Knowledge Management as a Driver of Competitive Advantage in SMEs: A Multisectoral Study

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Abstract: This study aims to analyze whether small and medium-sized enterprises (SMEs) recognize knowledge management (KM) as a factor that generates competitive advantage. To this end, a qualitative approach was adopted, through a multisectoral multi-case study based on semi-structured interviews with managers from four SMEs in the manufacturing, software development, construction sector and specialised technical services in the field of electricity sector. The results show that KM is widely recognised by managers as a strategic element essential to creating differentiation and strengthening organizational competitiveness. It was also found that factors such as professional experience, the level of qualification of managers and the competitive intensity of the sector of activity seem to positively influence the valuation of KM as a strategic resource. The conclusions obtained are in line with the existing literature, reinforcing the importance of systematic investment in human resource training and the consolidation of organizational knowledge as a condition for competitive sustainability. However, the study has limitations due to the small sample size, which limits the generalization of the results. We therefore recommend future research with larger samples and complementary methodologies to further explore and empirically validate the evidence identified.

Keywords: Knowledge management, Competitive advantage, SMEs, Intellectual capital, Organisational competitiveness

1. Introduction

From a business perspective, organizations face an environment of intense competition and high levels of competitiveness on a daily basis, being part of a globalized economy shaped by the demands of increasingly dynamic and unstable markets, where new consumption patterns emerge, as well as significant changes in the behaviour, attitudes and expectations of their stakeholders. For Ribeiro (2022), this volatile and uncertain environment, known as VUCA – Volatility, Uncertainty, Complexity and Ambiguity, which was later updated by Filipe (2024) to BANI - Brittle, Anxious, Nonlinear, Incomprehensible, pressures companies to create or adjust their management models in order to find strategies that can provide a quick and adequate response to constant changes and new market challenges. Knowledge is now "a fundamental asset for organizations, synonymous with value creation and competitive advantage that needs to be managed in order to support its creation, adaptation, codification, transfer and application" (Cardoso, 2022, p. v). According to Pinto et al. (2018), the value and competitiveness of an organization encompass its employees and its intangible assets, such as knowledge, policies and processes, which are used to differentiate it from its competitors and, consequently, enable it to generate competitive advantages and produce value. Thus, Knowledge Management (KM) has become a key strategic element for organizations seeking competitive advantage in dynamic and highly competitive markets. By effectively capturing, organizing and sharing information, companies can improve processes, foster innovation and enhance operational performance (Ferraz, 2015). According to the National Statistics Institute (INE), SMEs play a central role in the Portuguese business landscape, representing more than 99% of all companies and serving as the main drivers of employment and innovation. Given their relevance to the national economy, this article aims to analyse whether SMEs recognise KM as a source of competitive advantage. To achieve this objective, a multiple case study was conducted in four Portuguese SMEs from different sectors, allowing for an in-depth exploration of the research topic.

2. Literature Review

We currently live in the age of information and knowledge, where the efficiency and competitiveness of companies depend, above all, on the knowledge they possess and the capacity of their human resources, becoming as important as, or even more important than, physical or financial resources, since innovation, creativity, and technology are considered key factors for the success and growth of organizations (Cardoso, 2022). Since the 1980s, knowledge has gradually been recognised as an asset in organizations, where human capital and social capital play an important role. Cardoso (2022) states that the creation of a knowledge-based

economy stimulates the development of disruptive projects and actions, which is an added value for increasing the competitiveness of organisations.

2.1 Knowledge Management

Nowadays, organisations rely on information systems to manage knowledge due to the increasing need to process large volumes of data. Although data, information and knowledge are interconnected, they are distinct concepts: data are raw, context-free elements that, when organized, become information, which in turn, through analysis and use, generates knowledge (Cardoso, 2022; Pinto et al., 2018). Knowledge is therefore a key organizational asset and a source of competitive advantage, already recognized since the mid-20th century for its role in improving productivity and financial performance (Cardoso, 2022). In this context, Knowledge Management (KM) is essential in knowledge-based economies. According to Dias (2022), KM comprises activities aimed at creating, sharing and applying knowledge across the organization, integrating it into products, services and systems, while ensuring its protection. Advances in Information Technology (IT) have significantly enhanced KM by improving efficiency, knowledge sharing and organizational learning. Nonaka and Takeuchi's framework, highlighted by Dias (2022), distinguishes between tacit knowledge (TK) - acquired through experience and difficult to formalize - and explicit knowledge (EK) - documented and easily shared - (Ferraz, 2015). These forms of knowledge are complementary, although tacit knowledge is often harder to capture and manage (Pinto et al., 2018), which reinforces the need for its formalization to ensure continuity. Organizational knowledge encompasses employees' skills, methods and the continuous incorporation of new knowledge (Pinto et al., 2018). Thus, KM is a continuous process of creating and sharing knowledge, enabling organisations to structure information within organizational memory and achieve greater competitiveness in the market (Pinto, 2015; Ferraz, 2015).

2.2 Applied Models and Theories and the Knowledge Management Cycle

2.2.1 Knowledge spiral

Nonaka and Takeuchi's theory, also known as the Knowledge Spiral Theory, was created by Ikujiro Nonaka and Hirotaka Takeuchi in the 1980s, describing the process of knowledge creation within organizations. This theory results from the interaction of two types of knowledge, TK and EK, whose combination gives rise to four modes of knowledge conversion, forming four quadrants (Nonaka, 1994, cited by Sousa, 2017). Socialization creates shared knowledge, a process that allows, through social interaction, the sharing of TK, enabling the exchange of experiences, perceptions and personal knowledge, whether through observation, imitation or practice; Externalization generates conceptual knowledge, consisting of the transformation of TK into something explicit, a process that takes place through dialogue or shared analysis; Combination gives rise to systemic knowledge through the exchange of standardised and easily understood information. To this end, individuals share knowledge through documents, meetings or communication networks; Finally, Internalization produces operational knowledge, a stage in which members of the organization improve their individual knowledge, in other words, it is the process of incorporating EK into TK (Pinto et al., 2018; Sousa, 2017).

Fig. 1 presents the Knowledge Spiral model proposed by Nonaka and Takeuchi.

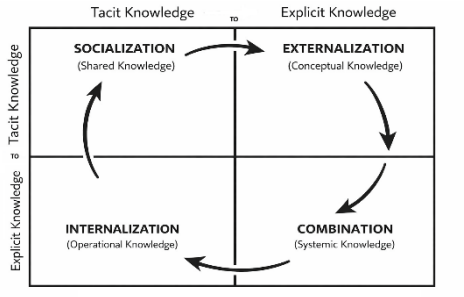


Figure 1: Knowledge Spiral – adapted from Sousa (2017)

2.3 Intellectual Capital Models

Nowadays, knowledge is considered a key strategic asset for business success, acting as a driver of innovation and competitive advantage and being widely recognised as a critical success factor (Correia, Mendes & Marques, 2018, cited by Sousa & Ferreira, 2021). However, its effective management requires new approaches to organizational performance measurement, particularly through the concept of intellectual capital as a

source of value creation (Kianto et al., 2013, cited by Sousa & Ferreira, 2021). Intellectual capital includes knowledge, ideas, inventions and processes that can be transformed into value, extending beyond technological innovation or legally protected intellectual property, and is ultimately understood as the effective use of knowledge rather than mere information (Bontis, 1998, cited by Sousa & Ferreira, 2021). Together with physical and financial capital, intellectual capital constitutes one of the three essential organisational resources and includes human capital (individual knowledge and capacity to generate new knowledge), structural capital (organizational processes, structures and culture), and relational capital (knowledge derived from relationships with stakeholders) (Marr, 2008, cited by Sousa & Ferreira, 2021). In this context, KM is described as a continuous spiral process or cycle comprising six stages: knowledge creation, capture, organization, storage, dissemination and application. This cycle ensures that information is transformed into structured knowledge, made accessible within the organization, and effectively used to improve decision-making, performance and competitive advantage (Fukunaga, 2015).

2.4 Competitive Advantage and Information Technologies

Competitive advantage occurs when a company is able to perform activities differently from its competitors, enabling it to stand out in the market and generate greater value for customers (Oliveira, 2007, cited by Daniel, 2020; Brito & Brito, 2012, cited by Alves et al., 2023). This value is reflected when the perceived benefits of products or services exceed their production costs (Barney & Hesterly, 2007, cited by Alves et al., 2023). However, in an increasingly globalised and competitive environment, achieving sustained competitive advantage has become more challenging due to factors such as intense competition and market expansion. In this context, organizations must adopt effective methods for collecting, processing and sharing information, enabling the creation and management of new knowledge (Silva, 2022). Information Technologies (IT) play a central role in supporting decision-making and Knowledge Management (KM), providing tools for storing, sharing and improving information flows within organizations (Gomes, 2024). At the same time, contemporary society is characterized by high levels of data generation and connectivity, requiring advanced processing capabilities (Freitas Junior et al., 2016). Within this framework, Big Data emerges as a key tool for transforming large volumes of data into useful information and knowledge, ultimately generating added value for organizations (Erickson & Rothberg, 2014, cited by Freitas Junior et al., 2016). Big Data enables the processing of large volumes of data from multiple sources, supporting strategic decision-making within organizations. It includes tools such as Big Data Analytics, focused on advanced data analysis, and Power BI, used for interactive visualization and exploration of information. Big Data Analytics is defined as an integrated process of managing, processing and analyzing large datasets to extract value and sustain competitive advantage (Ren et al., 2017; Wamba et al., 2017, cited by Santos, 2023), offering benefits such as faster and more informed decisions, higher productivity, improved stakeholder engagement, and cost reduction (Loebbecke & Picot, 2015, cited by Santos, 2023). In the context of Business Intelligence, Power BI stands out as a tool that processes data from multiple sources and presents it through reports and interactive dashboards, facilitating decision-making (Silva, 2022). These dashboards enable real-time access to customized information across devices, enhancing collaboration and organizational communication. Additionally, Artificial Intelligence (AI) further strengthens KM by supporting personalized human–computer interaction, content management, and knowledge retrieval based on historical data (Tsui et al., 2000, cited by Nascimento, 2023). According to Nascimento (2023), AI refers to the ability of machines to receive and process data and perform tasks based on extracted information, responding like humans in equivalent situations. Its main benefits for KM include facilitating the capture, use and sharing of knowledge, removing language barriers, and enhancing the visibility of intellectual capital (Taherdoost et al., 2023, cited by Nascimento, 2023). Collaborative platforms such as Microsoft Teams also play an important role in KM by enabling communication, collaboration and information sharing regardless of geographical location, thereby supporting cooperative work processes (Silva, 2007, cited by Couto, 2011). In highly competitive environments, standardization has become a key differentiating factor, with organizations increasingly relying on continuous improvement and effective knowledge management to create value. In this context, ISO certifications are considered structuring tools that support KM by documenting processes, standardizing practices and facilitating the internal sharing of knowledge (Anes, 2018). According to the Portuguese Institute for Quality (2015), quality management systems contribute to organizational performance and sustainable development, reinforcing the role of ISO standards as facilitators of knowledge creation and dissemination (Lin & Wu, 2005; Colurcio, 2009; Choo et al., 2007, cited by Anes, 2018).

2.5 Contextualization of SMEs in Portugal

In Portugal, the use of the SME nomenclature is based on the Commission Recommendation (2003/361/EC of 6 May), which defines three types of companies in the SME category: micro, small and medium-sized enterprises. The classification of a company as an SME is based on a set of criteria, namely: employing fewer than 250 people, having an annual turnover of less than €50 million or an annual balance sheet total of less than €43 million. Tab. 1 shows the criteria for classifying SMEs.

Table 1: Criteria for Micro, Small and Medium-sized Enterprises

SME	No. of Employees (full-time)	Turnover (Annual)	Total Balance Sheet (Annual)
Medium-sized company	< 250	< 50 million euros	< 43 million euros
Small Company	< 50	< 10 million euros	< 10 million euros
Micro Enterprise	< 10	< 2 million euros	< 2 million euros

According to INE (2025), Portugal had 1,576,606 companies in 2024, of which 1,574,963 were SMEs, representing more than 99% of the national business structure. These firms are mainly concentrated in mainland Portugal, particularly in the North and the Lisbon Metropolitan Area, with lower representation in the Azores and Madeira. Pordata (2025) further shows that SMEs are predominantly active in the tertiary sector, especially in trade, accommodation and catering, health and social support, and construction, while agriculture and manufacturing also remain relevant. Overall, SMEs are the backbone of the Portuguese economy, with a significant role in employment and innovation (DGAE). However, their small size often leads to resource constraints that hinder the implementation of effective Knowledge Management (KM) practices, negatively affecting competitiveness (Trindade et al., 2016). These challenges are intensified in a BANI environment, requiring greater organizational adaptability. Moreover, the Deloitte (2023) report highlights strong heterogeneity in the adoption of information technologies among Portuguese SMEs, reinforcing the need for further research, as digital maturity has a direct impact on KM processes.

3. Methodology

The study focused on four SMEs from different economic sectors, namely manufacturing, software development, construction sector and specialised technical services in the field of electricity. All the organizations analyzed fall within the definition of SMEs, in accordance with legally established criteria. The companies were selected by non-probabilistic convenience sampling, taking into account criteria such as accessibility, availability of participants and interest in collaborating in the study. Although this option limits the statistical generalization of the results, it is appropriate for the qualitative and exploratory nature of the research. The small number of cases is justified by the exploratory nature of the study and the intention to prioritise analytical depth over sample size. In qualitative research, interpretative richness and contextual depth take precedence over numerical representativeness, allowing for a detailed analysis of organizational perceptions and practices associated with KM. Data collection was carried out through semi-structured interviews with the managers of the respective companies, as it was considered that they have a strategic and integrated view of organizational practices. The interviews took place between October 2025 and February 2026 and were conducted both in person (at the companies' premises or at a previously agreed location) and remotely, depending on the context and availability of the interviewees. All interviews were recorded, with prior consent, and were subsequently transcribed for full analysis, ensuring confidentiality, anonymity of participants and reliability of the information collected. Tab. 2 presents the characteristics of the companies involved in the study.

Table 2: Characterisation of companies participating in the study

Company code	Business Sector	Year of Incorporation	Number of Employees	Location (Municipality)	Type of Interview
A	Manufacturing	2007	30	Viana do Castelo	On-site (off-site)
B	*Software* Development	1994	55	Porto	Remote

Company code	Business Sector	Year of Incorporation	Number of Employees	Location (Municipality)	Type of Interview
C	Construction	2016	38	Ponte da Barca	On-site (at the premises)
D	Technical Services in the field of Electricity	1977	21	Ponte da Barca	On-site (at the premises)

To complement the characterisation of the companies analysed, Tab. 3 presents the profile of the managers interviewed, as the main decision-makers in the organisations under study.

Table 3: Characterisation of the managers participating in the study

Company code	Position of Interviewee	Years of service in position	Management Experience (years)	Experience in an Organisational Context	Academic Qualifications
A	General Manager	17	20	Multinational	Degree in Engineering and Industrial Management
B	Coordination of the *Software* and Services Department	28	28	Multinational	Degree in Information Technology
C	Managing Partner	10	13	National	Secondary Education (12th year) – Level 3 (QNQ)
D	Manager	6	6	National and Multinational	Civil Technical Course – Level 4 (QNQ)

According to Sá et al. (2021), interviews are particularly suited to interpretative studies and qualitative research objectives, allowing for a descriptive and detailed analysis of the phenomena under study. Taking into account the research question – to understand whether SMEs recognise KM as a factor that generates competitive advantage – three propositions were formulated to guide the analysis: p1: SME managers recognise the importance of Knowledge Management as a competitive advantage; p2: The recognition of Knowledge Management as a competitive advantage in SMEs is positively associated with the level of experience and qualification of managers; p3: SMEs operating in highly competitive sectors tend to value Knowledge Management more as a strategic factor.

4. Analysis and Discussion of Results

The analysis of the data collected was carried out using thematic content analysis, with the three propositions formulated (p1, p2 and p3) as guiding categories. After the interviews were transcribed in full, the discourses were read through, units of meaning were identified and then aggregated into analytical categories, allowing for a comparative interpretation between the different cases studied. The presentation of the results follows the structure of the defined propositions, linking empirical evidence (excerpts from the interviews) with analytical interpretation and theoretical framework.

> *Proposition 1 (P1): SME managers recognise the importance of knowledge management as a competitive advantage.*

The interview analysis shows that managers from companies A, B, C and D recognise the strategic importance of Knowledge Management (KM), although with different levels of formalization and organizational maturity. Companies A and B present more structured KM approaches, supported by ERP systems, digital platforms and ISO certifications (ISO 9001, ISO 14001, ISO/IEC 20000 and ISO/IEC 27001), positioning KM as essential for knowledge retention, organizational continuity and employee integration. In contrast, companies C and D rely mainly on informal and experience-based practices, where tacit knowledge and employees' know-how are central to organizational value and quality improvement. Overall, the results suggest that KM as a competitive advantage depends not only on formal systems, but also on the strategic value attributed to human capital. These findings align with the literature, which recognizes organizational knowledge as a key intangible asset and highlights the role of information technologies in supporting knowledge systematization and long-term competitiveness.

Proposition 2 (P2): The recognition of KM as a competitive advantage in SMEs is associated with the level of experience and qualification of managers.

The comparative analysis of managers' profiles suggests a possible relationship between professional experience, academic qualifications and the strategic value attributed to Knowledge Management (KM). Managers from companies A and B, with higher education and extensive experience, adopt a more structured and systematic approach to KM, integrating it into organizational strategy through certifications, collaborative platforms and formal knowledge-sharing mechanisms. This is reflected in the perception that KM has become increasingly critical due to organizational complexity and the growing importance of human resources, with experience seen as a factor that enhances maturity in knowledge management. In contrast, companies C and D associate KM mainly with practical experience and informal knowledge transmission, although managers also acknowledge that professional experience influences their understanding of KM, indicating a gradual increase in awareness of its strategic relevance. However, given the qualitative nature of the study and its limited sample size, these findings cannot be interpreted as causal, but rather as exploratory evidence. This interpretation is consistent with the literature, which links KM to an integrated organizational perspective (Dias, 2022) and highlights human capital as a key strategic resource for value creation (Sousa & Ferreira, 2021).

Proposition 3 (P3): SMEs operating in highly competitive sectors tend to value KM more as a strategic factor.

The multisectoral analysis suggests that the competitive context can influence the degree of formalization and strategic valuation of KM. Company A operates in a highly competitive international market, with strong price pressure. In this context, the manager states that "having critical mass within the organization allows us to face challenges with greater comfort and efficiency", highlighting knowledge as a mechanism for differentiation from the competition. Similarly, company B operates in a technology sector marked by high turnover and rapid evolution of knowledge. The manager states that "KM is critical to maintaining competitiveness", reinforcing the idea that the ability to respond to the market depends on the systematization and capitalization of internal knowledge. In companies C and D, although competition is significant at the national level, the value placed on KM is more focused on the practical experience and TK of employees. Knowledge is understood as a factor of quality and operational differentiation, but not necessarily formalised in structured systems. These results suggest that sectors with greater competitive intensity and greater technological volatility tend to encourage more formal KM practices. However, as in the previous proposition, the data only allow us to identify interpretative trends and not generalisable relationships. The findings are in line with the literature that argues that effective knowledge management is essential to the survival of SMEs in competitive markets (Ferraz, 2015; Trindade et al., 2016).

5. Conclusions

The present study aimed to analyze whether SMEs recognize KM as a factor that generates competitive advantage, while also seeking to understand how this recognition relates to the profile of managers and the competitive context of the sectors of activity. The results obtained confirm, at an exploratory level, proposition P1, showing that the managers of the four SMEs analyzed recognise KM as an essential strategic element for organisational sustainability. Although with different levels of formalisation, all companies value knowledge as a differentiating resource, either through structured systems (ISO certifications, digital platforms, technical repositories) or through the valorization of the TK accumulated by employees. These findings corroborate the literature that identifies organisational knowledge as an intangible asset central to value creation and competitive differentiation (Pinto et al., 2018; Ferraz, 2015), as well as the contributions of the intellectual capital approach, which highlights human capital as a fundamental strategic resource (Sousa & Ferreira, 2021). Regarding proposition P2, the data suggest a possible association between managers professional experience and academic qualifications and the degree of formalisation of KM practices. Managers with more professional experience and higher education demonstrate a more structured and strategic view of KM, integrating it into formal systems and organisational mechanisms for knowledge retention and sharing. However, the qualitative nature and small size of the sample do not allow for a conclusive or causal relationship to be established, and these results should be interpreted as exploratory evidence. Nevertheless, the results are in line with the literature that argues that KM requires an integrated view of the organisation and leadership capable of recognising knowledge as a strategic resource (Dias, 2022). Regarding proposition P3, the multisectoral analysis suggests that the competitive context influences the degree of value and formalisation of KM. Companies in more dynamic and competitive sectors, namely manufacturing with international exposure and

the technology sector, have more systematic knowledge management and retention practices. This result is consistent with the literature, which argues that in highly competitive and volatile environments, the ability to effectively manage knowledge is a critical factor for survival and differentiation (Ferraz, 2015; Trindade et al., 2016). On the other hand, in sectors where competitiveness takes on more operational contours, KM manifests itself mainly through the valorisation of TK and the practical experience of employees. Taken together, the results reinforce the theoretical perspective that KM should not be understood merely as a set of technological tools or formal procedures, but as a continuous process of creating, sharing and applying organisational knowledge, as advocated by the knowledge spiral and intellectual capital models. It is observed that the maturity of KM practices varies according to organizational and contextual factors, but the recognition of knowledge as a strategic resource is common to all the cases analysed. From a theoretical point of view, the study contributes by highlighting, in a multisectoral context of Portuguese SMEs, the link between KM, leadership profile and competitive context. From a practical point of view, the results suggest that investment in human resource training, knowledge systematization and the adoption of structuring instruments (such as certifications and collaborative platforms) can strengthen organizational robustness and the ability to adapt to competitive and uncertain environments. In summary, the study confirms that KM is recognised by the SMEs analysed as a relevant driver of competitive advantage, even though its formalisation and strategic integration depend on internal and contextual factors, constituting a strategic priority for organisations operating in increasingly complex and competitive environments.

6. Limitations of the Study and Suggestions for Future Research

The study presents some limitations, particularly the small sample size, which restricts the generalisation of the findings to the broader SME context. In addition, data collection relied exclusively on interviews with company managers, without triangulation with other sources such as employees, internal documents, or organizational performance indicators, which may introduce interpretative bias. Moreover, due to its qualitative and exploratory nature, the study does not establish causal relationships but rather identifies trends and contextual associations. Future research should adopt quantitative or mixed-method approaches to further examine the relationship between Knowledge Management and SME organizational performance.

Ethics Declaration: This study was conducted in accordance with ethical research principles. Informed consent was obtained from all interview participants prior to their participation, and their confidentiality and anonymity were fully ensured.

AI Declaration: Artificial intelligence (AI) tools were used solely for language editing and stylistic refinement during the preparation of this manuscript. The authors remain fully responsible for the content, analysis, and conclusions presented in this paper.

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