Intellectual Capital and Performance: A Case Study of Construction Companies

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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

1. Introduction

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 organizational 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:

1. What is the capacity of companies to implement intellectual capital management policies that facilitate the retention and transmission of knowledge created and accumulated?
2. 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.

2. Literature Review

2.1 Intellectual Capital

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).

Daryaee 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).

2.2 Intellectual Capital in SMEs

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 organizational 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.

2.3 Research Support Intellectual Capital Management Model

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 organizational knowledge (Matos, 2013).

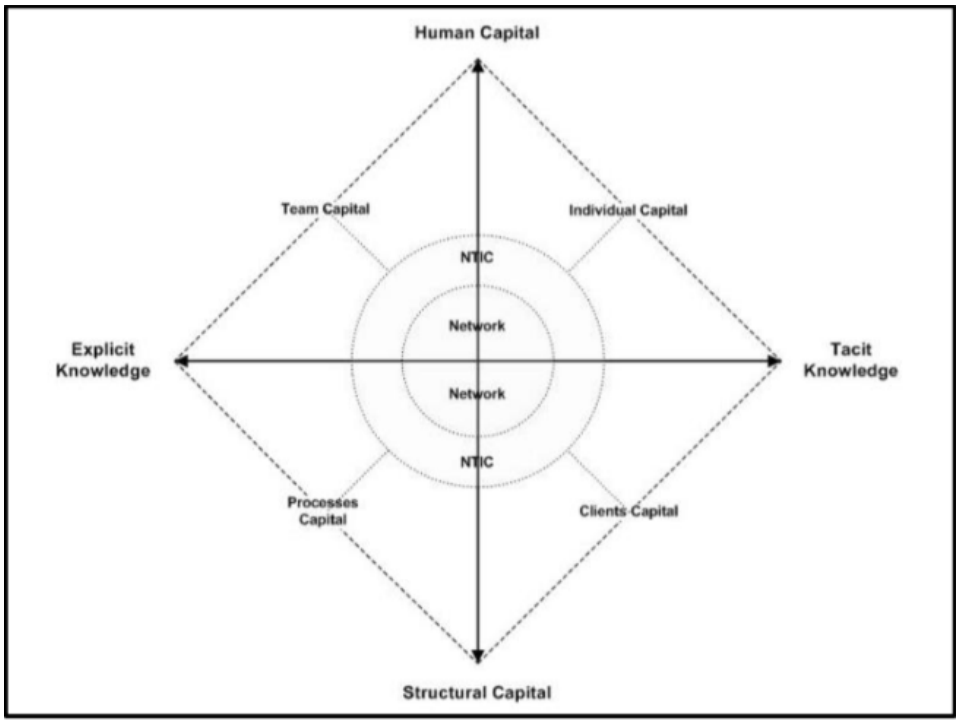

Figure 1: ICM - Intellectual Capital Model (Matos, 2013, p. 343)

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 organizational 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 organizational knowledge, which can be understood as the organizational 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.

3. Methodology

3.1 Data Collection and Analysis Methods

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.

3.2 Sample

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.

3.3 Interview Survey

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.

3.4 Data Analysis Method

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 the data.

4. Analysis of Results

4.1 Presentation of 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 prospect of companies.

Founded in 2015, Reprototais Remodelações Unipessoal, Lda gave continuity to other companies founded by the current managing partner during the 1990s. Reprototais is one of the companies with the greatest presence in the construction and remodelling market in Lisbon, establishing several private partnerships.

Baratino – Indústria de Móveis e Restauro, Lda, 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, Baratino 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.

António GB Monteiro Equipamentos Elétricos, Lda is a sole proprietorship company founded by its current managing partner during the 1990s. António GB Monteiro Equipamentos Elétricos, Lda, 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.

4.2 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 the case studies 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 were 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 colour-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: Reprototais	Interviewee 2: Antonio Monteiro	Interviewee 3: Baratino
Does the company carry out the intellectual capital management?			
Were there hirings in the period 2019 and 2020?			
Question	**Interviewee 1: Reprototais**	**Interviewee 2: Antonio Monteiro**	**Interviewee 3: Baratino**
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 organizational 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?			
Question	**Interviewee 1: Reprototais**	**Interviewee 2: Antonio Monteiro**	**Interviewee 3: Baratino**
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

4.3 Intellectual Capital Management Graphics Synthesis

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

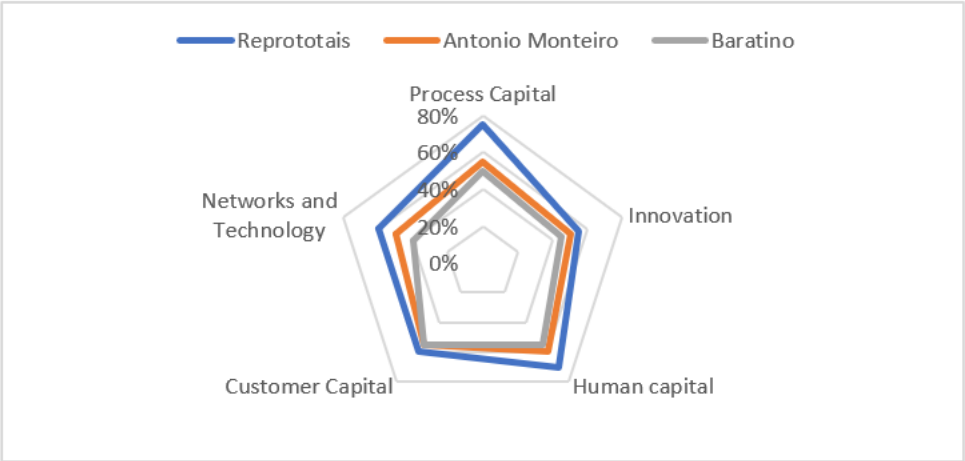

Figure 2: Graphical Synthesis of GCI in the three companies surveyed

Source: Self elaboration.

In the case of Reprototais, 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 Reprototais.

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

The 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.

4.4 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.

4.4.1 Individual Capital Quadrant

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. Baratino 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.

4.4.2 Team Capital Quadrant

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.

4.4.3 Process Capital Quadrant

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 the testimony, that is, the commitment to teamwork, which enables the learning of the newest elements of the companies that end up having as mentors 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. Reprototais 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.

4.4.4 Customer Capital Quadrant

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

4.4.5 New Technologies and Networks Quadrant

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 the 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 a 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 Reprototais 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 a very near future.

5. Conclusion and Limitations

The three companies that participated in the study were aware of and concerned about their role in the market. By favouring 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.

The company Reprototais 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 & 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, Reprototais 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, Reprototais 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 were 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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