, the model represented in Figure 12 can be divided into two distinct models. The first model, where knowledge management mediates the relationship between intellectual capital and organisational performance and the second one, where strategic partnerships moderate this same relationship. However, it should be noted that in both models, innovation is a constant that influences the relationship described. This obtains greater benefit if the two models merge into one, as it is presented in Figure 10.

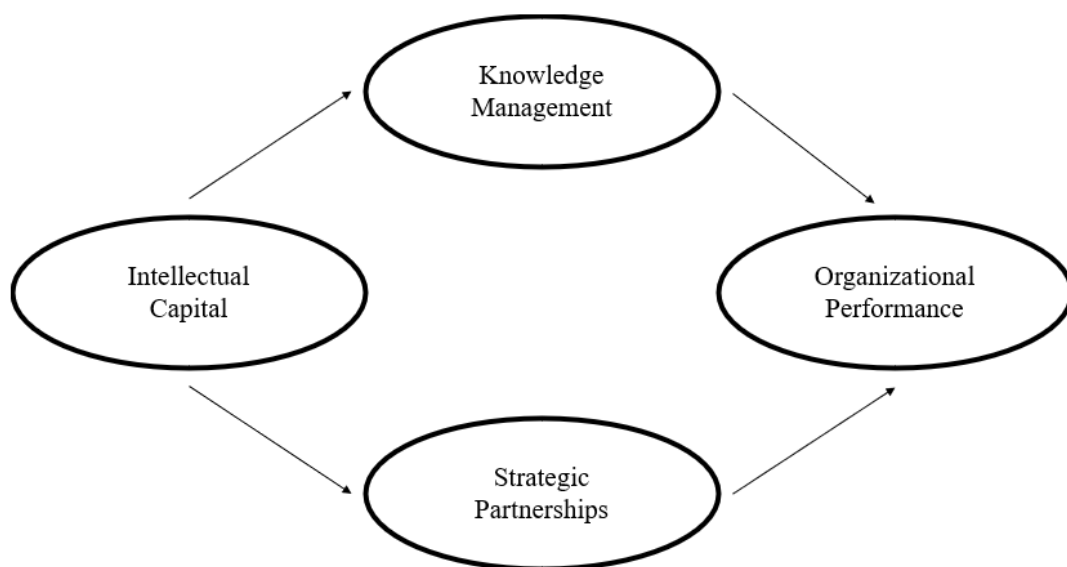


Figure 12 General Framework.

Future Lines of Research

Future research could investigate the mechanisms through which intellectual capital affects organisational performance in construction SMEs (Rexhepi et al., 2013). Longitudinal studies could provide deeper insights into the long-term effects of intellectual capital on performance outcomes. It is also recommended to explore the specific mechanisms through which intellectual capital impacts organisational performance in construction SMEs. Furthermore, conducting longitudinal studies could provide deeper insights into the long-term effects of intellectual capital on performance outcomes. Exploring these avenues would contribute to a more comprehensive understanding of the intricate relationship between intellectual capital and organisational performance in the context of construction SMEs.

Additionally, it would be valuable to examine how different types of intellectual capital, such as human capital, structural capital, and relational capital, individually influence organisational performance within the construction SME sector. This approach could provide a deeper understanding of the unique contributions of each form of intellectual capital to overall performance, offering tailored insights for SME managers and decision-makers.

Moreover, future research could explore the influence of external factors, such as industry dynamics, market conditions, and regulatory environments, on the relationship between intellectual capital and organisational performance in construction SMEs. This would provide a more holistic perspective and inform the development of targeted strategies for enhancing performance in this sector.

Conclusions

The need for SMEs to view the future more critically has revealed the need to change investment strategies and policies. It still needs to be considered within SMEs (mainly family-owned ones), and intellectual capital stands out as the key to easing organisations' growth and maturity (Chen and Zhu, 2020). In this sense, intellectual capital and organisational performance appear related to one construct forcing the other to grow, improving the environment for employees, customers, and the economy (Li et al., 2021).

Research on the topic under review in this article is recent, with research reaching a peak in 2020. The considerable increase in research on the issue from the beginning of the century to the present day is due to the need for organisations to compete and leverage their progress through the strategic application of investments and policies (Han and Li, 2015).

As far as possible, no systematic literature review was identified that addressed the topic. Thus, this study contributes to a holistic view of the relationship between intellectual capital and organisational performance in SMEs. Identifying the sub-themes present in the research area is

also defined, allowing the identification of some gaps in state of the art and, thereby, suggesting possible lines of research.

The bibliometric analysis allowed the identification of sets of constructs with strong links between them. The bibliographic coupling allowed the identification of 4 clusters – cluster (1) Intellectual Capital and Organisational Performance, cluster (2) Knowledge Management, cluster (3) Innovation, and cluster (4) Strategic Partnerships, allowing us to answer the question "What are the dominant sub-themes in the knowledge area under analysis?"

The co-citation analysis allowed us to ascertain the most cited/influential authors (Yang et al., 2014; Han and Li, 2015; Wang et al., 2015; Hussinki et al., 2017; Cabrilo et al., 2018) and the journals with the most significant number of publications on the theme under analysis – Journal of Intellectual Capital, the Journal of Knowledge Management and Management Decision, in descending order. This research allowed answering the following questions: "Which are the most influential authors?" and "Which journals have the most publications?"

To answer the research question of the study conducted, "What are the impacts of intellectual capital on SMEs/construction firms?" the bibliometric analysis allowed us to ascertain the impacts of intellectual capital on SMEs but did not make a clear statement about construction firms due to the lack of literature. In this way, it was verified that when there is a coherent line of investment in intellectual capital, its constructs are strengthened and, in turn, through a two-way relationship, allow for a better organisational performance that, in the opposite direction, stimulates the development of intellectual capital. Nevertheless, knowledge management and strategic partnerships play a key role in this relationship. This role can be played individually or jointly, as shown in the model present in the "Framework" chapter. In other words, through the mediation of the relationship between intellectual capital and organisational performance, knowledge management can enhance the performance and productivity of SMEs. At the same time, strategic partnerships facilitate the leverage of both constructs by moderating the same relationship. Regarding innovation, although playing a key role in the advancement and growth of organisations, it does not play a pivotal role in improving organisational performance. In short, if an organisation is not aware of the ability of these constructs to work together, it may be undervaluing and underutilising all its competencies. In contrast, an organisation that understands how to put all these strengths to work together achieves better results through improved performance.

Like any research, this RSL (Systematic Review of the Literature) is not immune to limitations in its process. The fact that it only uses one database (Web of Science) restricts the search spectrum, and documents of relevance and interest have not been considered. The different filters that were used to narrow and focus the research have a double face in the sense that they provide a focus within the theme but inhibit the holistic view of the theme. Finally, there is a lack of studies applied to various economic areas, including the area of construction, especially in the Portuguese context, which forced us to broaden our field of investigation to SMEs.

In conclusion, the article's findings and methodological approach contribute to the current understanding of intellectual capital and organisational performance in construction SMEs. Additionally, they pave the way for future research directions that can further enrich the literature and offer actionable insights for industry practitioners and policymakers.

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Chapter 4

The effect of Intellectual Capital and Strategic Partnerships in Construction Companies

Abstract

The construction industry is facing significant challenges due to globalization, increasing competition, and rapid technological advancements. In this context, intellectual capital and strategic partnerships have emerged as essential factors for the success and competitiveness of construction companies. Intellectual capital encompasses a company's intangible assets, such as knowledge, skills, experience, expertise, and relationships. At the same time, strategic partnerships involve a mutually beneficial relationship between two or more organizations that work together to achieve common goals. This paper aims to explore the effect of intellectual capital and strategic partnerships on the performance and competitiveness of construction companies. This article utilizes a statistical approach to analyze the variables in question through Structural Equation Modeling (SEM). The proposed hypothesis was evaluated using this method. Data were gathered through a questionnaire distributed to 88 individuals in managerial positions at small and medium-sized enterprises (SMEs) in the construction industry. The findings suggest that intellectual capital and strategic partnerships can significantly improve construction companies' innovation, efficiency, and competitiveness. However, effective management and utilization of these assets require a clear understanding of the company's goals, resources, and capabilities, as well as the development of a collaborative and knowledge-sharing culture. The paper concludes by proposing future research directions and practical implications for construction companies to enhance their intellectual capital and strategic partnerships.

Keywords: intellectual capital, strategic partnerships, construction industry, knowledge management, competitiveness.

Introduction

The construction industry has undergone a significant transformation over the years, driven by technological advancements and increasing global competition. To remain competitive, construction companies need to focus on developing and leveraging their intellectual capital and forming strategic partnerships (Asiaei & Jusoh, 2017). Intellectual capital, which includes

knowledge, skills, and expertise, has been identified as a key driver of organisational performance and competitiveness. Strategic partnerships, on the other hand, allow firms to access resources, capabilities, and knowledge that they do not possess in-house, thereby enhancing their competitive advantage (Ali et al., 2021).

This paper aims to investigate the effect of intellectual capital and strategic partnerships on the performance and competitiveness of construction companies. By examining these two constructs, the study seeks to provide insights into how construction companies can enhance their performance and competitiveness in a rapidly changing environment. To achieve this objective, a review of the relevant literature on intellectual capital and strategic partnerships in the construction industry will be conducted, followed by an empirical study of construction companies. This research is part of a set of papers belonging to ongoing research. Since data collection is still ongoing, the nature of this paper is purely exploratory.

The paper is structured as follows. The next section provides a review of the literature on intellectual capital, strategic partnerships, and their relationship with organisational performance and competitiveness. This is followed by a section on research methodology, which outlines the research design, data collection, and analysis procedures. The results of the study are then presented and discussed in the subsequent section. The final section concludes the paper by summarizing the findings, highlighting their implications for construction companies, and suggesting directions for future research.

Literature Review

The construction industry has been facing significant challenges in terms of its performance and competitiveness in recent years. As a result, many construction companies have started to focus on strategies that can enhance their performance and competitiveness. Two such strategies that have gained significant attention in recent years are the development of intellectual capital and the formation of strategic partnerships (Afroz et al., 2019).

Intellectual capital is a crucial factor for companies to achieve and maintain a competitive advantage in the current business environment. The concept of intellectual capital encompasses three main components: structural, relational, and human capital (Matos et al., 2020).

Structural capital refers to the organisational infrastructure, systems, and processes that support knowledge creation, sharing, and utilization. It includes intellectual property, patents, trademarks, copyrights, databases, and proprietary software. Structural capital is essential for companies to capture and retain the knowledge and expertise that is embedded in their processes and systems (Edvinson & Malone 1997). Relational capital, on the other hand, refers to the network of relationships that a company has with its stakeholders, such as customers, suppliers, and partners. These relationships provide access to external knowledge, information, and resources, which can be leveraged to enhance a company's intellectual capital. Relational capital is particularly important in the construction industry, where collaboration and coordination with

other stakeholders are critical for project success (Matos, 2013). Human capital refers to the knowledge, skills, and expertise of a company's employees. It includes both explicit knowledge, such as technical and professional skills, and tacit knowledge, such as experience and intuition. Human capital is the most critical component of intellectual capital, as it is the source of innovation and creativity (Edvinson & Malone 1997).

Several studies have highlighted the importance of intellectual capital for construction companies. For example, Liu et al. (2022) found that intellectual capital positively affects the performance of construction firms. Similarly, Li et al. (2019) found that intellectual capital has a significant positive effect on the competitiveness of construction companies. In addition to intellectual capital, strategic partnerships are also critical for the success of construction companies. Strategic partnerships can provide access to resources and capabilities that a company may not have on its own, such as specialized knowledge, technology, and expertise. Several studies have emphasized the importance of strategic partnerships in the construction industry. For example, Bilgin et al. (2015) found that strategic partnerships positively affect the innovative performance of construction companies.

Overall, the literature suggests that intellectual capital and strategic partnerships are crucial factors for the performance and competitiveness of construction companies. The effective management of intellectual capital and strategic partnerships can help construction companies to achieve their objectives and sustain their competitive advantage in the long term (Zhytchenko et al., 2017). However, it is important for construction companies to carefully select their partners and establish clear goals and communication channels to ensure that the partnership is effective and beneficial for all parties involved.

Theory and Hypothesis

Intellectual capital is a critical resource for firms in the construction industry because it can enable firms to develop new and innovative solutions to complex problems, improve their operational efficiency, and increase their overall competitiveness. According to the resource-based view of the firm, the availability and effective use of intellectual capital can provide construction firms with a sustainable competitive advantage over their rivals (Li et al., 2019). In this context, the following hypothesis is proposed:

Hypothesis 1: There is a positive relationship between intellectual capital and construction firm performance.

Strategic partnerships can also have a significant impact on the performance and competitiveness of construction companies. By forming alliances with other companies in the industry, construction firms can leverage their complementary strengths and resources to achieve common goals, such as reducing costs, improving quality, and increasing innovation. In addition, strategic partnerships can help companies access new markets and customers and build stronger

relationships with suppliers and other stakeholders (Hao & Song, 2016). Based on these findings, the following hypothesis is formulated:

Hypothesis 2: There is a positive relationship between strategic partnerships and construction firm performance.

Finally, it is expected that intellectual capital and strategic partnerships may have a complementary effect on the performance and competitiveness of construction companies. By combining their intellectual resources and forming strategic alliances, construction firms can increase their innovation capability, improve their operational efficiency, and increase their market share (Ferreira & Franco, 2017). Therefore, the following hypothesis is proposed:

Hypothesis 3: The combined effect of intellectual capital and strategic partnerships is positively related to the performance of construction companies.

Data and Method

The validation of the hypotheses under investigation relies on a set of observational data obtained from the questionnaire provided in the appendix. Drawing from theoretical insights, the following structural equation model has been developed.

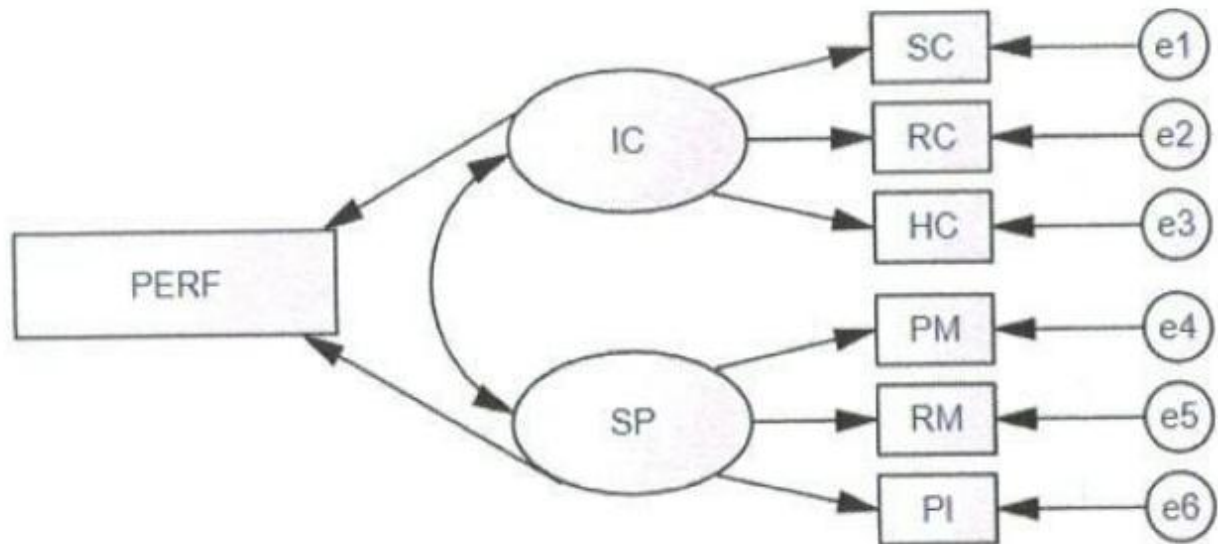


Figure 13 Proposed Structural Equation Modeling

Organisational performance (PERF) serves as the dependent and observable variable in the model, reflecting the organization's success across various indicators, such as financial performance, innovation, productivity, and customer satisfaction, as previously outlined.

Consequently, performance is measured empirically and is directly impacted by two latent variables: strategic partnerships and intellectual capital.

The latent variable, strategic partnerships (SP), pertains to the organization's capability to effectively establish and maintain collaborative relationships with other entities. While not directly observable, this variable can be inferred through three observable indicators: partnership management, relationship management, and partnership implementation. The latent variable, intellectual capital, includes the collection of intangible assets that are essential for organisational success. Similar to strategic partnerships, intellectual capital (IC) is not directly measurable; instead, it is inferred through three observable components: relational capital, structural capital, and human capital. The interconnections between these constructs are of paramount importance for the enhancement of each company, enabling the elimination of its less advantageous characteristics and the exploitation of the collective success of cooperative companies. The observable variables were measured through Q7 to Q28 and through Q35 to Q40 of the questionnaire in appendix.

The empirical analysis in this study relies on primary statistical data gathered from various SMEs in the construction sector. To build the database, information was collected on the characteristics of individuals employed in construction companies, as well as data related to the intellectual capital and strategic partnerships of organizations operating within this field. There is the proposed model:

$$[\text{PERF} = \beta_1 \cdot \text{SP} + \beta_2 \cdot \text{IC} + \epsilon]$$

In the second phase, to validate the proposed SEM, feedback was gathered using a five-point Likert scale, ranging from (1) strongly disagree to (5) strongly agree. This structured method allowed for an in-depth assessment of the relevant constructs within the study, enabling a detailed understanding of the relationships under examination. The results presented in this study include descriptive statistics of the variables, the relationships among them, and the SEM analysis, which allows for testing the proposed hypotheses. All statistical analyses were conducted using IBM SPSS AMOS Version 24.

To measure intellectual capital, it was used the scale of Matos et al. (2020), where the relational, structural and human components are evaluated. In the same sense, to measure the construct strategic partnerships the scale of Hoffmann and Schlosser (2001) was used. Finally, the scale used to measure performance through the ability of organizations to innovate (Elsaman et al., 2022). Responses were given on a five-point Likert scale ranging from (1) strongly disagree to (5) strongly agree. Using SPSS (version 28) correlation analyses were performed in order to test hypotheses 1, 2 and 3.

Sample Characterization

The sample consists of the opinions of eighty-eight (n=88) people with management roles in SMEs in the construction industry. It is characterized by being mostly made up of graduates up to master level, with only (25%) doctorates. Two thirds of the participants work in the human resources areas, in the department or administration of the organization under analysis. As for the period of work, (8%) have worked in the organization for less than a year, (46,6%) have worked in the organization for between one and five years, (23,9%) have worked in the company for between six and ten years, and (21.6%) have worked in the company for more than ten years. Most of the respondents work in organizations with less than 250 employees and with a turnover of less than 10 million euros.

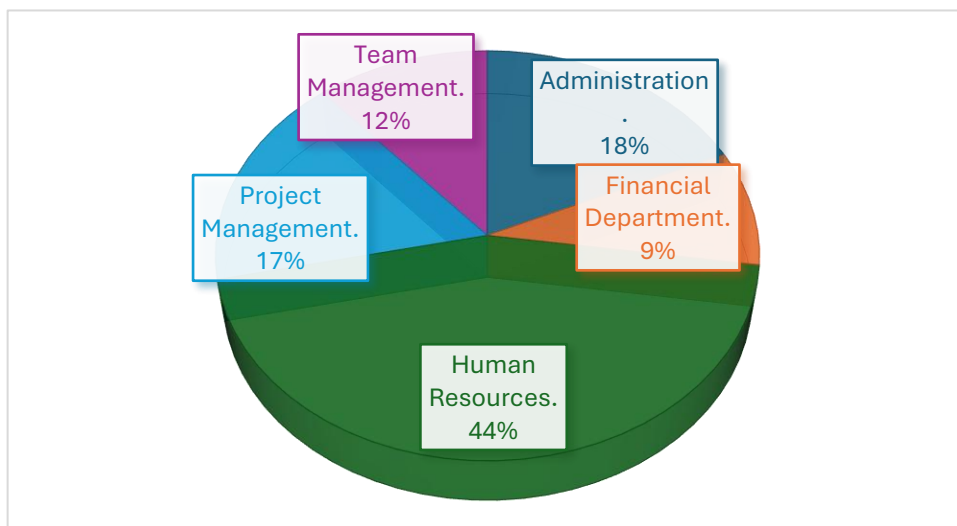


Figure 14 Company Department

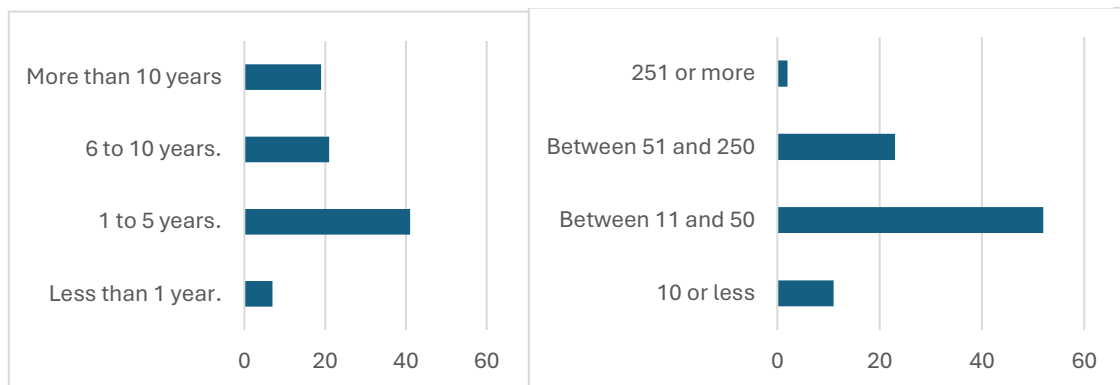


Figure 15 Number of Employees and Number of Years at the Company

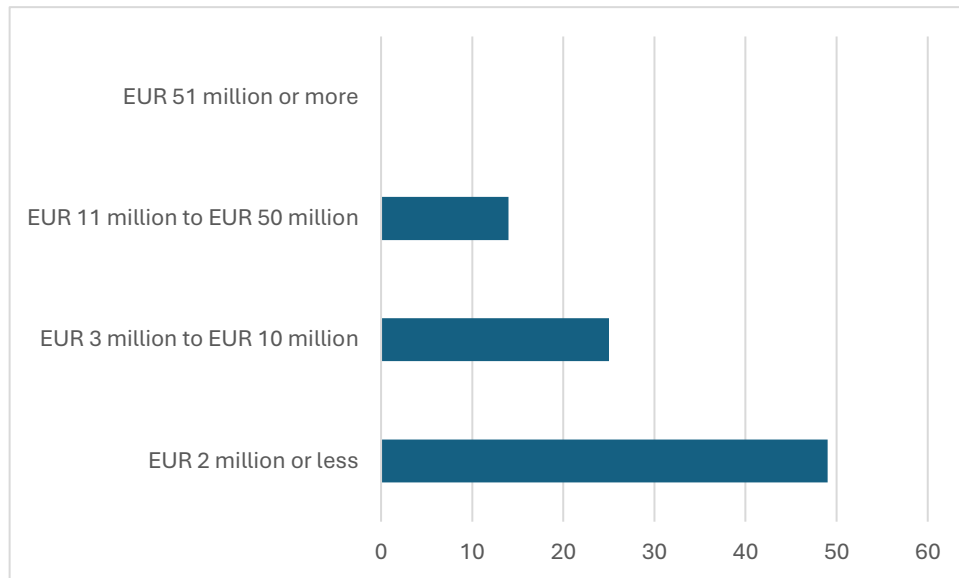


Figure 16 Turnover.

Data Analysis

In today's complex and competitive business landscape, organizations are constantly looking for ways to improve their performance and gain a competitive advantage. Two key factors that have emerged as crucial drivers of success are intellectual capital in its components relational capital, structural capital and human capital, and strategic partnerships. After collecting data and testing Cronbach's Alpha, we conclude that the questionnaire has a good reliability (0.839). The analysis reveals a positive and highly significant correlation between intellectual capital and strategic partnerships. In this sense, the human capital and relational capital constructs stand out for their positive and highly significant relationship with strategic partnerships. This suggests that construction firms with higher levels of human capital and relational capital are more likely to engage in strategic partnerships, achieving more success with them. Structural capital also appears with a positive and quite significant correlation with strategic partnerships, however, with less weight than the other constructs.

Furthermore, the analysis shows a positive and significant correlation between strategic partnerships and organisational performance, as well as a positive and significant correlation between intellectual capital and performance. In this scenario, the construct with the highest weight is human capital. This implies that construction firms that establish strategic partnerships and apply intellectual capital management policies tend to achieve better results in terms of organisational performance. Strategic partnerships allow firms to access complementary capabilities, share risks and resources, and leverage synergies, ultimately leading to better performance. The results highlight the importance of intellectual capital and strategic partnerships to the performance of construction firms. By effectively developing and managing intellectual capital, firms can improve their knowledge base, innovation capabilities, and

operational efficiencies. Engaging in strategic partnerships allows them to leverage external expertise, expand their market reach, and access new opportunities.

In view of the results obtained, and as referenced above, it is possible to verify that all the hypotheses are true. By validating them it becomes clear the importance of the variables intellectual capital, where the three constructs stand out, and strategic partnerships in the organisational performance in companies in the construction sector. Thus, hypothesis 1, where the focus was the positive relationship between intellectual capital and the performance of organizations in the sector (Liu et al., 2022), hypothesis 2, where the focus is the positive relationship between strategic partnerships and organisational performance (Bilgin et al., 2015) and, finally, hypothesis 3, where the focus is the positive impact caused by the relationship between intellectual capital and strategic partners on the performance of companies in the construction sector (Zhytchenko et al., 2017) are validated.

Table 3 Correlations of variables.

	IC	SC	HC	RC	SP	PERF
IC					,681**	,501**
SC			,508**	,516**	,478**	,300**
HC				,662**	,672**	,509**
RC					,556**	,458**
SP						,630**

**Correlation is significant at the 0,01 level (2-tailed)

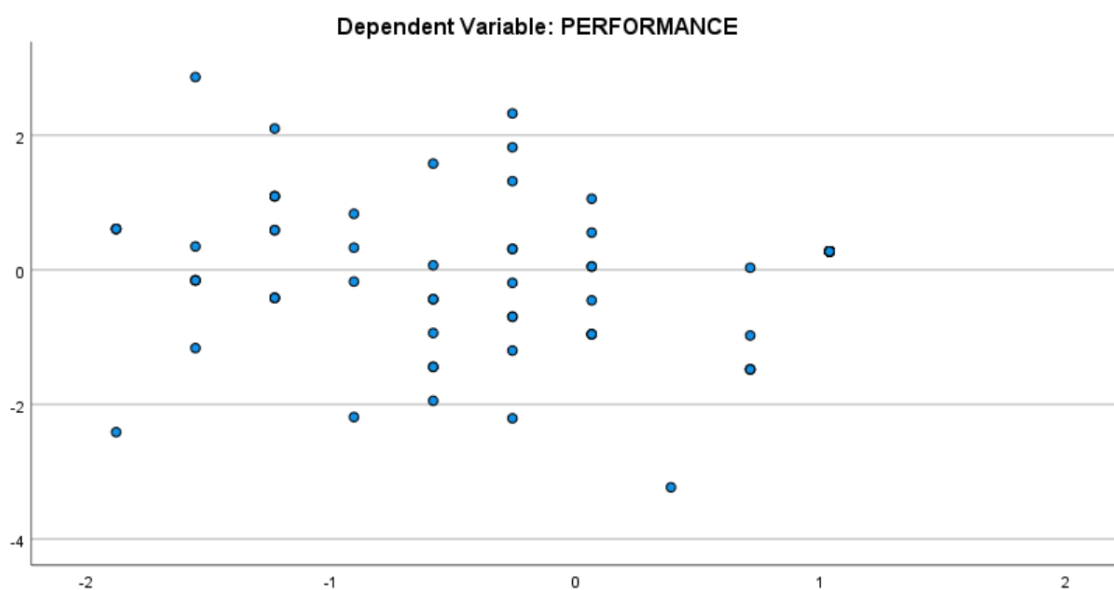


Figure 17 Scatterplot - Dependent Variable - Performance; Independent Variables - Intellectual Capital and Strategic Partnerships

To test the research hypotheses, SEM was employed, a robust statistical methodology frequently regarded as an extension of multiple linear regression (Diehl, 2004; McCusker & Gunaydin, 2014). SEM enables the analysis of the effects of multiple independent variables on dependent variables while simultaneously assessing all interrelationships among the factors involved in the phenomenon being studied (García-Morales et al., 2013). Although the data did not fully satisfy the distribution and linearity assumptions required by the estimation method, the use of SEM was still considered to be valuable for estimating the model through an empirical approach using IBM SPSS AMOS Version 24. By combining insights from regression and SEM estimation, the findings are deemed to have practical operational value.

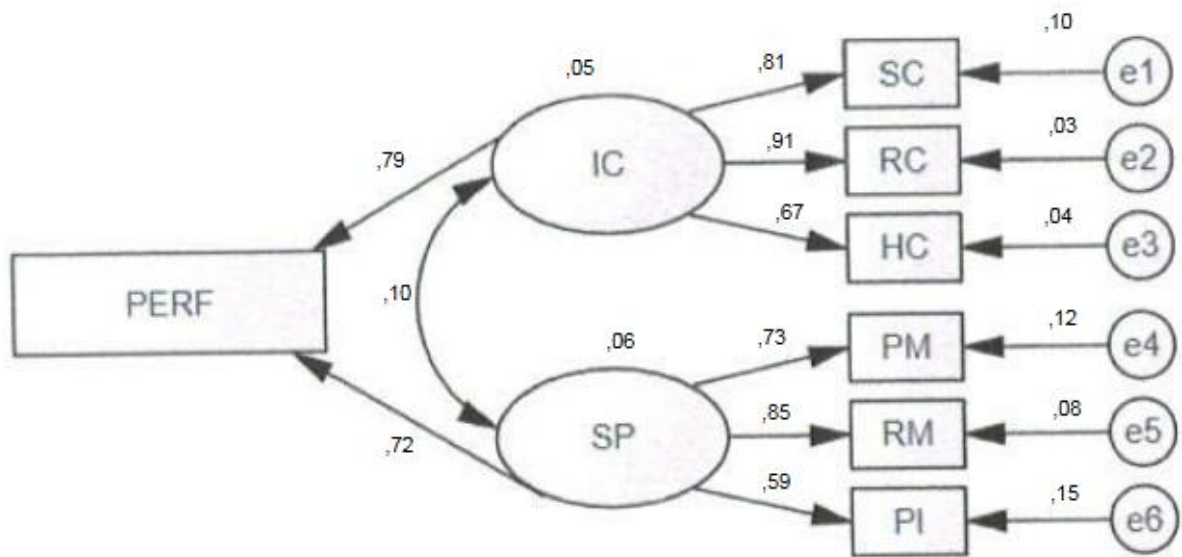


Figure 18 Structural model with standardized coefficient

Figure 18 illustrates a positive correlation between strategic partnerships and organisational performance ($\beta = 0.72$), as well as between intellectual capital and organisational performance ($\beta = 0.79$). Furthermore, a slight positive correlation was observed between intellectual capital and strategic partnerships ($\beta = 0.10$), though it is relatively modest. The latent variable intellectual capital demonstrates positive associations with all of its observable variables, specifically structural capital ($\beta = 0.81$), relational capital ($\beta = 0.91$), and human capital ($\beta = 0.67$). Similarly, the latent variable strategic partnerships is positively related to each of its observed variables, namely partnership management ($\beta = 0.73$), relationship management ($\beta = 0.85$), and partnership implementation ($\beta = 0.59$). In light of these findings, it can be concluded that all hypotheses are supported, indicating that both intellectual capital and strategic partnerships exert a positive influence on organisational performance in the construction sector.

Discussion and Conclusion

The analysis demonstrates a robust positive correlation between strategic partnerships and organisational performance ($\beta = 0.72$), as well as between intellectual capital and organisational performance ($\beta = 0.79$). Furthermore, a modest positive correlation was observed between intellectual capital and strategic partnerships ($\beta = 0.10$).

Within the latent variable of intellectual capital, strong positive associations were identified with its observable components, namely structural capital ($\beta = 0.81$), relational capital ($\beta = 0.91$), and human capital ($\beta = 0.67$). Similarly, the latent variable of strategic partnerships demonstrated positive correlations with its observable variables, including partnership management ($\beta = 0.73$), relationship management ($\beta = 0.85$), and partnership implementation ($\beta = 0.59$). These findings substantiate all proposed hypotheses, indicating that both intellectual capital and strategic partnerships exert a positive influence on organisational performance in the construction sector. First, intellectual capital, which includes human, structural and relational components, is a valuable resource for organizations. Construction companies that invest in developing the knowledge and skills of their employees (human capital), optimizing their internal processes and systems (structural capital), and fostering external relationships and networks (relational capital) tend to gain a competitive advantage (Matos et al., 2020). The availability and effective use of intellectual capital provide a solid foundation for organizations to establish strategic partnerships (Li et al., 2019).

Thus, and as data collection provides evidence that strategic partnerships positively influence organisational performance, facilitate knowledge exchange, enable cost sharing and risk reduction, and create opportunities for joint value creation (Bilgin et al., 2015). These collaborative efforts have the potential to improve productivity, efficiency, and overall performance outcomes.

Finally, and after corroborating hypotheses posed, it is possible to highlight the crucial role of intellectual capital and strategic partnerships in improving organisational performance in the construction sector. By effectively managing intellectual capital and leveraging strategic partnerships, construction firms can gain a competitive advantage, achieve operational excellence, and drive sustainable growth (Zhytchenko et al., 2017). This knowledge tends to facilitate construction firms in making decisions and developing strategies that maximize the benefits derived from intellectual capital and strategic partnerships.

Limitation and Future Lines of Research

The present article, despite its contribution to the literature, contains limitations. A limitation of existing research on intellectual capital, strategic partnerships, and organisational performance

is the lack of generalizability in different contexts. Many studies were conducted in specific industries or geographic regions, which may limit the applicability of the findings to other contexts. Future research should aim to explore diverse industries and geographic locations to improve the generalizability of the findings.

Another limitation lies in the measurement and operationalization of intellectual capital and strategic partnerships. These constructs can be complex and multifaceted, which makes it difficult to develop standardized and comprehensive measurement tools. Different studies may use different measurement approaches, making it difficult to compare results across studies. Future research should focus on developing reliable and valid measurement instruments to ensure consistency and comparability. The number of answers to the questionnaire, despite providing good data, is insufficient to take further conclusions.

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Chapter 5

Impact of Knowledge Management and Intellectual Capital on Organisational Performance in Construction SME

Abstract

This paper explores the relationship between intellectual capital and knowledge management in construction companies and how they impact organisational performance. The construction industry is characterized by a unique set of challenges related to knowledge management and intellectual capital. Project-based work is a dominant feature, necessitating robust knowledge sharing among stakeholders. This article employs a statistical approach to examine the variables under investigation through a Structural Equation Modelling (SEM). The hypothesis proposed was tested using this methodology. Data were collected via a questionnaire administered to 88 individuals occupying managerial roles in small and medium-sized enterprises (SMEs) operating within the construction industry. The study concludes that intellectual capital and knowledge management have a significant positive impact on the performance of construction companies and recommends that these concepts be integrated into the management practices of construction companies. Correct combination by companies in the construction sector of the constructs intellectual capital and knowledge management can create dynamics that significantly improve the performance of the organisations from the construction sector. Construction companies, like any other businesses, can benefit from effective knowledge management and the efficient use of intellectual capital to increase their competitiveness and long-term success.

Keywords: Intellectual Capital, Knowledge Management, Construction Companies, Organisational Performance, SME

Introduction

The construction industry, a pillar of the global economy, hosts a myriad of stakeholders, including contractors, sub-contractors, architects, engineers, suppliers, and clients. Its intricate projects necessitate extensive coordination among diverse participants, making it a complex web of interactions. This multifaceted industry is not only highly regulated but also rife with risks and

uncertainties, requiring companies to manage resources astutely for sustained competitiveness and long-term success.

Intellectual capital represents the intangible assets that elude traditional financial statements. It encompasses the collective wisdom, skills, experience, and expertise of a company, along with intangibles like relationships, organisational culture, brand, and reputation (Edvinsson and Malone, 1997). Intellectual property, such as patents, trademarks, and copyrights, is also part of this dynamic mix. In the realm of construction companies, intellectual capital takes the form of the knowledge, skills, and experience of employees, the reputation of the company, and its ability to innovate solutions to construction challenges.

Knowledge management, as elucidated by Alavi and Leidner (2001), is the orchestrated process of creating, sharing, using, and managing an organisation's knowledge and information. Its effective implementation fosters innovation, encourages knowledge dissemination, and enhances collaboration. In construction companies, where projects are often intricate and multifaceted, knowledge management becomes pivotal. It ensures that the right knowledge and information are accessible to the right people at the right time, thereby optimizing project performance (Tezel and Koskela, 2017).

The construction industry is characterized by a unique set of challenges related to knowledge management and intellectual capital. Project-based work is a dominant feature, necessitating robust knowledge sharing among stakeholders. Furthermore, the sector grapples with significant uncertainties and risks that can obstruct effective intellectual capital management. Thus, the strategic deployment of knowledge management practices and the judicious use of intellectual capital emerge as critical success factors for construction companies (Agyekum et al., 2020).

As the industry undergoes transformations driven by technological advancements, sustainability imperatives, and changing client expectations, the role of intellectual capital and knowledge management becomes even more pronounced. Companies must not only manage their tangible and intangible assets effectively but also adapt to evolving industry paradigms. The ability to innovate, foster a learning culture, and leverage intellectual capital for strategic advantage becomes paramount in this dynamic landscape.

Moreover, the socio-economic landscape has witnessed a growing emphasis on sustainability and responsible business practices. Construction companies are increasingly evaluated not only on the basis of project completion but also on environmental impact, social responsibility, and ethical considerations. Intellectual capital, encompassing the human, relational, and structural aspects, plays a pivotal role in enabling companies to navigate this landscape successfully.

This paper investigates the crucial roles played by intellectual capital and knowledge management in the construction industry, due to the gap on literature regarding their intricate connections and profound impacts on organisational performance. In the following sections, we will delve deeper into the specific components of intellectual capital, explore how knowledge management is

implemented in construction companies, and analyze their combined impact on organisational performance. By unraveling these intricate connections, we aim to provide valuable insights for practitioners, researchers, and policymakers in the construction industry.

Literature Review

Construction companies are knowledge-intensive organisations that rely heavily on their intellectual capital to create value for their clients. Intellectual capital refers to the knowledge, skills, experience, expertise and relationships that are not reflected in a company's financial statements (Matos et al., 2020). The concept of intellectual capital has become increasingly important for construction companies as they face growing competition and pressure to deliver projects faster, better and cheaper.

In the construction industry, knowledge management has been recognized as a critical success factor for companies to remain competitive (Bhatti et al., 2011). Knowledge management is the process of creating, sharing, using and managing an organisation's knowledge and information (Alavi & Leidner, 2001; Mehralian et al., 2018). By effectively managing their knowledge, construction companies can improve their performance, reduce their costs and increase their innovation capabilities. Several studies have explored the relationship between intellectual capital and the performance of construction companies. Aminbakhsh et al. (2013) found that intellectual capital has a positive effect on the performance of construction companies. They found that companies that invest in their intellectual capital, such as their knowledge, skills and experience, are more likely to be successful in delivering projects on time and within budget.

Besides being dependent on the productive capacity of the employees, the productivity of an organisation is linked to the performance of the intellectual capital that, in turn, eases organisational performance (Ahangar, 2011). In this way, it becomes essential that SMEs become increasingly aware of the strategic asset that is knowledge management (Bhatti et al., 2011). Some organisations' underlying problem is the inability to apply knowledge management policies appropriate to their contexts and environments (Al Koliby et al., 2022). Authors like Mehralian et al. (2018) reiterate the importance of developing and investing in intellectual capital and knowledge management concepts from the very beginning of organisations' lives and throughout their time in business. Only in this way is it possible to positively impact organisational environments, thus improving the outlook for future generations of professionals (Pigola et al., 2022).

SMEs must proactively plan their social decisions if knowledge management is to have a significant impact on the relationship between intellectual capital and organisational performance (Archer-brown et al., 2018). In other words, because SMEs are more prevalent in society, they are compelled to take these concerns seriously because the benefits they stand to gain are contingent upon their social involvement. Particularly noteworthy are the direct effects of strategic knowledge management on the relational capital, structural capital, and knowledge

sharing components of intellectual capital (Heisig et al., 2016; Cabrilo et al., 2018; Oliveira et al., 2020).

Because of employees' ability to share information, knowledge management develops as an important role for the relationship between intellectual capital and organisational performance, where it starts to register a positive variation, increasing all operational dynamics of SMEs (Hussinki et al., 2016; Wang et al., 2015; Wang et al., 2016). Because knowledge management interacts both directly and indirectly with intellectual capital, it can have a favorable impact on organisational performance (Amjad et al., 2019). Later, by providing more unbiased data, the writers Bansal et al. (2022) bolstered the theory even further. They concluded that organisations with high levels of knowledge management and intellectual capital typically outperform their rivals.

Kianto et al., (2013) caution against making too much of an analysis. The author reminds us that although knowledge management has a role in the relationship between intellectual capital and organisational performance, effective policies for managing intellectual capital are necessary for the latter. That is to say, the likelihood of SMEs having a beneficial impact on their performance is significantly diminished if, as previously indicated, they do not make investments in the management of intellectual capital and do not modify their policies (Wang et al., 2016).

As well as depending on the production capacity of its workforce, an organisation's productivity is also influenced by the effectiveness of its intellectual capital, which improves organisational performance (Ahangar, 2011). Therefore, it is imperative that SMEs learn more about managing knowledge, the strategic asset (Bhatti et al., 2011). The fundamental problem for certain organisations is that they fail to implement knowledge management practices appropriate to their environment and circumstances. Scholars such as (Mehralian et al., 2018) stress the importance of creating and allocating resources for knowledge management and intellectual capital from the beginning of an organisation's existence and throughout its existence. It is only through this approach that organisational environments can be effectively affected, improving prospects for the next generations of professionals (Pigola et al., 2022). SMEs must proactively plan their social decisions so that knowledge management has a significant impact on the relationship between intellectual capital and organisational performance (Archer-brown et al., 2018). In other words, since SMEs are more prevalent in society, they are obliged to take these concerns seriously, since the benefits they stand to gain depend on their social involvement. The direct effects of strategic knowledge management on the relational capital, structural capital and knowledge sharing components of intellectual capital stand out (Heisig et al., 2016), (Cabrilo et al., 2018) and (Oliveira et al., 2020).

In terms of knowledge management, Ling (2013) and Kianto et al. (2013) found that companies that have implemented knowledge management practices are more likely to have a competitive advantage. They found that companies that have a knowledge management culture, such as sharing knowledge between different projects and departments, are more likely to be successful

in delivering projects on time and within budget. Similarly, Tezel and Koskela (2017) developed a knowledge management framework for project-based construction that emphasized the importance of knowledge sharing between different projects and departments.

Overall, the literature suggests that both intellectual capital and knowledge management are critical success factors for construction companies. Bassi and Buren (1999) highlight the necessity of organisations appropriately understanding the importance of intellectual capital in organisational performance. The correct planning and investment in these components ease the development of competitive advantage. The challenge resides in the organisations that, aside not knowing what offers them with the advance and growth, they do not grasp how and where to invest for this might happen. As such, and to overcome this recurring problem in businesses, Carriere (2009) underline the significance for organisations to state, in a clear fashion, what their medium-long-term aims are. Put another way, by mandating that they invest in their employees' training, development, and career advancement, they will enable them to contribute intangible value to the company. But there's still another essential presumption: selecting the best candidates. It is essential that there be more investment made in this sector because of this. Promoting key organisational themes like vision, mission, and values will be made possible by these investments being consistent, and this will in turn encourage the promotion of organisational culture (Carriere, 2009).

The basis for the growth of the relationship between intellectual capital and organisational performance in SMEs is said to be organisational culture (Asiaei et al., 2015). Certain intellectual capital categories, like relational and structural capital, can also grow as a result of this process. In other words, there is a two-way link between intellectual capital and organisational performance. Since effective leadership encourages and facilitates information exchange, the writers stress the significance of leadership in this interaction. supports this theory and adds human capital as a key component for enhancing organisational performance (Bhatti and Christofi, 2020). It is feasible to keep raising the performance of SMEs by properly using human capital in tandem with organisations' emotional intelligence (Li, 2021). Therefore, in order for this resource to have a major influence on organisations, investment structures that facilitate its development must be established (Chen and Zhu, 2020).

The relationship between knowledge management and organisational performance can also be mediated by the creation of intellectual capital (Daud et al., 2011). One of the most important components that SMEs may use to increase their performance is knowledge management. Considering the findings that Ling (2013) emphasizes in his research is another method to explain this outcome. Thus, (Agostini & Nosella, 2017) offer two approaches to accomplish this. Every organisation contains intellectual capital. But we may either think about it and make an investment in it or not. Here, organisations are split into two categories. In the first group, as a result of lack of investment intellectual capital is underutilized. The second one enhances organisational performance by taking into account investment and the upkeep of intellectual capital. Improvements in SMEs' internal organisation, which are directly related to their

performance but not immediately to their financial success, are also advantageous in this regard (Jardon et al., 2014).

It is safer to state, therefore, that effective organisational planning contributes to improved performance through wise use of intellectual capital (Asiaei and Jusoh, 2017) and enables advancements toward organisational sustainability (Kopia, 2017). Other writers, like Han and Li (2015), highlight the significance of intellectual capital by highlighting the fact that an organisation's capacity to make timely and accurate decisions is based on its ability to see opportunities and risks. The productivity of SMEs can only be effectively increased in this manner, as it is a factor that directly affects how well organisations perform (Kengatharan, 2019).

Theory and Hypothesis

Over the years, several theories have been developed where the constructs of intellectual capital and knowledge management come together for the benefit of organisations. Thus, the most relevant theories for this research are in one hand the Resource-Based View Theory that states that a firm's resources, including intellectual capital and knowledge, contribute to its competitive advantage and financial performance. In other words, construction companies that invest in intellectual capital and knowledge management can achieve a competitive advantage in the industry and improve their financial performance (Rehman et al., 2022).

On the other hand, the Social Capital Theory ennobling the social relationships and networks play a crucial role in knowledge sharing and innovation. Construction companies that build strong relationships with their employees, customers, suppliers, and other stakeholders can create a social capital that facilitates knowledge sharing and contributes to better performance and innovation (Yu et al., 2022). And finally, the Knowledge-Based View Theory that suggests that a firm's ability to create, transfer, and apply knowledge is essential for its competitive advantage and success. Construction companies that manage their knowledge effectively and apply it to their projects and operations can achieve better performance, quality, and innovation (Akil et al., 2021).

Considering the literature review presented, the following hypotheses were formulated:

H1: The intellectual capital management positively affect the performance of construction companies.

H2: The knowledge management practices positively affect the performance of construction companies.

Data and Method

The validation of the hypotheses to be investigated is based on a set of observational data resulting from the application of the questionnaire presented in the appendix. Based on the theoretical considerations, the following structural equation model has been constructed.

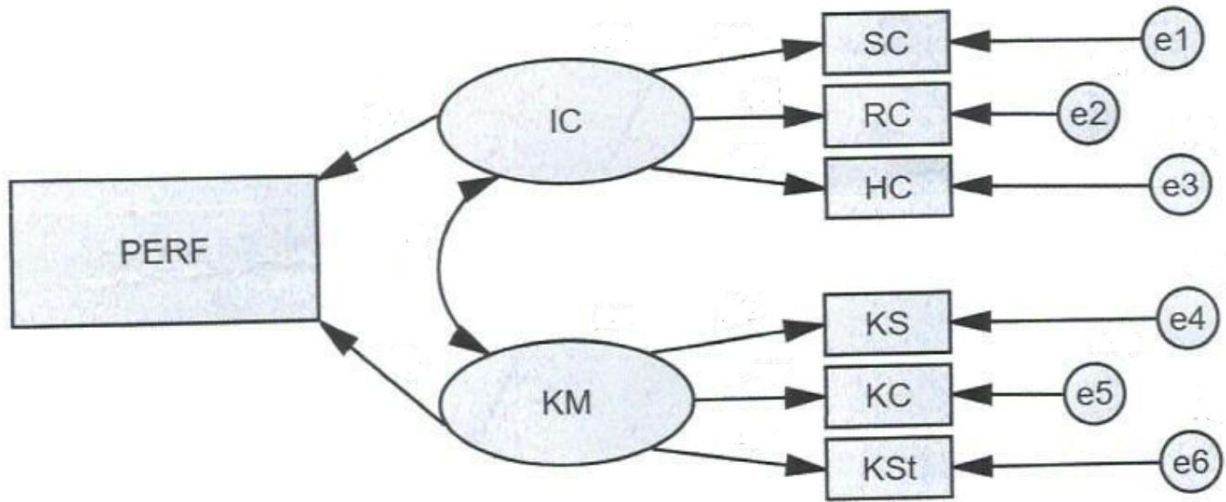


Figure 19 Proposed Structural Equation Modeling

Organisational performance emerges as the dependent and observable variable in the model, representing the degree of success achieved by the organization in terms of various indicators that can include financial performance, innovation, productivity and customer satisfaction, as described earlier. Performance is therefore measured empirically and is directly influenced by two latent variables: knowledge management and intellectual capital.

The latent variable, knowledge management, refers to the organization's ability to efficiently manage its processes for creating, storing, and disseminating knowledge. Although not directly observable, this variable can be inferred through the three observable variables knowledge sharing, knowledge creation and knowledge storage. The latent variable, intellectual capital, encompasses the set of intangible assets that are fundamental to organisational success. Like knowledge management, intellectual capital is not directly measurable but is inferred through three observable components relational capital, structural capital and human capital. The relationships between these constructs are critical for the exchange of information and knowledge between the organization and the external environment, providing access to new markets, innovation, and opportunities for collaboration. The observable variables were measured through Q7 to Q34 of the questionnaire in appendix.

The empirical analysis used in this study is based on the use of primary statistical data collected from several SMEs operating in the construction sector. For the construction of the database, data was collected concerning the characteristics of individuals working in companies of the construction sector and data corresponding to the intellectual capital and knowledge management of the organisations that develop their economic activity in the same area. Therefore, the proposed structural model suggests that both knowledge management and intellectual capital have a direct impact on organisational performance.

$$[\text{PERF} = \beta_1 \cdot \text{KM} + \beta_2 \cdot \text{IC} + \epsilon]$$

In a second phase, in order to confirm the proposed SEM, the feedback provided was collected using a five-point Likert scale, which ranged from (1) strongly disagree to (5) strongly agree. This structured approach facilitated a comprehensive evaluation of the pertinent constructs within the study, ensuring a nuanced understanding of the relationships under scrutiny. The results that will be presented in this study refer to the descriptive statistics of the variables in question, the relationships existing between them, and the SEM so that the hypotheses raised can be tested. All this statistical analysis was performed using IBM SPSS AMOS VS 24.

The assessment of intellectual capital drew upon Matos et al.'s (2020) scale, encompassing an evaluation of its three fundamental components: relational, structural, and human. Likewise, the measurement of knowledge management employed the scale developed by Rocha (2021). In the context of gauging organisational performance, particularly in terms of their innovative capabilities, as delineated by Elsaman et al. (2022), was used.

Data Analysis

The study sample comprises the viewpoints of eighty-eight (n=88) individuals holding management positions within Small and Medium-sized Enterprises (SMEs) operating in the construction sector. The sample exhibits a predominantly well-educated profile, with the majority having achieved educational qualifications ranging from graduate to master's level. However, it is noteworthy that only a quarter (25%) of the participants possess doctoral degrees. Approximately two-thirds of the respondents are employed within the sphere of human resources, either within the department or administrative functions of the organisation under examination.

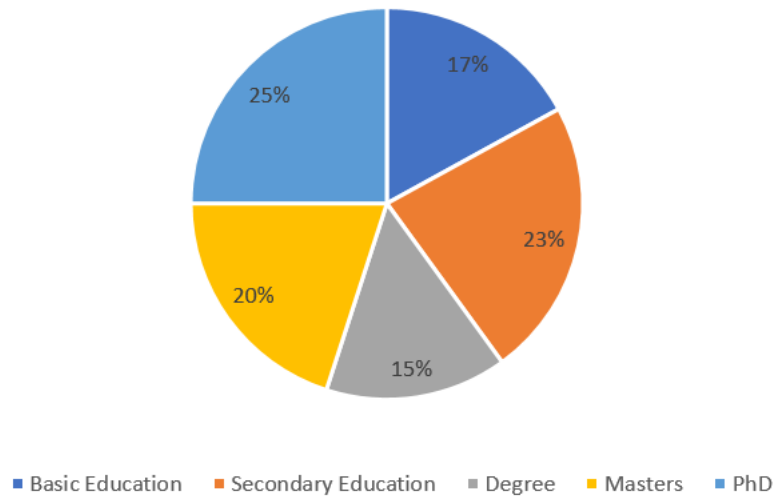


Figure 20 Habilitations.

In terms of tenure within their respective organisations, a diverse distribution is observed. Specifically, (8%) of the respondents have been employed in their organisations for less than one year, while a substantial portion (46.6%) has a tenure ranging from one to five years. Furthermore, (23.9%) have contributed their services to the same company for a period spanning six to ten years, with (21.5%) having a work history of more than ten years within the same organisation. Notably, a majority of the surveyed individuals are associated with organisations characterized by a staff size of less than 250 employees and an annual turnover of less than 10 million euros.

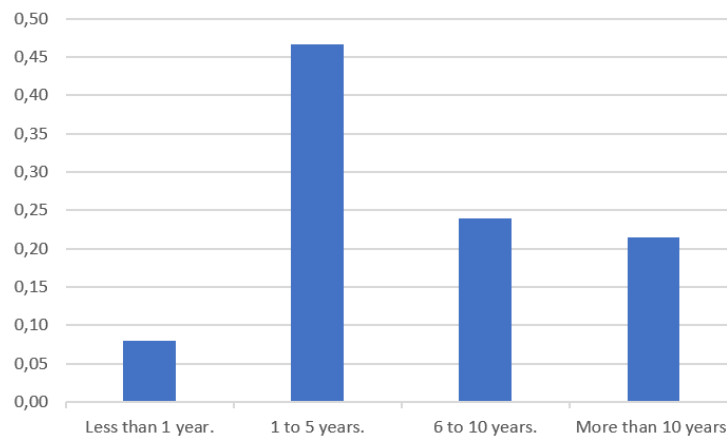


Figure 21 Years working for the company.

The hypothesis 1 predicted intellectual capital management would have a positive and significant relationship with organisational performance. The regression analysis showed intellectual capital

has a positive and significant relationship with organisational performance ($\beta = .501$, $p < .01$), respectively, and explains 50.1% of its variation ($p < .01$).

Table 4 Model Summary.

Model	R	R ²	Adjusted R ²	Std. Deviation	Durbin-Watson
1	,501a	,251	,243	,277	1,552

Predictor: (Constant), IC

Dependent Variable: PERF

Table 5 ANOVAa.

Model	Sum of the Squares	df	Square Mean	F	Sig
Regression	2,208	1	2,208	28,872	<,001b
Residual	6,578	86	,076		
Total	8,786	87			

Dependent Variable: PERF

Predictor: (Constant), IC

Table 6 Coefficients.

Model	Unstandardized coefficients		Standardized coefficient	beta	t	Sig
	B	Error Error				
1 (Constant)	2,149	,387			5,548	<,001
IC	,520	,097	,501		5,373	<,001

As can be seen from the model summary table, R2 explains that 25.1% of the variance in performance is explained by intellectual capital. Analysis of Table 4 and 5 (ANOVA and Coefficients) confirms the model's adjustability and robustness. The simple linear regression shows that intellectual capital predicts an increase in performance, which is confirmed by the following:

$$[F(1,86)= 28,872, p<0.001; R2=0,251]$$

The hypothesis 2 predicted that knowledge management practices would impact positively organisational performance. The regression analysis showed that knowledge management has a positive and significant relationship with intellectual capital and organisational performance ($\beta = ,670, p < .01$) ($\beta = ,644, p < .01$), respectively, and explains 64.4% of its variation ($p < .01$).

Table 7 Model Summary.

Model	R	R2	Adjusted R2	Std. Deviation	Durbin-Watson
1	,644a	,415	,408	,244	1,606

Predictor: (Constant), KM

Dependent Variable: PERF

Table 8 ANOVAa.

Model	Sum of the Squares	df	Square Mean	F	Sig
Regression	3,647	1	3,647	61,031	<,001b
Residual	5,139	86	,060		
Total	8,786	87			

Dependent Variable: PERF

Predictor: (Constant), KM

Table 9 Coefficients.

Model	Unstandardized coefficients		Standardized beta coefficient	t	Sig
	B	Error Error			
1 (Constant)	2,148	,267		8,045	<,001
KM	,521	,067	,644	7,812	<,001

As can be seen from the model summary table, the R2 explains that 41.5% of the variance in performance is explained by knowledge management. Analysis of Table 7 and 8 (ANOVA and Coefficients) confirms the model's adjustability and robustness. The simple linear regression shows that knowledge management predicts an increase in performance, which is confirmed by the following:

$$[F(1,86)= 61,031, p<0.001; R2=0,415]$$

The results are in line with other studies, which indicate that because of employees' ability to share information, knowledge management develops as an important role for the relationship between intellectual capital and organisational performance, where it starts to register a positive variation, increasing all operational dynamics of SMEs (Hussinki et al., 2017), (Wang et al., 2015), (Wang et al., 2016). Because knowledge management interacts both directly and indirectly with intellectual capital, it can have a favorable impact on organisational performance (Amjad et al., 2019). Later, by providing more unbiased data, the writers (Bansal et al., 2022) bolstered the theory even further. They came to the conclusion that organisations with high levels of knowledge management and intellectual capital typically outperform their rivals. Therefore, hypothesis 1 and hypothesis 2 were supported by the data.

Table 10 Descriptive Analysis, Correlations and Reliability of Variables.

	M	SD	1	2	3
Intellectual Capital	3,99	,307	(,888)		

Knowledge Management	3,98	,393	,670**	(,742)
Organisational Performance	4,22	,307	,501**	,644** (,812)

Note: N = 88; α de Cronbach in brackets.

** $p < .01$.

To validate the research hypotheses, SEM was employed, a highly robust statistical method that can be viewed as an extension of multiple linear regression (Diehl, 2004; McCusker and Gunaydin, 2014). SEM permits the evaluation of the impact of multiple independent variables on dependent variables, while simultaneously testing all the relationships among the factors involved in the phenomenon under investigation (García-Morales et al., 2013). Although the data do not meet all the distribution and linearity conditions required by the estimation method, it was still considered useful to estimate the structural equation model using IBM SPSS AMOS VS 24 in an empirical approach. By using the combined evidence of regression and SEM estimation, the conclusions are considered to have operational value.

Confirmatory factor analysis (CFA) was employed to ascertain the validation of the measurement model, utilising the maximum likelihood method, the most prevalent approach in SEM analysis (Hair et al., 2010). The results generated by the IBM SPSS AMOS VS 24 software were observed to ascertain whether the loadings were greater than 0.5 ($\lambda > 0.5$) and whether the individual reliability was equal to or greater than 0.25. Variables that did not meet these criteria were removed (Hair et al., 2010). As illustrated in the preceding section, all R2 values exceed 0.25, and the average variance extracted (AVE) is greater than 0.5, in this case 0.737858. Additionally, the loadings range between 0.68 and 0.81, indicating a satisfactory level of convergent validity. In light of these findings, it can be concluded that convergent validity is confirmed.

As outlined by Hair et al. (2010), the second phase of the SEM process entails the validation of the structural model, which serves to assess the precision of the proposed research hypotheses. This step permits the assessment of the model's fit (see Figure 21). As per the formulated research hypotheses, the structural model in question reflects the logical linkages between the studied constructs and the visualization of the aforementioned hypotheses, as outlined by Yin (1989).

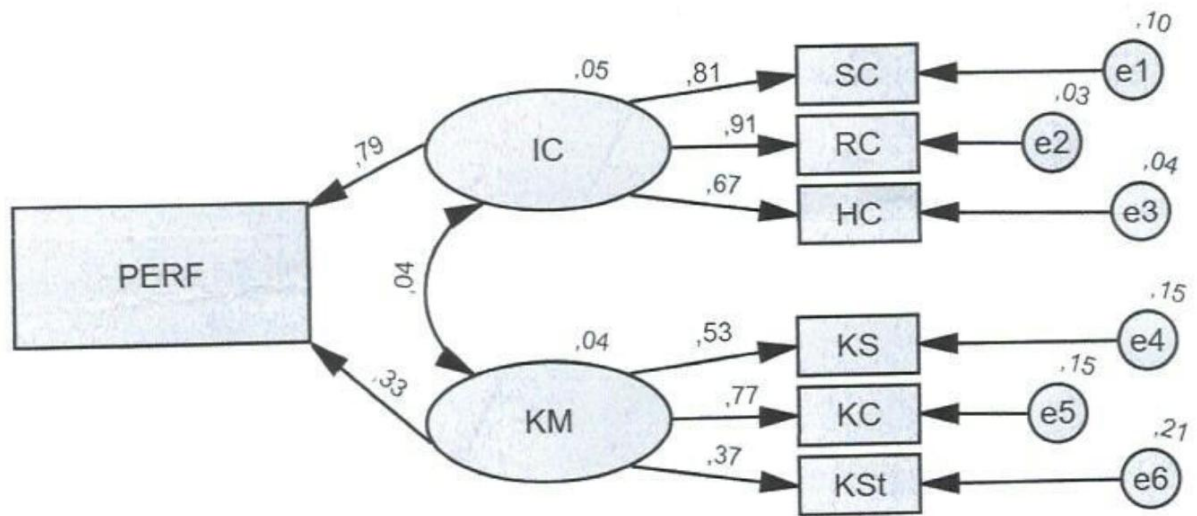


Figure 22 Structural model with standardized coefficient.

It is possible to evaluate through figure 22 a positive correlation between the variables of knowledge management and organisational performance ($\beta = 0.33$) and between intellectual capital and organisational performance ($\beta = 0.79$). Additionally, a positive yet relatively insignificant correlation was observed between intellectual capital and knowledge management ($\beta=0.04$). With regard to the latent variable intellectual capital, it can be seen that it has a positive relationship with all the observable variables. Specifically, the results indicate a positive relationship with structural capital ($\beta=0.81$), relational capital ($\beta=0.91$), and human capital ($\beta=0.67$). The latent variable of knowledge management also exhibits a positive relationship with all observed variables. In this case, the respective values are $\beta=0.53$ for knowledge sharing, $\beta=0.77$ for knowledge creation, and $\beta=0.37$ for knowledge storage. In light of the presented model, both H1 and H2 are accepted hypotheses, indicating that both intellectual capital and knowledge management have a positive effect on the organisational performance of companies in the construction sector.

Conclusion

The validation of the aforementioned hypothesis are in line with the results obtained in other studies as well as the literature review. The preponderance of the combination of intellectual capital and knowledge management (Ahangar, 2011) in the lives of SMEs is shown to boost their performance (Pigola et al., 2022).

In the specific case of knowledge management, this construct tends to have a very positive and significant impact on the organisational performance of construction companies. Companies can increase their ability to share, retain and apply internal knowledge efficiently by developing

effective knowledge management strategies. This leads to increased productivity, quality and innovation in the execution of construction projects. In addition, knowledge management enables rapid adjustment to changes in the business environment and improved decision-making based on up-to-date information. Therefore, effective knowledge management in the activities of construction companies has the capacity to offer substantial benefits and make a significant and positive contribution to the performance and success of the sector.

Intellectual capital, like knowledge management, tends to have a positive and significant impact on the organisational performance of companies in the construction sector. However, its degree of impact differs slightly from that of knowledge management. Construction companies can increase their operational efficiency, promote innovation in their projects and improve the quality of their deliveries by recognizing the value of their employees' knowledge, skills and expertise. The table of knowledge and skills is not just the sum of intellectual capital; it also includes the value of the relationships and strategic partnerships that companies establish. These partnerships increase the companies' ability to meet complicated challenges and seize market opportunities quickly. Thus, intellectual capital is seen as a valuable resource that promotes the overall performance of companies in the construction sector and increases excellence in operations.

This study explores the relationship between intellectual capital, knowledge management and organisational performance. The results show that both intellectual capital and knowledge management are positively associated with organisational performance. Other studies have demonstrated that knowledge management and intellectual capital have a major positive influence on construction organisations' performance. As evidenced by the findings of Aminbakhsh et al. (2013), intellectual capital significantly improves both the financial and non-financial performance of construction companies. Similar findings were made by Kaming et al. (1997), who discovered that knowledge management can enhance the efficacy and efficiency of building projects.

In this way, the results show that the correct combination by companies in the construction sector of the constructs intellectual capital and knowledge management can create dynamics that significantly improve the performance of these organisations.

Limitations and Future Lines of Research

Although it has a great influence on literature, the article has limitations. The sample size (N=88) is relatively small and will not be able to express any worldwide representativeness. Data collection is difficult in construction SMEs because most of the managers in these organisations are often in charge of coordinating or monitoring projects directly. The very nature of the questionnaire survey is another limitation. Given the sensitive nature of the issues and notwithstanding the guaranteed anonymity, there may be a voluntary or involuntary tendency to reply in person to socially acceptable matrices.

Regarding future research directions, it would be interesting to see how civil construction companies can strategically integrate emerging technologies, such as artificial intelligence, machine learning, and virtual reality, into their knowledge management and intellectual capital development processes, and how this affects their performance. On the other hand, the analysis of the use of specific knowledge management models aims to determine the most effective approaches for construction companies to maximize their performance. Finally, verify the intersection between sustainability practices and the development of intellectual capital in construction companies. This involves investigating how commitment to sustainable construction practices, including green building and responsible management of natural resources, influences knowledge retention, drives innovation and ultimately affects the long-term performance of these organisations.

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Chapter 6

Intellectual Capital in Construction SMES

Abstract

This study examines the critical role of intellectual capital in enhancing the performance of small and medium-sized enterprises in the construction industry. Emphasizing the synergistic support of knowledge management and strategic partnerships, the research aims to unravel the nuanced dynamics that contribute to organisational success. Intellectual capital, which includes relational, structural, and human elements, is recognized as a critical asset in the construction industry. The study uses a comprehensive framework to assess IC components and their impact on the operational effectiveness of SMEs. Using knowledge management practices, SMEs can systematically harness and optimize their intellectual capital, fostering innovation and adaptability. Strategic partnerships emerge as a catalytic force that amplifies the impact of intellectual capital. Collaboration with external entities facilitates knowledge sharing, technology adoption, and market responsiveness. This study underscores the imperative for construction SMEs to recognize intellectual capital as a cornerstone for sustainable growth. By intertwining effective knowledge management initiatives and strategic partnerships, SMEs can unlock their full potential, overcome industry challenges, and achieve lasting success. Embarking on these diverse research paths promises a comprehensive understanding of the interplay between intellectual capital, knowledge management, and strategic partnerships in construction SMEs. The dynamic nature of the construction business environment presents an additional challenge. The sector is subject to rapid changes in regulatory frameworks, market conditions and technological advances. The interaction between the concepts in the article is crucial in differentiating companies, especially those in the construction industry, and driving them towards long-term success.

Keywords: Intellectual Capital, Organisational Performance, SME, Construction Sector, Knowledge Management, Strategic Partnerships.

Introduction

Characterized by its complexity and dynamic project-based nature, the construction industry is a critical sector that not only shapes the built environment, but also serves as a linchpin for economic development. Within this expansive landscape, small and medium-sized enterprises (SMEs) in the construction industry find themselves at the crossroads of challenges and opportunities. To thrive in an environment characterized by technological advances, increasing

competition, and global economic shifts, construction SMEs must strategically navigate a complex web of factors. This paper begins an in-depth exploration of the links between intellectual capital, knowledge management, strategic partnerships, and organisational performance, offering a focused lens on the unique context of small and medium-sized construction firms.

The fundamental cornerstone of our exploration lies in the concept of intellectual capital—the cumulative knowledge, skills, and innovations embedded in an organization. In the context of construction SMEs, intellectual capital manifests not only as the technical expertise required to execute projects, but also as the tacit insights gained through experience. Because these firms are often characterized by specialized skills and industry-specific knowledge, it is imperative to understand how intellectual capital contributes to their competitiveness, innovation, and adaptability.

Recognizing the wealth of intellectual capital within construction SMEs makes knowledge management a strategic imperative. Effectively capturing, sharing, and applying both tacit and explicit knowledge within these firms can not only improve operational efficiency, but also foster a culture of continuous learning and innovation. This paper aims to dissect the nuanced relationship between intellectual capital and knowledge management practices, shedding light on how effective knowledge management strategies influence organisational performance in the context of SMEs in the construction industry.

In pursuit of sustainable growth and competitiveness, construction SMEs often seek external collaborations through strategic partnerships. These alliances, whether with other SMEs, larger corporations, or research institutions, introduce an external dynamic to the internal workings of intellectual capital and knowledge management. The examination of strategic partnerships forms a critical aspect of this research, as we explore how these collaborations serve as catalysts for enhancing intellectual capital and enriching knowledge management practices. The study aims to uncover the ways in which strategic partnerships contribute to enhanced organisational performance in the distinctive realm of construction SMEs.

In embarking on this comprehensive exploration, our overall aim is to go beyond theoretical frameworks and provide pragmatic implications for construction SMEs striving to navigate the intricate interplay of intellectual capital, knowledge management, strategic partnerships and their relationship to organisational performance. Through an analysis of various articles, including the exploratory study, the systematic literature review and the quantitative analyses carried out on the elements of intellectual capital, knowledge management and strategic partnerships, the aim of this article is to summarize all the conclusions reached previously and to contribute a framework that will allow SMEs in this sector to be better analyzed. Construction SMEs need a theoretical model to help them develop their strategies and achieve their objectives, always with the growth of the company as the goal.

Literature Review

The significance of intellectual capital in organisational performance has been elucidated by authors such as Bassi and Buren (1999). They underscore that organizations must accurately assess the relevance of intellectual capital, as proper planning and investment in these components facilitate the attainment of a competitive advantage. However, many organizations struggle due to a lack of understanding regarding what propels their progress and growth, leading to challenges in determining how and where to invest. Addressing this chronic issue, Carriere (2009) emphasizes the crucial need for organizations to clearly define their medium-to-long-term intentions.

In essence, the delineation of investments in training, development, and career progression for employees becomes imperative, bringing immeasurable added value to the organization. An essential premise in this context is the selection of suitable candidates, necessitating increased investment in this area. Consistent investments not only promote crucial organisational messages, such as vision, mission, and values, but also contribute to the cultivation of organisational culture (Carriere, 2009).

Organisational culture is positioned as the cornerstone fostering the relationship between intellectual capital and organisational performance in SMEs (Asiaei et al., 2015). This synergy also facilitates the development of constructs within intellectual capital, including structural and relational capital. The interplay between intellectual capital and organisational performance is reciprocal, emphasizing the pivotal role of leadership in motivating and facilitating knowledge sharing. Bhatti and Christofi (2020) reinforce this perspective and introduce human capital as a fundamental construct for enhancing organisational performance.

Building on this, Li (2021) and Nagwan et al. (2021) advocate for the judicious use of human capital, coupled with the emotional capabilities of organizations, as a means to continually enhance SMEs' performance. To harness the significant impact of human capital on organizations, mechanisms for investment and development are deemed necessary (Chen and Zhu, 2020).

The evolution of intellectual capital also serves as a mediator in the relationship between knowledge management and organisational performance (Daud et al., 2011). Knowledge management emerges as a pivotal element aiding SMEs in improving their performance. Ling (2013) underscores this by suggesting two paths organizations may take concerning intellectual capital—either investing in and leveraging it or neglecting its potential. The former leads to enhanced organisational performance, while the latter results in the underutilization of intellectual capital.

Effective organisational planning, guided by an understanding of intellectual capital, contributes to improved performance (Asiaei and Jusoh, 2017) and propels organizations toward

sustainability. Authors like Han and Li (2015) further stress the pivotal role of intellectual capital, asserting that organisational performance hinges on the ability to make informed decisions promptly in response to opportunities and threats. This strategic approach is crucial for enhancing SMEs' productivity, a factor intricately linked to organisational performance (Kengatharan, 2019).

Beyond relying on the productive capacity of employees, an organization's productivity is intricately linked to the performance of intellectual capital, thereby facilitating overall organisational performance (Ahangar, 2011). It is imperative for SMEs to recognize knowledge management as a strategic asset (Bhatti et al., 2011). Some organizations struggle due to an inability to implement knowledge management policies suitable for their specific contexts and environments. Scholars such as Mehralian et al. (2018) emphasize the significance of developing and investing in intellectual capital and knowledge management concepts early in an organization's lifecycle and sustaining these efforts over time. This proactive approach positively influences organisational environments, contributing to a more promising outlook for future generations of professionals (Pigola et al., 2022).

For knowledge management to assume a pivotal role in the relationship between intellectual capital and organisational performance in SMEs, strategic planning of social decisions becomes crucial (Archer-brown et al., 2018). The growing prominence of SMEs in the social environment necessitates a serious response to these issues, as the benefits they can derive hinge on their social action. Strategic knowledge management directly impacts components of intellectual capital, with relational capital, structural capital (Heisig et al., 2016), and knowledge sharing (Oliveira et al., 2020) emerging as significant factors.

Knowledge management operates as a mediator in the relationship between intellectual capital and organisational performance, exhibiting a positive variation that enhances all operational dynamics of SMEs (Hussinki et al., 2017). This enhancement results from employees' ability to share knowledge (Wang et al., 2015; Wang et al., 2016). The positive influence of knowledge management on organisational performance is evident through its direct and indirect interactions with intellectual capital (Amjad et al., 2019). Building on this, Bansal et al. (2022) further substantiate the theory by presenting objective findings, concluding that organizations with high levels of intellectual capital and knowledge management tend to outperform their competitors.

However, caution is warranted, as Kianto et al. (2013) highlights the need for a nuanced analysis. Despite the positive mediation of knowledge management in the relationship between intellectual capital and organisational performance, the latter is contingent on effective intellectual capital management policies. In essence, if SMEs neglect investment in intellectual capital management and fail to adapt their policies, the potential positive impact on performance is significantly diminished (Wang et al., 2016).

Proposed Framework

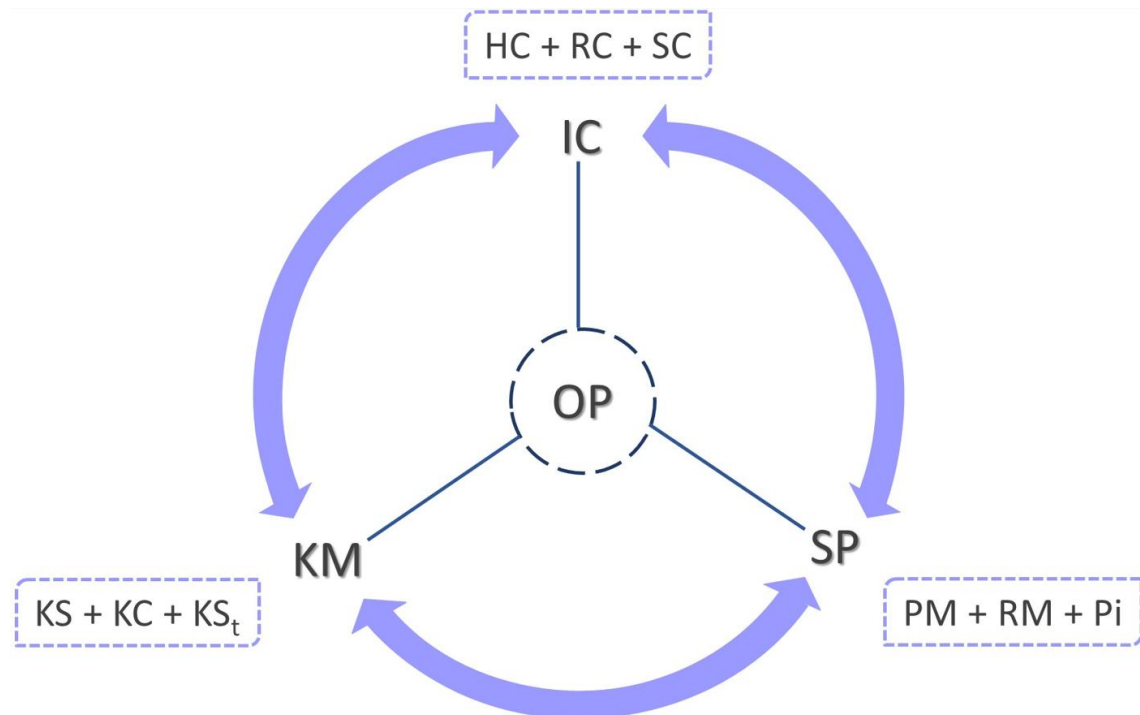


Figure 23 Framework proposed by the authors.

OP – Organisational Performance.

IC – Intellectual Capital / HC – Human Capital / RC – Relational Capital / SC – Structural Capital.

KM – Knowledge Management / KS - Knowledge Sharing / KC - Knowledge Creation / KSt – Knowledge Storage.

SP – Strategic Partnerships / PM – Partnership Management / RM – Relationship Management / Pi – Partnership Implementation

The above framework presents the authors' research and summarises their conclusions on the topic. Organisational performance is a crucial element for all companies, including those in the construction sector. In this unique and sometimes challenging sector, it is essential to develop a model that benefits the companies and all that is inherent in them when applied in the business environment (Beltramino et al., 2022).

Organisational performance benefits from effective management of intellectual capital in its three dimensions: human, relational and structural. This is achieved through the implementation of good knowledge management policies, specifically in terms of knowledge sharing, creation, and storage. Strategic partnerships are a crucial aspect of organisational performance, especially in

terms of partnership and relationship management, which are essential in implementing new partnerships. These constructs have a positive impact on organisational performance when applied individually, but their benefits are multiplied when applied in combination (Al Koliby et al., 2022). The relationship between these constructs is crucial in this framework and is what sets companies apart, particularly those in the construction industry.

Limitations

The study of the pivotal role of intellectual capital within small and medium sized construction firms, supported by the facilitating mechanisms of knowledge management and strategic partnerships, provides significant insights. However, it is imperative to acknowledge and critically evaluate certain limitations inherent to the study.

Foremost among these considerations is the aspect of generalizability. The applicability of the research findings may be limited to the specific context of construction SMEs, raising questions about the broader relevance of the findings. Factors unique to the construction sector may limit the universal transferability of the study's findings, underscoring the need for nuanced interpretation within the specified industry.

In addition, the dynamic nature of the construction business environment presents an additional challenge. The sector is subject to rapid changes in regulatory frameworks, market conditions and technological advances. As a result, the study's findings may capture a particular moment in time, and the evolving landscape may render certain recommendations obsolete or less effective in light of future developments.

Future Lines of Research

In shaping the future landscape of research on intellectual capital, knowledge management, and strategic partnerships in construction SMEs, several promising directions emerge. This text outlines key avenues for future investigation.

Prioritize longitudinal studies to unravel the temporal dynamics of intellectual capital in construction SMEs. Tracking the evolution of knowledge management and the impact of strategic partnerships over time promises a nuanced understanding. Explore how intellectual capital operates within construction SMEs compared to other industries. Cross-industry benchmarking facilitates a deeper understanding of the industry-specific factors that shape knowledge management and strategic partnerships. Examine the resilience and adaptability of construction SMEs in times of crisis. Assess the role of intellectual capital, knowledge management, and strategic partnerships in fostering organisational resilience to meet unforeseen challenges. Examine how intellectual capital strategies vary across different cultural contexts and geographic regions within the construction industry. Understand the impact of globalization on knowledge management and strategic partnerships.

Embarking on these diverse research paths promises a comprehensive understanding of the interplay between intellectual capital, knowledge management, and strategic partnerships in construction SMEs. This roadmap provides a path to meaningfully contribute to the ongoing discourse in the field.

Conclusion

The urgent need for small and medium enterprises (SMEs) to adopt a more nuanced view of the future underscores the critical need for a strategic shift in investment strategies and policies. This imperative is particularly pertinent in SMEs, which are often family-owned, where intellectual capital is emerging as a central and intangible asset essential for facilitating organisational growth and maturation (Chen and Zhu, 2020). The link between intellectual capital and organisational performance is evident, with each construct significantly influencing the other, thereby fostering an improved environment for employees, customers, and overall economic impact (Li et al., 2021).

This research contributes to a nuanced and contemporary exploration of the intricate relationship between intellectual capital and organisational performance in SMEs. Specifically, the literature review reveals a significant increase in research activity on this topic, with scholarly interest peaking in 2020. This increased attention is attributed to the growing need for organizations to position themselves competitively and drive progress through strategic investments and strategies (Han and Li, 2015).

This study attempts not only to provide a comprehensive understanding, but also to identify the sub-themes within the research domain. This allows for the identification of specific gaps in existing knowledge and suggests potential avenues for further investigation. It becomes clear that a coherent and strategic approach to investment in intellectual capital strengthens its constituent elements. Through a reciprocal relationship, this not only enhances organisational performance, but also catalyzes the dynamic and ongoing development of intellectual capital. This complex dynamic is significantly influenced by knowledge management and strategic partnerships, which act as pivotal factors in this symbiotic relationship. As shown in the framework outlined in the Framework chapter, knowledge management, whether independently or in conjunction with strategic partnerships, not only enhances the performance and productivity of SMEs, but also acts as a mediator in the relationship between intellectual capital and organisational performance. At the same time, strategic partnerships facilitate the synergistic development of both constructs by moderating this complex relationship.

In the broader context of innovation, while it plays a critical role in organisational development and growth, its impact on improving organisational performance is found to be less central. This nuanced understanding underscores the complexity of these relationships and emphasizes that organizations that fail to recognize the synergies among these constructs risk undervaluing and underutilizing their full range of competencies. Conversely, organizations that skillfully harness

the collaborative potential of these strengths achieve superior results through improved overall performance, illustrating the complex interplay between intellectual capital, strategic investment, and organisational maturity in the context of SMEs.

The authors' framework summarises their research, highlighting the importance of effective management in the construction sector. The framework emphasises the cultivation and use of intellectual capital across three dimensions: human, relational, and structural. Effective knowledge management strategies can enhance a company's performance. Strategic partnerships can also improve organisational efficacy, especially when there is a focus on meticulous partnership and relationship management. Although each component contributes to performance independently, their combination can yield exponential benefits. The interaction between these concepts is crucial in differentiating companies, especially those in the construction industry, and driving them towards long-term success.

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Chapter 7

Conclusion

Small and Medium-sized Enterprises (SMEs) have a pivotal role in enhancing economic growth, generating employment opportunities and fostering territorial cohesion. Their significance is particularly pronounced within the domain of civil construction. This sector is of economic significance and has a direct impact on the built environment. Consequently, it is one of the most influential in national development. The high complexity of projects, the labour-intensive nature and tacit knowledge, combined with a competitive and constantly changing environment, render SMEs in the construction sector particularly sensitive to how they manage their intangible resources, namely intellectual capital (IC).

This study highlights the critical importance of (SMEs) acknowledging and addressing the identified needs. It is imperative that enterprises, particularly those in the construction sector, adopt a strategic approach. A sustained and visionary approach to the management of their intangible assets is required. The extant literature and the results obtained throughout this research demonstrate that IC management is a critical success factor, significantly influencing innovation capacity and organisational performance, especially in smaller organisational contexts. In light of the fragmented and project-based nature of the construction sector, the significance of effective processes for the creation, retention and transfer of knowledge becomes particularly pronounced. The integration of human, structural and relational capital has been demonstrated to enhance the adaptive and innovative capacity of organisations, thereby strengthening their competitiveness and sustainability. As posited by Matos (2013), Edvinsson & Malone (1997) and Guthrie & Petty (2000), the strategic valuation of intangible assets, in conjunction with the promotion of an organisational culture oriented towards continuous learning and collaboration, constitutes a fundamental vector of differentiation, particularly in SMEs in the construction sector.

The research problem was thus defined as follows: to understand how the management of intellectual capital influences the organisational performance of SMEs in the construction sector. The research objectives centred on the analysis of the relationship between IC and performance, the understanding of the impact of knowledge management and strategic partnerships, and the proposal of models to guide effective IC management practices adapted to the sector under study.

The research was developed based on five empirical studies. The initial study, of an exploratory nature, employed a qualitative analysis, through interviews with SME managers in the construction sector, of the perception of the influence of IC on performance. The results indicated a clear appreciation of human capital and knowledge-sharing processes, with evidence that knowledge management and strategic partnerships reinforce the impact of IC. The second study

consisted of a systematic review of the literature, the objective of which was to identify the main thematic axes and research gaps in relation to IC in SMEs, with particular reference to the areas of performance, innovation, knowledge management and strategic partnerships. The study resulted in the formulation of a conceptual framework that provided a foundation for subsequent research endeavours. The third study, which was quantitative in nature, empirically tested the relationship between IC, performance and strategic partnerships. This was achieved by means of a questionnaire administered to 88 directors in SMEs. The findings indicated that both IC and strategic partnerships exert a positive influence on organisational performance, with this influence being more pronounced when analysed collectively. The fourth study analysed the role of knowledge management in the relationship between IC and organisational performance. A novel application of the questionnaire yielded the conclusion that the processes of storing, creating and sharing knowledge reinforce the impact of IC on the organisational performance of SMEs in the construction industry, especially when considered in an integrated manner. Finally, the fifth study consolidated the previous empirical contributions and resulted in the proposal of a final framework to support the strategic management of IC in SMEs in the construction industry.

The proposed conceptual model highlights that knowledge management, either in isolation or in conjunction with strategic partnerships, exerts a positive and significant impact on the relationship between IC and organisational performance. The enhancement of synergies between constructs analysed is a key finding of this study, with strategic partnerships having a positive impact on the relationship between IC and organisational performance. Whilst innovation is evidently a significant factor in the development of organisations, its direct influence on performance is less substantial than that exerted by the synergies between IC and strategic partnerships.

The effectiveness of management in the construction sector is contingent upon the capacity of companies to cultivate and apply IC in its three dimensions. The formulation of effective knowledge management strategies and the establishment of robust strategic partnerships are pivotal to enhancing organisational effectiveness. It was also determined that the integration of the various components of IC, when managed in an integrated manner, results in exponential benefits. This intricate interplay constitutes a salient differentiating factor between companies and is a pivotal element in determining their long-term success.

In summary, this research reinforces the centrality of strategic IC management in SMEs, highlighting the role of knowledge management and strategic partnerships as catalysts for organisational growth and competitiveness. The symbiotic nature of these relationships has been demonstrated to facilitate not only the enhancement of performance, but also the consolidation of sustainable competitive advantages.

This research makes a significant contribution to the theoretical advancement of the field by applying and validating the Intellectual Capital Management (ICM) model proposed by Matos

(2013) in a sector that has been little explored from this perspective – civil construction. The empirically tested articulation between the concepts of IC, performance, knowledge and partnerships contributes to the strengthening of the extant theoretical body and proposes new lines of research. Adopting a pragmatic perspective, this study offers SMEs, in the construction industry, practical tools to support the effective identification and management of their intangible assets. The proposed framework is designed to facilitate the enhancement of internal processes, the reinforcement of skills retention and development, the systematisation of critical knowledge, and the establishment of collaborative value networks. The repercussions of this phenomenon are of particular concern to the business community. The conceptual framework developed here offers a reference that can be used by companies to design effective IC management strategies, increasing their capacity for innovation, adaptation and competitiveness.

Future Research Directions

To shape the future landscape of research on IC, knowledge management, and strategic partnerships in construction SMEs, several promising directions emerge. Prioritize longitudinal studies to unravel the temporal dynamics of IC in construction SMEs. Tracking the evolution of knowledge management and the impact of strategic partnerships over time promises a nuanced understanding. Explore how IC operates within construction SMEs compared to other industries. Cross-industry benchmarking facilitates a deeper understanding of the industry-specific factors that shape knowledge management and strategic partnerships. Examine the resilience and adaptability of construction SMEs in times of crisis. Assess the role of IC, knowledge management, and strategic partnerships in fostering organisational resilience to meet unforeseen challenges. Investigate how IC strategies vary across different cultural contexts and geographic regions within the construction industry. Understand the impact of globalization on knowledge management and strategic partnerships.

Limitations and Implications

While the study provides significant insights into the pivotal role of IC within construction SMEs, supported by knowledge management and strategic partnerships, it is imperative to acknowledge certain limitations. The challenging aspect of gathering data from SMEs is compounded by the limited time available for interviews with SME managers, which in turn results in a relatively small sample size. The generalizability of the findings may be limited to the specific context of construction SMEs, raising questions about the broader relevance of the findings. Factors unique

to the construction sector may limit the universal applicability of the study's conclusions, necessitating nuanced interpretation within the specified industry.

Furthermore, the dynamic nature of the construction business environment presents an additional challenge. The sector is subject to rapid changes in regulatory frameworks, market conditions, and technological advancements. Consequently, the study's findings may capture a specific moment in time, and evolving circumstances may render certain recommendations obsolete or less effective in future contexts.

Appendix A

Interviewee:

Interview location: Via zoom.

Time: expected to last no more than 20 minutes.

Position in the company: Managing Partner

1. After reading the definition of ICM, do you think the company manages its intellectual capital? Please explain.
2. What is the company's area of intervention (regional, national)?
3. What is the total number of workers employed by the company?
4. On average, how long does a worker stay with the company?
5. How many employees are permanent?
6. How many workers are on temporary or subcontracted?
7. How many women work in the company?
8. What level of education do the workers have? (How many workers have up to 9th grade, up to 12th grade, up to bachelor's degree, up to master's degree, up to doctorate)
9. What was the turnover in 2019 and 2020?
10. Did the net results for 2019 and 2020 remain the same as in previous years?
11. Did you hire people in 2019 and 2020?
12. Did you make redundancies in 2019 and 2020?
13. In the next two years, does the company plan to hire, fire or keep the same number of workers?
14. Do you value and facilitate the acquisition of knowledge by your employees?
15. Are talented workers valued and compensated?
16. Is vocational training recognized as an instrument for new skills?
17. Are employees encouraged to share their individual knowledge and expertise?

18. Are there rewards for employees who share their individual knowledge?
19. Are employees encouraged to be innovative?
20. Are employees who are innovative/creative rewarded?
21. Are there any innovations regarding internal organisational processes?
22. Are there innovations at the organisational level?
23. Does the company hold any certifications other than those required for the exercise of its activity?
24. Are the employees dedicated to their work?
25. Are the workers creative or spontaneous?
26. Do workers have a high sense of teamwork?
27. Is all the knowledge acquired by workers passed on to new colleagues?
28. Is the development of teamwork skills a priority in the company?
29. Does the company use new technologies to record and systematize all internal and external internal and external organisational processes?
30. Are new technologies a tool for improving the quality of internal organisational processes?
internal organisational processes?
31. Is important employee knowledge computerized?
32. Is important employee knowledge stored in paper format?
33. Is important employee knowledge stored in memory of each employee and are not recorded?
34. Does the company have a certification system? If so, which one?
35. Have partnerships been developed with other companies or institutions at national level?
36. Have partnerships been developed with other companies or institutions at an international level?
37. Have the partnerships developed been creating more value for the company and consequently improve internal dynamics?

38. Have the partnerships developed improved results?
39. Does the company carry out market research? If so, how often?
40. Are the innovations developed mainly as a result of customer needs?
41. Are the innovations developed mostly the result of employees' ideas about the market?
42. Are team ideas a source of innovation for presenting new solutions to the market?
43. Does the company prioritize customer relations?

Appendix B

Intellectual Capital in Companies in the Construction Sector INFORMED CONSENT

As a doctoral student in Management at UBI - Universidade da Beira Interior and under the supervision of Professor António João Santos Nunes and co-supervision of Professor Florinda Maria Carreira Neto Matos from UBI and ISCTE respectively, I am carrying out research into Intellectual Capital in companies operating in the construction sector.

Intellectual capital encompasses all forms of intangibles and is the combination of an organization's human, structural and relational resources.

There is a broad consensus that intellectual capital results from the interaction of three categories of capital: Human Capital, Structural Capital and Relational Capital.

- Human Capital is understood as the capital of an organization's people, made up, among other things, of their skills, the accumulated value of their knowledge management practices, their creativity, their capacity for innovation, their networks of relationships and their values. Organisational culture and values are also part of this capital.

- Structural Capital is understood as the organization's support infrastructure, for example, databases, communication and technological infrastructure, knowledge repositories, manuals, client lists, processes, internal standards, certifications, brands and patents.

- Relational Capital corresponds to the strength and loyalty of customers and other stakeholders responsible for cash flows and other factors that will contribute to future growth. Relational capital is fundamental in the processes of market growth and internationalization, as well as in the capacity for resilience and assimilation of digital transformation processes. In the current context of accelerating technological change and business digitalization, this is the most relevant capital for sustainability.

Source: <https://www.icscoring.pt>

This questionnaire is expected to take an average of 15 minutes and is aimed at individuals of all genders, aged 18 or over, working in an SME in the construction sector and performing management functions.

Completion of the questionnaire is completely anonymous, and the results obtained will be used for purely academic purposes, with the information being kept confidential.

All processing of personal data carried out for the duration of the survey is in accordance with the General Data Protection Regulation (EU) 2016/679 and Regulation (EU) 2018/1725 of the

European Parliament and of the Council of October 23, 2018 on the protection of natural persons with regard to the processing of personal data by the Union institutions, bodies, offices and agencies and on the free movement of such data, repealing Regulation (EC) No 45/2001 and Decision No 1247/2002/EC.

In this regard, please be honest. If you agree to take part, we will ask for your informed consent.

If you have any questions, please contact us by email (André Sucena: andre.sucena@ubi.pt).

Thank you very much for your cooperation!

1. By selecting the options below, I declare that: I have read and understood this document and agree to participate in the scientific project, giving my informed consent and having the assurance that all my data will remain confidential. I am over 18 years of age.

2. What is your level of education?

3. In which department of the company do you work?

4. How long have you worked for the company?

5. How many employees does the company have?

6. What was the turnover last year?

7. Employees participate in company decisions.

8. Employees are encouraged to always be creative and take initiative.

9. Employees have a high level of education.

10. The company invests long-term in its employees.

11. Employees are committed to the company.

12. All employees are trained to carry out their duties.

13. The company continually invests in training and qualifications for its employees.

14. The capacity and skills of the employees allow them to innovate in their tasks.

15. If an employee leaves the company, knowledge is lost.

16. In the last two years there has been an increase in investment in new systems (tools, software...) which improve production capacity.

17. Employee suggestions are evaluated and implemented when relevant.
18. There has been an improvement in the technical capabilities of work processes.
19. Customer complaints have decreased over the last 2 years.
20. In the last two years the company has invested at least 0.5% of its profits in research and development.
21. Creative ideas are discussed by everyone.
22. In the last 2 years the number of new businesses has increased.
23. Over the last 2 years, customers have shown that they are satisfied with the company.
24. Customer satisfaction with price, quality and meeting deadlines is adequate.
25. The company has an excellent reputation with customers.
26. The company has partnerships with customers.
27. The company has an excellent reputation with suppliers.
28. The company has partnerships with suppliers.
29. Employees are encouraged to put their personal knowledge at the service of the company.
30. Employees have in-depth knowledge and consider issues beyond the material.
31. The company values knowledge creation.
32. The sharing of knowledge between employees to solve problems is supported by the company.
33. The company promotes the sharing of experiences between employees.
34. All employees contribute to the creation of knowledge.
35. Establishing partnerships with other companies helps the company's results.
36. Establishing partnerships with other organizations (e.g. associations or research institutions) helps the company's results.
37. Team members try to take advantage of the synergies involved in working with teams outside the company.
38. Team members meet to discuss the progress of projects with external teams.

39. Team members exchange ideas with a large number of colleagues outside the team.
40. Team members exchange ideas with a large number of professionals working in companies in the same field.
41. The company uses the human resources, financial resources and technologies of partner companies to develop its project portfolio.
42. The company has developed improvements to existing products/services and/or work processes in the last 2 years.
43. In the last 2 years the company has created or improved products/services or work processes based on ideas from employees, customers or suppliers.
44. In the last 2 years the company has developed new working methods.
45. The company is looking to apply new technologies.
46. In the course of each project, strategic innovation skills are developed with a view to the long-term sustainability of the business.
47. An innovation-oriented organisational culture is promoted.
48. The company promotes entrepreneurial and innovative behavior in the various areas in which it operates.

The questionnaire has come to an end. Thank you very much for your time.