Mapping and measuring IC in Knowledge-Intensive Organizations: An interventionist study

Domenica Lavorato, Alessandra Lardo**, Rita Lamboglia****

Received: 24 September 2024
Accepted:19 January 2025

Abstract

This research proposes a conceptual framework for mapping and measuring intellectual capital (IC) in knowledge-intensive organizations (KIOs) and designs a tool specifically aimed at identifying and evaluating the processes that lead to the creation, enhancement and maintenance of IC. IC is increasingly recognized as a key strategic asset in today's competitive business environment. However, its intangible nature presents challenges for quantification and it is particularly relevant in KIOs. Despite various frameworks proposed by literature, the practical implementation of IC measurement remains inconsistent, with limited evidence of its adoption and benefits in organizations. This study adopts an interventionist approach, with academics working with a research center to address the issues of IC mapping and measurement. The research findings present a conceptual framework and an IC tool, composed of processes and processes indicators, which has been subsequently tested in a selected department, representing our pilot case. This article contributes to both research and practice on non-financial measurement, by conceptualizing an innovative approach to mapping and measuring IC in the complex context of KIOs.

Keywords: Intellectual capital, IC Processes, Knowledge Intensive Organizations, Non-Financial Measurement, Interventionist research

* University of Naples "Parthenope", Department of Economics, Law, Cybersecurity, and Sport Sciences. Corresponding author: domenica.lavorato@uniparthenope.it.

** University of Napoli "Parthenope", Department of Business and Economics.

1. Introduction

The purpose of this research is to propose a framework for mapping and measuring intellectual capital (IC) and to design, refine and develop a tool specifically aimed at identifying and evaluating the processes that lead to the creation, enhancement and maintenance of IC.

IC is a critical strategic asset that contributes significantly to the success and sustainability of organisations operating in highly competitive business environments (Cohen and Kaimenakis, 2007; Bontis, 2001; Ross and Ross, 1997). As a result, effective IC management has become a critical factor for organisations seeking to remain competitive in today's dynamic markets.

According to Kozak (2011), the concept of IC is still evolving and there is no universally accepted definition for its subcomponents. However, it is widely recognized that physical assets and access to capital alone do not adequately reflect an organisation's ability to create current or future value. A more complete understanding of this capability requires an analysis of the organisation's intangible assets, such as knowledge, problem-solving routines and the ability to perform specific tasks. In addition, intangibles such as reputation, network affiliations and organisational culture are examples of components of an organization's IC (e.g., Stewart, 1997). In this context, Stewart (1997) defines IC as the synergy of human capital, structural capital and relational capital.

One of the main challenges in the discourse on IC is its measurement. As IC encompasses non-financial and intangible elements, quantifying its value is inherently complex and challenging (Habersam *et al*., 2013; Giuliani and Skoog, 2020). Several studies have emphasised that management accounting plays an important role in addressing this challenge by enabling managers to identify IC value drivers and develop information systems and performance measures for effective IC measurement (Badia *et al*., 2019; Zambon *et al*., 2019; Giuliani and Skoog, 2020; Trequattrini *et al.*, 2021).

Although numerous frameworks and models have been proposed to measure and capture the intangible aspects of value creation, their practical application is often inconsistent (Dumay, 2012; Guthrie *et al*., 2012; Novas *et al*., 2017). Furthermore, there is currently no globally accepted standard for IC measurement in professional practice. This lack of standardisation makes it difficult to compare and benchmark IC measurement across organisations and industries. The context in which an organisation operates can further influence IC measurement, as needs and priorities often differ across industries and organisational types, making it difficult to apply a single measurement model. These issues are exacerbated by the limited

evidence of organisations actively measuring IC, with even fewer reporting tangible benefits from such initiatives.

Developing a comprehensive and accurate measurement system for IC remains an ongoing challenge and a topic of significant debate in both the business and academic communities (Novas *et al*., 2017; Dumay *et* al., 2020). There is a growing need for research focused on identifying, measuring and managing IC (Novas *et al.*, 2017; Dumay and Guthrie, 2019; Dumay *et al*., 2020).

The topic of IC measurement becomes even more relevant in the context of KIOs (Hidalgo and Albors, 2008; Millar *et al*., 2016; Shimazoe, 2021). Knowledge is a vital driver of business success and competitiveness, particularly in KIOs which primarily focus on the creation and sale of knowledge (Mas-Machuca, 2014). In fact, KIOs are organizations in which knowledge serves as the main input and output. Companies with significant levels of IC, such as KIOs, are more inclined to use non-financial measures and sophisticated performance measurement systems that encompass balanced and multi-dimensional approaches.

In light of these considerations, this study explores the topic of mapping and measuring IC in the context of KIOs. Specifically, the research aims to address the following questions:

RQ1: How can a conceptual framework for mapping and measuring IC for KIOs be developed?

RQ2: How can a tool be designed to identify and evaluate the processes that lead to the creation, enhancement and maintenance of IC in KIOs?

To address these research questions, we present a case study developed using an interventionist approach (Lukka, 2000; Jansen, 2018; Baard and Dumay, 2020). We analyse a research centre, operating in the aerospace sector, that encounters challenges in measuring and capturing the value of its research activities, trying to solve a practical problem.

The remainder of the paper is organized as follows. After the introduction, Section 2 presents an analysis of the literature, focusing on the identification, measurement and management of IC and the unique characteristics of KIOs. Section 3 describes the research methodology. Section 4 presents the findings in relation to the development of the conceptual framework and the design of a tool to identify and evaluate IC processes. Finally, Section 6 discusses the findings and presents the main conclusions of the paper.

2. Literature review

2.1 Identifying, measuring and managing IC

In the knowledge-based economy, IC plays a pivotal role in creating a competitive advantage and significantly influencing firm performance (Stewart, 1997; Sveiby, 1997; Dumay, 2012; Guthrie *et al*., 2012; Lardo *et al*., 2017). As a result, effective IC management has become critical for companies seeking to remain competitive in today's dynamic market and to drive innovation and sustainable growth. Within the discourse on IC, a key aspect is its measurement, which encompasses intangible elements such as employee know-how, brand reputation, innovation capacity and customer relationship management. Intangible resources are recognized as significant sources of sustainable value creation; however, quantifying this value remains challenging due to its non-financial and non-mandatory nature (Habersam *et al*., 2013; Giuliani and Skoog, 2020). Accounting professionals have pursued diverse strategies to make these intangible assets more visible, manageable, and exploitable (Meritum, 2002; Mouritsen *et al*., 2003). While certain intangible assets, like patents, can be valued on a balance sheet according to accounting principles, this is not possible for all elements of IC (Fincham and Roslender, 2003). Despite the recognized strategic importance of IC in business organizations, it is often not adequately represented in external reporting. The main challenge lies in accounting for the value of intangible assets that are not reflected in financial statements but that contribute to the value creation of an organization.

To address these challenges, research and practical efforts in IC have focused on proposing guidelines and models for its measurement (Mouritsen and Roslender, 2009). The goal is to promote management practices that strengthen company competitiveness and improve IC disclosure (Guthrie *et al*., 1999; Andriessen, 2004; Sveiby and Lloyd, 2010). Although various frameworks have been proposed to capture the intangible aspects of value creation, their practical implementation remains inconsistent (Dumay, 2012; Guthrie *et al*., 2012; Novas *et al*., 2017). Limited evidence exists of firms actively measuring their IC, and there are even fewer reports of the benefits derived from such measurement. Hence, there is a growing need for research focused on identifying, measuring and managing IC (Novas *et al.*, 2017; Dumay and Guthrie, 2019; Dumay *et al*., 2020).

Studies on identifying, measuring, and managing IC can be categorized into two main approaches: a static approach and a dynamic approach (Meritum, 2002; Mouritsen, 2006). The static approach considers IC a stock

of resources and focuses on identifying and quantifying these assets, following the adage "you can manage what you can measure" (Stewart, 1997; Mouritsen and Roslender, 2009). Studies within this approach consider IC as a distinct organizational element that needs to be identified and measured to explain the gap between market and book value (Giuliani and Skoog, 2020). Early IC research is consistent with the static perspective, emphasizing the role of IC in building and sustaining competitive advantage and examining various methods for its measurement (Mouritsen, 2006; Guthrie *et al*., 2012).

Conversely, the dynamic approach emphasizes IC flows in order to better understand and manage them. Studies adopting this approach focus on the processes, practices, activities and connections involved in value creation (Dumay and Garanina, 2013; Guthrie and Dumay, 2015; Badia *et al*., 2019; Zambon *et al*., 2019). Research within this strand emphasizes how IC should be managed effectively, drawing attention to the managerial activities required to control and manage intangibles in a firm (Guthrie *et al*., 2012; Chiucchi, 2013; Giuliani *et al*., 2016). Several scholars have highlighted that exploring the dynamics of IC reveals how it creates value in organizations and in the capital market (Mouritsen, 2006; Dumay and Garanina, 2013). Skoog (2003) emphasizes the importance of discussing value creation and IC processes in order to understand their development and manage them effectively. The dynamic approach has its roots in the resource-based view (RBV), which assumes that a firm's competitive advantages come from knowledge-based resources and their development (Teece *et al*., 1997; Marr and Roos, 2005). According to the RBV, value creation is both resource- and activity-oriented. Therefore, it is important not only to identify key intangible assets within the organization but also to focus on key activities and understand how resources are used internally to create value and build competitive advantages (Haanes and Fjeldstad, 2000; Pirozzi and Ferulano, 2016; Iacuzzi and Pauluzzo, 2023).

The analysis of the existing literature reveals several perspectives for interpreting the dynamic dimension of IC (Kianto, 2007). The first perspective defines this dynamic dimension as "value creation dynamics" and focuses on the processes that create value by exploring how resources interact and combine (Roos and Roos, 1997; Mouritsen *et al*., 2001; Skoog, 2003). The second perspective considers the activities around IC as the means to extract and activate its value (Meritum, 2002; Mouritsen *et al*., 2005), emphasizing IC practices that involve acquiring, generating, maintaining and improving IC, as well as measuring and monitoring it. The third perspective interprets the dynamic dimension of IC as the capacity for change, understanding IC as a way for companies to learn, innovate, and

proactively adapt to the changing environment (Arenas and Lavanderos, 2008; Chiucchi, 2013). Each of these three perspectives, as defined by Kianto (2007), highlights a unique aspect of the dynamic dimension of IC, and they are not mutually exclusive.

Several IC accounting models and guidelines have attempted to understand and report on the dynamic dimensions of IC. For example, the Meritum guidelines (Meritum, 2002) integrate IC activity indicators and performance measures with strategic value creation objectives. Similarly, Chiucchi (2013) proposes a framework for measuring and reporting IC based on the premise that intangible assets are shaped by management activities. The proposed measurement and reporting system, inspired by the Meritum framework (Meritum, 2002), includes a map of an organization's intangible assets, a map of development activities, and a set of indicators to capture both the growth or decline of these assets and the efficiency and effectiveness of management practices. The study of Habersam *et al*. (2013) shows how a mandatory external IC reporting tool becomes relevant from an internal management control perspective. The model analyzed, called Knowledge Balance Sheets, includes performance indicators related to IC (human, relational and structural capital), core processes and the output and impact of the core processes.

Although numerous models have been proposed for measuring and reporting IC, their practical application remains limited (Chiucchi and Montemari, 2016), and the appropriate use of IC indicators is still a topic of debate (Catasús and Gröjer, 2006; Badia *et al*., 2019). Moreover, few studies have attempted to integrate static and dynamic approaches to better understand value creation and organizational performance (Kianto *et al*., 2014). As a result, there is an increasing call for research that addresses IC measurement while taking into account the specific contexts in which IC operates (Guthrie *et al*., 2012; Dumay and Guthrie, 2019; Dumay *et al*., 2020).

2.2 Knowledge-Intensive Organizations

Knowledge is an essential driving force for business success and competitiveness, especially in KIOs, whose core business is to create and sell knowledge (Mas-Machuca, 2014). The shift from an industry-based economy to a knowledge-intensive economy has created “Knowledge Intensive Enterprise” (Drucker, 1988), which plays a pivotal role in creating economic value (Seo et al., 2012). As a result, knowledge is their most valuable asset, leading these organizations to invest heavily in intangible

resources such as research and development (Wu *et al*., 2008), which are essential for gaining competitive advantage (Martín-de Castro, 2015; Mohammad Shafiee *et. al,* 2024). At the same time, the use of acquired knowledge is equally important for achieving this advantage (Flor *et al*., 2018).

KIOs are based on knowledge development, employee creativity, and collaboration to drive innovation and value creation (Leon, 2013; Khan, 2014). Knowledge serves as both the primary input and output of their operations, making them leaders in innovation and proponents of exploration and exploitation activities (Jørgensen *et al.*, 2011; Ohehmichen *et al*., 2017). These organizations require distinct management and leadership styles compared to traditional firms (Donate and de Pablo, 2014), as they operate in industries where knowledge and intellectual assets are central (Hansen *et al*., 1999; Alvesson and Karreman, 2001; Garcia-Perez *et al*., 2020). Examples of such industries include technology, research and development, consulting, professional services, pharmaceuticals, and biotechnology (Argote and Ingram, 2000; Grant, 1996).

The management of KIOs rely on IC, continuous learning, and knowledge-sharing culture (Davenport and Prusak, 1998). They leverage IC to drive innovation, enhance decision-making, and advance scientific and technological progress (Nonaka and Takeuchi, 1995). Effective knowledge management practices enable adaptability, learning, and responsiveness in dynamic markets (Grant, 1996; Spender, 1996). These firms give emphasis to collaboration, IT infrastructure, and robust knowledge transfer processes (Argote and Ingram, 2000; Nonaka and Takeuchi, 1995).

Research on KIOs has explored their characteristics, challenges, and strategies, focusing on knowledge transfer, organizational learning, innovation, and leadership's role in fostering knowledge-sharing behaviors (Hansen *et al*., 1999; Alavi and Leidner, 2001, Khan, 2014). KIOs often go beyond traditional financial metrics, employing advanced performance measurement systems that integrate non-financial indicators like innovation rates, customer satisfaction, and employee knowledge sharing (Ittner and Larcker, 1998; Kaplan and Norton, 1992). This multidimensional approach aligns with the complexity of IC and supports both short-term performance and long-term value creation (Bontis, 2001; Marr *et al*., 2004; Bisbe and Otley, 2004).

In conclusion, KIOs distinguish themselves by their strategic use of IC, reliance on non-financial performance metrics, and focus on innovation and knowledge management to sustain competitive advantage and drive long-term success.

3. Research method

This research focuses on proposing an innovative approach to mapping and measuring IC through a case study (Yin, 2018) conducted using the interventionist method (Lukka, 2000; Chiucchi *et al*., 2014; Pigatto *et al*., 2023). The case study concerns a research center operating in Italy in the aerospace sector, that is primarily a project-based organization. Due to privacy concerns, the research center has specifically requested that its name and specific details of its business operations remain confidential. Nevertheless, the company agreed to join the working group and actively participate in the research project.

The interventionist research is highly recommended for studying managerial accounting practices, especially when investigating real problems that are relevant for both research and managerial applications (Kaplan, 1998; Ahrens and Chapman, 2007). Furthermore, this method is well-suited for addressing the call for research in the accounting literature, especially in the field of IC studies, for case studies that aim to test and observe concepts, methods, and tools in practical contexts (Mouritsen, 2006; Chiucchi, 2013; Dumay, 2013; Giuliani and Skoog, 2020). The interventionist research is based on a collaborative process between researchers and the company under study. This collaboration incentivizes company members to actively participate and invest time working with researchers, as they expect practical and relevant outcomes. As a result, researchers gain valuable insights through their engagement with practitioners (Eden and Huxham, 1996).

To investigate our research topic, we use the constructive research process proposed by Lukka (2000), which typically involves the following steps: identifying a problem of potential practical and theoretical relevance; assessing the possibility of establishing a medium-to-long-term collaboration with organizations potentially interested in participating in the research; attaining in-depth practical and theoretical knowledge of the subject under investigation; developing a solution to the practical problem that also holds potential for theoretical advancement; implementing the solution and testing its functionality; reflecting on the potential dissemination of the solution in contexts beyond the one in which it was formulated; identifying the theoretical contribution of the research by referring to the existing literature.

The collaboration started with some informal meetings between the research project coordinator and the Chief Financial Officer of the analyzed KIO in late 2021. The initial problem identified by top management was the

difficulty in measuring the value of the organization's research activities, especially in terms of reporting to investors, due to a traditional view of IC as only intangible assets recognised in the financial statements. After initial interactions, the researchers were able to clarify that the problem outlined was actually related to the difficulty of capturing all the intangible aspects of value creation. Therefore, the research aimed to address the practical issue of the research center through the development of a conceptual framework for mapping and measuring IC and the design of a tool to identify and evaluate IC processes.

Once the practical problem was identified, a long-term collaboration agreement between the university research team and the research center was formalized in January 2022. In order to develop an in-depth understanding of the research object, the research team conducted a systematic literature review on the identification, measurement, and management of IC in the context of KIOs, as well as interviews and meetings with managers of the research center to understand the existing professional best practices on the topic. This step lasted from February to September 2022 and involved, on the university side, the members of the research group and, on the KIO side, the CFO, the head of logistics services, asset management and the head of a division responsible for specific activities relevant to the research project. The output of this step was the development of the conceptual framework for mapping and measuring IC.

The design, implementation and testing steps were developed interactively. The design of the tool to identify and evaluate IC processes was based, on the one hand, on the theoretical frameworks appropriately selected in the studies on the identification, measurement, and management of IC (Meritum, 2002; Chiucchi, 2013; Habersam *et al*., 2013). On the other hand, qualitative data were collected from various sources, including company reports, meetings, interviews, workshops and focus groups with top management and the head and members of the division selected to test the tool (Qu and Dumay, 2011), from October 2022 to July 2023.

The meetings and interviews were mainly conducted online using video conferencing tools such as Google Meet, while the workshops and focus groups were held both at university campus and at the organization's headquarters. Interviews were conducted by at least two researchers, while all the researchers involved in the project participated in the workshops and focus groups. Two workshops of two hours each were held in December 2022 and March 2023. The IC tool was also presented and discussed in two focus groups. These groups consisted of the university researchers and 8 participants from the KIO. The research project coordinator acted as focus

group facilitator, ensuring that discussions remained on topic without being directive and allowing participants to explore the topic from different perspectives (Morgan et al., 1998). The focus groups followed a semi-structured agenda proposed by the facilitator, which was discussed with senior management and then adapted for use.

The implementation and testing steps consisted of an IC tool developed using MS Excel spreadsheets and shared with members of the selected division, who analyzed the relevance and feasibility of the measures included and made changes to the tool.

Once tested, the IC tool was presented at international conferences on accounting and IC, in order to obtain further suggestions and feedback able to identify the theoretical contribution to the literature on IC. The IC tool was also presented at a final workshop in March 2024, with the participation of the CEO of KIO, to assess its applicability in contexts beyond the analyzed division.

The constructive research process is synthesized in Table 1.

Table 1- The constructive research process

Steps- Constructive research process (Lukka, 2000)	**Activities**	**Actors involved**	**Timing**
1- Identifying a problem of potential practical and theoretical relevance	• Informal meetings.	• Research project coordinator; • CFO.	November-December 2021
2- Assessing the possibility of establishing a medium-to-long-term collaboration	• Formalized the long-term collaboration agreement.	• University research team; • Research center.	January 2022
3- Attaining in-depth practical and theoretical knowledge of the subject under investigation	• Systematic literature review on IC identification, measurement, and management in KIOs; • Interviews and meetings to identify the existing professional best practices on the topic.	• University research team; • CFO; • Head of logistics services, asset management; • Head of the selected division.	February-September 2022
4- Developing a solution to the practical problem that also holds potential for theoretical advancement 5- Implementing the solution and testing its functionality	• Selection of theoretical frameworks in IC identification, measurement and management studies; • Interviews; • Workshops; • Focus groups.	• University research team; • Top management; • Head of the selected division; • Team of the selected division.	October 2022- July 2023
6- Reflecting on the potential dissemination of the solution in contexts beyond the one in which it was formulated 7- Identifying the theoretical contribution of the research by referring to the existing literature	• Results formalization; • Results presented at international conferences on accounting and IC; • Results presented at a final workshop.	• University research team; • CEO; • Head of logistics services, asset management; • Head of the selected division.	September 2023- March 2024

4. Findings and results

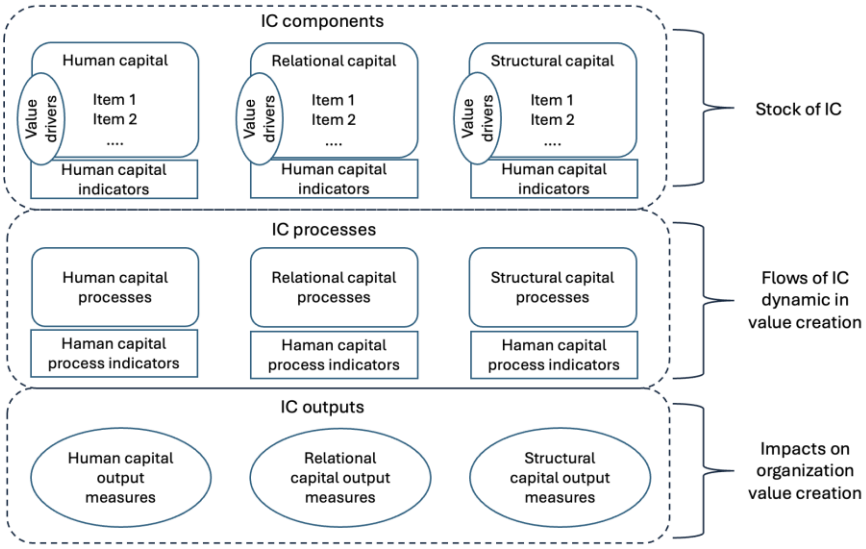
This section presents the main findings and results of the constructivist research process. Specifically, it describes the conceptual framework for mapping and measuring IC and the design, refinement and development of the tool used to identify and evaluate IC processes.

4.1. The conceptual framework for mapping and measuring IC (RQ1)

The conceptual framework for mapping and measuring IC developed in this study integrates the static and dynamic perspectives on IC (Meritum, 2002; Chiucchi, 2013; Habersam *et al*., 2013). It considers IC both as a stock of resources, representing static entities at a given point in time (Stewart, 1997; Mouritsen and Roslender, 2009), and as flows, representing the processes that contribute to value creation (Dumay and Garanina, 2013; Guthrie and Dumay, 2015; Badia *et al*., 2019; Zambon *et al*., 2019).

The conceptual framework for mapping and measuring IC, shown in Figure 1, consists of three sections. The first section focuses on the components of IC: human capital, structural capital and relational capital (Stewart, 1997). Each component consists of a list of items that represent its elements. For example, patents and copyrights are items associated with structural capital. These items are grouped into homogeneous sets called 'value drivers', which are defined on the basis of the organization's strategic objectives. Once the items for each IC component have been identified and categorized into value drivers, the framework supports the identification of indicators to measure IC resources. The second section deals with IC processes, which are conceptualized as management activities that enable the organization to create, enhance and develop IC resources. For each IC component, relevant business processes are identified to ensure the maintenance or enhancement of the IC resources. The framework also includes process indicators, which are measures used to evaluate, either qualitatively or quantitatively, the processes involved in the creation, enhancement and development of IC. The third section focuses on output measures, which assess the impact of IC on the organization's value creation.

Figure 1- The conceptual framework for mapping and measuring IC



4.2. The IC tool (RQ2)

This section reports the results regarding the tool design, implementation and testing steps, with a particular focus on IC processes. Table 2 describes the several phases that involved the university team and the KIO's team. In the remainder of this section, we describe each phase in detail.

Table 2 – Phases and roles in the research project

Number and name of the phase	Brief description	Participants' role
Phase 1 - Mapping IC processes and process indicators	Identification of IC processes and related process indicators typical of KIOs and construction of the IC tool.	At this phase, only researchers who had developed a thorough literature review on the non-financial IC measurement were involved.
Phase 2- Identification of the pilot division	Selection of the pilot division to test the IC tool. Selection of a dataset	This phase involved both researchers and members of the pilot division. The pilot

to test the IC tool	of indicators based on their relevance.	division members: individual selection and analysis of the set of IC processes and process indicators. Researchers: support and discussion with division members.
Phase 3- Critical analysis and refinement of the IC tool	Final selection of a subset of IC processes and process indicators to be included in the IC tool.	This phase involved both the researchers and the members of the KIO. The pilot division members: collective selection and discussion of a final subset of IC processes and process indicators. Researchers: collection of feedback on the research process, methodology and results.

Phase 1- Mapping IC processes and process indicators

This phase of the research focused on analyzing the literature related to the non-financial measurement of IC, in particular studies that define IC processes and their related process indicators.

Based on the results of the literature review, the researchers developed a tool to identify and evaluate IC processes, called the "IC tool", using an Excel spreadsheet. The IC tool consists of two sections: one section outlines the typical business processes of a KIO aimed at creating, enhancing and developing the IC; the other section presents a set of IC process indicators, primarily non-financial.

The IC processes section identifies general IC-related processes as well as specific processes for each component of IC: human capital, relational capital and structural capital. Meanwhile, the IC process indicators section provides a list of indicators related to IC processes in general. At this stage, the researchers decided to keep the two sections independent, avoiding direct alignment between processes and the indicators.

According to the literature review, the IC processes section contains 87 items, while the IC processes indicators section includes 20 items. The results were presented at a workshop at KIO's headquarters where the tool was demonstrated (see Appendix – www.sidrea.it/mapping-knowledge-organizations - for more details on IC processes and indicators).

Phase 2- Identification of the pilot division to test the IC tool

After several meetings between the researchers and KIO's managers, it was agreed to select a specific division to test the IC tool. The division was chosen because all six members were available to take part in the test and because its activities are mainly focused on research and development. In addition, the division is involved in national and European projects with various partnerships.

In this phase, the IC tool was sent to the team of the pilot division for validation. First, the researchers distributed the tool individually to each team member, who independently assessed the presence of the identified processes in their division and the feasibility of calculating the proposed process indicators. Each team member assessed the relevance of the IC processes and process indicators included in the IC tool by considering their alignment with the division's usual activities. As a result, some IC processes, although related to the creation, enhancement and development of IC resources, were considered irrelevant in the context of the pilot division's specific tasks.

The researchers collected and compared the results of the individual assessments. Based on this comparison, a relevance scale was created for both IC processes and process indicators according to the response rates. IC processes and process indicators considered relevant by at least five team members were fully included in the IC tool. Those considered relevant by three or four team members were deferred for further discussion. Processes and process indicators considered relevant by only one or two team members were also deferred for further discussion. Those identified as irrelevant by none of the team members were excluded from the IC tool.

The researchers presented the results of the individual consultations to the entire division, using the relevance scale outlined above. These results, together with a summary of the response rates, are presented in Table 3.

Table 3 – Response rate

Full agreement	6/6 – 5/6
Medium agreement	4/6 – 3/6
Low agreement	2/6 – 1/6
No agreement	0/6

Phase 3- Critical analysis and refinement of the IC tool

The final phase involved the researchers, the members of the pilot division, and the KIO's top management. The researchers conducted a critical analysis of the results from the previous phases and shared them with both top management and division members.

During a dedicated meeting, the researchers presented the key issues identified in the analysis and explained the rationale behind the inclusion or exclusion of certain IC processes and process indicators. They then asked the division members to meet and collectively re-evaluate the processes and indicators that had received moderate to low agreement in Phase 2. The evaluation results were recorded in a spreadsheet using a simplified 'high/low' scoring parameter to streamline the decision-making process. In addition, the division members provided a list of potential new indicators that they considered valuable to help provide a more comprehensive assessment of the division under study.

The researchers selected and included in the final IC tool the processes and indicators with a high level of agreement among division members and the additional indicators suggested by them. As a result, the final IC tool includes 64 IC processes and 18 process indicators.

The IC tool was then presented at a meeting with KIO's top management and CEO to assess its validity and applicability to other divisions of the research center. In addition, the IC tool was presented at international conferences to gather suggestions and feedback to further enhance its contribution to the IC literature.

5. Discussion and conclusions

The research aimed to propose a conceptual framework for mapping and measuring IC and to design, refine and develop a tool for identifying and evaluating IC processes, within a research center through an interventionist methodology, following the Lukka's (2000) constructive research process.

The findings focused, on the one hand, on proposing an innovative approach to IC measurement, which also highlights the originality of this work. On the other hand, the findings were concerned with mapping the processes that lead to the creation, enhancement and development of IC, as well as defining IC process indicators specific to KIOs. The broader goal was to advance the literature on the identification, measurement, and management of IC (Guthrie *et al*., 2012; Dumay and Guthrie, 2019; Dumay

et al., 2020; Trequattrini *et al*., 2021; Trequattrini *et al*., 2022).

To develop and test the IC tool the research was structured into three distinct phases. In the first phase, 87 IC processes and 20 IC process indicators were identified through an extensive analysis of the literature on the non-financial measurement of IC (Meritum, 2002; Chiucchi, 2013; Habersam *et al*., 2013). In the second phase, a pilot division was selected to test the IC tool. Six members of the pilot division participated in this phase and individually evaluated the tool. Based on their responses, the researchers developed a relevance scale to categorize the items according to the participants' level of agreement. In the third phase, a critical analysis of the results of the testing phase was carried out. The purpose of this analysis was to identify the rationale for including or excluding specific IC processes and process indicators, while mitigating potential biases from individual judgements. The last stage of the analysis focused in particular on processes and indicators where there was no unanimous agreement or disagreement, thereby increasing the reliability of the results.

Following the critical analysis, the IC tool was refined by adjusting the scoring of certain items. In the three components of IC, some processes shifted between medium and low relevance and vice versa. For human capital, some processes initially included in the IC tool were excluded. For example, the process "Monitoring of invested human resources in producing and developing net services" was removed because it was considered more relevant for a manufacturing company than for a research center. Conversely, the process "Planning of training activities and developing communication techniques in the areas of risk and conflict of interest management" was upgraded from medium to high relevance. This change reflects the importance of training in project risk management and conflicts of interest, which are critical for KIOs involved in many project-based activities.

Some adjustments were also made for relational capital. For example, the process "Involving political and other stakeholders in the setting of output and outcome targets and the development of the organization's management system" was downgraded from medium to low. This adjustment recognises that the KIO, as a project-based organization, already integrates stakeholders and political influences into its research themes, making this process less relevant for inclusiveness. Conversely, the process "Defining each party's responsibilities in managing partnerships including controls" was raised from medium to high. This change recognises the importance of clearly defining the responsibilities of all parties involved in a project for effective management.

In the analysis of structural capital, processes involving citizen

participation in both service development and delivery and innovation processes were considered irrelevant. This assessment was based on the fact that citizen participation is not a significant factor in the KIO analyzed. Conversely, the process "Efficiently applying appropriate technology to: manage tasks; manage knowledge; support learning and improvement activities; support the interaction with stakeholders and partners; support the development and maintenance of internal and external networks" was upgraded from medium to high relevance. This adjustment reflects the growing importance of using technological tools to share information, particularly in the light of remote working considerations.

For the process indicators, the changes in response rates were relatively small. Among them, the indicator "Proportion of independent research (% of total expenditures)" was upgraded from medium to high relevance. This change recognises its importance in providing insight into the areas of research that the organization wishes to develop, which can help to increase market share. On the other hand, the indicator "Personnel of scientific disciplines (%)" was downgraded from medium to low.

A notable result of the critical analysis was the proposal of five additional indicators by the members of the pilot division. Three of these focus on technological readiness, a crucial factor for projects as it reflects the ability to transform an idea into a product or patent. This type of indicator is particularly valuable given the project-oriented nature of the activities of both the KIO and the division. The remaining two indicators relate to the assessment of project risks.

In the final tool, only items with a high or medium response rate were included, while those with a low response rate were excluded. As a result, the final IC tool includes 64 IC processes and 18 process indicators.

Our study has several implications for both theory and practice. From a theoretical perspective, the study attempts to fill the gap in the literature regarding the practical application of IC measurement by proposing a conceptual framework to mapping and measuring IC, considering both the static and dynamic dimensions of IC (Mouritsen *et al*., 2005; Kianto, 2007; Guthrie *et al*., 2012; Dumay and Guthrie, 2019; Dumay *et al*., 2020). The IC tool developed is designed to help organizations effectively quantify intangible assets. Among its practical contributions, the IC tool improves the ability to map and measure IC in organizations with high levels of intellectual capital. It enables managers and employees to better understand IC, the value of activities that contribute to its enhancement and development, and the challenges associated with its measurement. In the case study analyzed, IC was not fully recognized by top management, whose initial understanding

was limited to intangible assets reported on the financial statements. Our research broadened this perspective and promoted a cultural change within the KIO. The research spread awareness of IC to members of the research center who previously had no specific expertise in this area. In line with previous study (Chiucchi, 2013; Chiucchi *et al.*, 2014), our findings confirm that the understanding and learning process activated by the research project is even more important than the IC tool itself. Therefore, the research work contributes also to studies regarding IC as a tool that facilitates organizational change (Chiucchi *et al*., 2014).

Finally, it is important to acknowledge the limitations of this study. As the research was conducted using an interventionist methodology, the results may have been influenced by the active involvement of the researchers, the unique characteristics of the pilot department analyzed, and the proposed IC tool itself. Future research should explore the feasibility of quantifying the results by translating qualitative information into quantitative measures, possibly using methods such as the Likert scale. This approach could provide the basis for defining a value creation metric and enabling the quantification of intangible resources.

Acknowledgement

The Authors appreciate the support from all participants in the ARIA Project, without their valuable collaboration this research would not be possible. Moreover, the authors are also grateful for the comments of the two reviewers, which helped to improve the paper.

References

Ahrens, T., Chapman, C. S. (2007), Management accounting as practice, *Accounting, organizations and society*, 32(1-2), pp. 1-27. https://doi.org/10.1016/j.aos.2006.09.013.

Alavi, M., Leidner, D. E. (2001), Review: Knowledge management and knowledge management systems: Conceptual foundations and research issues, *MIS Quarterly*, 25(1), pp. 107-136. https://doi.org/10.2307/3250961.

Alvesson, M., Karreman, D. (2001), Odd couple: Making sense of the curious concept of knowledge management, *Journal of Management Studies*, 38(7), pp. 995-1018. https://doi.org/10.1111/1467-6486.00269.

Andriessen, D. (2004), IC valuation and measurement: classifying the state of the art, *Journal of Intellectual Capital*, 5(2), pp. 230-242. https://doi.org/10.1108/14691930410533669.

Arenas, T., Lavanderos, L. (2008), Intellectual capital: object or process?,. *Journal of Intellectual Capital*, 9(1), pp. 77-85. https://doi.org/10.1108/14691930810845812.

Argote, L., Ingram, P. (2000), Knowledge transfer: A basis for competitive advantage in firms, *Organizational behavior and human decision processes*, 82(1), pp. 150-169. https://doi.org/10.1006/obhd.2000.2893.

Baard, V. C., Dumay, J. (2020), *Interventionist research in accounting: A methodological approach*, New York, Routledge. https://doi.org/10.4324/9781351262644.

Badia, F., Dicuonzo, G., Petruzzelli, S., Dell'Atti, V. (2019), Integrated reporting in action: Mobilizing intellectual capital to improve management and governance practices, *Journal of Management and Governance*, 23(2), pp. 299-320. https://doi.org/10.1007/s10997-018-9420-1.

Bisbe, J., Otley, D. (2004), The effects of the interactive use of management control systems on product innovation, *Accounting, Organizations and Society*, 29(8), pp. 709-737. https://doi.org/10.1016/j.aos.2003.10.010.

Bontis, N. (2001), Assessing knowledge assets: a review of the models used to measure intellectual capital, *International Journal of Management Reviews*, *3*(1), pp. 41-60. https://doi.org/10.1111/1468-2370.00053.

Catasús, B., Gröjer, J. E. (2006), Indicators: on visualizing, classifying and dramatizing, Journal of Intellectual Capital, 7(2), pp. 187-203. https://doi.org/10.1108/14691930610661854.

Chiucchi, M. S., Giuliani, M., Marasca, S. (2014), The design, implementation and use of intellectual capital measurements: a case study, *Management Control*, (2014/2). https://doi.org/10.3280/MACO2014-002007.

Chiucchi, M. S., Montemari, M. (2016), Investigating the "fate" of Intellectual Capital indicators: a case study, *Journal of Intellectual Capital*, 17(2), pp. 238-254. https://doi.org/10.1108/JIC-03-2015-0033.

Chiucchi, M.S. (2013), Measuring and reporting intellectual capital: Lessons learnt from some interventionist research projects, *Journal of Intellectual Capital*, *14*(3), pp. 395-413. https://doi.org/10.1108/JIC-03-2013-0036.

Cohen, S., Kaimenakis, N. (2007), Intellectual capital and corporate performance in knowledge-intensive SMEs, *The Learning Organization*, 14(3), pp. 241-262. http://dx.doi.org/10.1108/09696470710739417.

Davenport, T. H., Prusak, L. (1998), *Working knowledge: How organizations manage what they know*, Harvard Business Press.

Donate, J.M., de Pablo, J.D.S. (2014), The role of knowledge-oriented leadership in knowledge management practices and innovation, *Journal of Business Research*, 68(2), pp. 360-370. https://doi.org/10.1016/j.jbusres.2014.06.022.

Drucker, P. (1988), The coming of the new organization, *Harvard Business Review*, 66, pp. 45-53.

Dumay, J. (2013), The third stage of IC: towards a new IC future and beyond, *Journal of Intellectual Capital*, 14(1), pp. 5-9. https://doi.org/10.1108/14691931311288986.

Dumay, J. C. (2012), Grand theories as barriers to using IC concepts, *Journal of Intellectual Capital*, 13(1), pp. 4-15. https://doi.org/10.1108/14691931211196187.

Dumay, J., Garanina, T. (2013), Intellectual capital research: a critical examination of the third stage, *Journal of Intellectual Capital*, 14(1), pp. 10-25. https://doi.org/10.1108/14691931311288995.

Dumay, J., Guthrie, J. (2019), Reflections on interdisciplinary critical intellectual capital accounting research: Multidisciplinary propositions for a new future, *Accounting, Auditing & Accountability Journal*, 32(8), pp. 2282-2306. https://doi.org/10.1108/AAAJ-08-2018-3636.

Dumay, J., Guthrie, J., Rooney, J. (2020), Being critical about intellectual capital accounting

in 2020: An overview, *Critical Perspectives on Accounting*, 70, 102185. https://doi.org/10.1016/j.cpa.2020.102185.
Eden, C., Huxham, C. (1996), Action research for management research, *British Journal of management*, 7(1), pp. 75-86. https://doi.org/10.1111/j.1467-8551.1996.tb00107.x.
Fincham, R., Roslender, R. (2003), Intellectual capital accounting as management fashion: a review and critique, *European Accounting Review*, 12(4), pp. 781-795. https://doi.org/10.1080/0963818031000162846 4.
Flor, M.L., Cooper, S.Y., Oltra, M.J. (2018), External knowledge search, absorptive capacity and radical innovation, *European Management Journal*, 36(2), pp. 183-194. https://doi.org/10.1016/j.emj.2017.08.003.
Garcia-Perez, A., Ghio, A., Occhipinti, Z., Verona, R. (2020), Knowledge management and intellectual capital in knowledge-based organisations: a review and theoretical perspectives, *Journal of Knowledge Management*, 24(7), pp. 1719-1754. https://doi.org/10.1108/JKM-12-2019-0703.
Giuliani, M., Skoog, M. (2020), Making sense of the temporal dimension of intellectual capital: A critical case study, *Critical Perspectives on Accounting*, 70, 101993. https://doi.org/10.1016/j.cpa.2017.04.001.
Giuliani, M., Chiucchi, M. S., Marasca, S. (2016), A history of intellectual capital measurements: From production to consumption, *Journal of Intellectual Capital*, 17(3), pp. 590-606. https://doi.org/10.1108/JIC-08-2015-0071.
Grant, R. M. (1996), Toward a knowledge-based theory of the firm, *Strategic Management Journal*, 17(2), pp. 109-122. https://doi.org/10.1002/smj.4250171110.
Guthrie, J., Dumay, J. (2015), New frontiers in the use of intellectual capital in the public sector, *Journal of Intellectual Capital*, 16(2), pp. 258-266. https://doi.org/10.1108/JIC-02-2015-0017.
Guthrie, J., Petty, R., Ferrier, F., Wells, R. (1999), There is no accounting for intellectual capital in Australia: a review of annual reporting practices and the internal measurement of intangibles, *OECD Symposium on Measuring and Reporting of Intellectual Capital*, pp. 134, Amsterdam, Netherlands: OECD.
Guthrie, J., Ricceri, F., Dumay, J. (2012), Reflections and projections: a decade of intellectual capital accounting research, The British Accounting Review, 44(2), pp. 68-82. https://doi.org/10.1016/j.bar.2012.03.004.
Haanes, K., Fjeldstad, Ø. (2000), Linking intangible resources and competition, *European Management Journal*, 18(1), pp. 52-62. https://doi.org/10.1016/S0263-2373(99)00068-7.
Habersam, M., Piber, M., Skoog, M. (2013), Knowledge balance sheets in Austrian universities: The implementation, use, and re-shaping of measurement and management practices, *Critical Perspectives on Accounting*, 24(4-5), pp. 319-337. https://doi.org/10.1016/j.cpa.2012.08.001.
Hansen, M. T., Nohria, N., Tierney, T. (1999), What's your strategy for managing knowledge?, *Harvard Business Review*, 77(2), pp. 106-116.
Hidalgo, A., Albors, J. (2008), Innovation management techniques and tools: a review from theory and practice, *R&d Management*, 38(2), pp. 113-127. https://doi.org/10.1111/j.1467-9310.2008.00503.x.
Iacuzzi, S., Pauluzzo, R. (2023), Looking for missing outcomes: accounting for intellectual capital and value creation in ecosystems, *Journal of Management and Governance*, pp. 1-33. https://doi.org/10.1007/s10997-023-09688-3.
Ittner, C. D., Larcker, D. F. (1998), Innovations in performance measurement: Trends and research implications, *Journal of Management Accounting Research*, 10, pp. 205-238.
Jansen, E. P. (2018), Bridging the gap between theory and practice in management

accounting: Reviewing the literature to shape interventions, *Accounting, Auditing & Accountability Journal*, 31(5), pp. 1486-1509. https://doi.org/10.1108/AAAJ-10-2015-2261.

Jørgensen, F., Becker, K., Matthews, J. (2011), The HRM practices of innovative knowledge intensive firms, *International Journal of Technology Management*, 56(2/3/4), pp. 123-137. https://doi.org/10.1504/IJTM.2011.042978.

Khan, M. (2014). Identifying the components and importance of intellectual capital in knowledge-intensive organizations. *Business and Economic Research*, *4*(2).

Kaplan, R. S. (1998), Innovation action research: creating new management theory and practice, *Journal of Management Accounting Research*, 10, pp. 89-118.

Kaplan, R. S., Norton, D. P. (1992), The balanced scorecard: Measures that drive performance, "Harvard Business Review", 70(1), pp. 71-79.

Kianto, A. (2007), What do we really mean by the dynamic dimension of intellectual capital?, *International Journal of Learning and Intellectual Capital*, 4(4), pp. 342-356. https://doi.org/10.1504/IJLIC.2007.016332.

Kianto, A., Ritala, P., Spender, J. C., Vanhala, M, (2014), The interaction of intellectual capital assets and knowledge management practices in organizational value creation, *Journal of Intellectual capital*, 15(3), pp. 362-375. https://doi.org/10.1108/JIC-05-2014-0059.

Kozak, M. (2011), Strategic approach to intellectual capital development in regions, *International Journal of Learning and Intellectual Capital*, 8(1), pp. 76-93. http://dx.doi.org/10.1504/IJLIC.2011.037360.

Lardo, A., Dumay, J., Trequattrini, R., Russo, G. (2017), Social media networks as drivers for intellectual capital disclosure: Evidence from professional football clubs, *Journal of Intellectual Capital*, 18(1), pp. 63-80. https://doi.org/10.1108/JIC-09-2016-0093.

Leon, D. (2013), From the sustainable organization to sustainable knowledge-based organization, *The International Journal of Management Science and Information Technology*, 65(2), pp. 63-73.

Lukka, K. (2000), *The key issues of applying the constructive approach to field research*, Reponen, T.(ed.).

Marr, B., Roos, G. (2005), *A strategy perspective on intellectual capital*, in Marr, B. (Ed.), Perspectives on Intellectual Capital, Elsevier, Burlington, MA, pp. 28-41.

Marr, B., Schiuma, G., & Neely, A. (2004), The dynamics of value creation: mapping your intellectual performance drivers, *Journal of intellectual capital*, *5*(2), pp. 312-325. https://doi.org/10.1108/14691930410533722.

Martın-de Castro, G. (2015), Knowledge management and innovation in knowledge-based and hightech industrial markets: the role of openness and absorptive capacity, *International Marketing Management*, 47, pp. 143-146. https://doi.org/10.1016/j.indmarman.2015.02.032.

Mas-Machuca, M. (2014), The role of leadership: The challenge of knowledge management and learning in knowledge-intensive organizations, *International Journal of Educational Leadership and Management*, (1), pp. 97-116. https://doi.org/10.4471/ijelm.2014.10.

MERITUM (2002). Guidelines for managing and reporting on intangibles (Intellectual Capital Statements). Madrid: Vodafone Foundation.

Millar, C. C., Lockett, M., Mahon, J. F. (2016), Guest editorial: knowledge intensive organisations: on the frontiers of knowledge management, *Journal of knowledge management*, 20(5), pp. 845-857. https://doi.org/10.1108/JKM-07-2016-0296.

Mohammad Shafiee, M., Warkentin, M., & Motamed, S. (2024). Do human capital and relational capital influence knowledge-intensive firm competitiveness? The roles of

export orientation and marketing knowledge capability. *Journal of Knowledge Management*, *28*(1), 138-160.
Morgan, D. L., Krueger, R. A., King, J. A. (1998), *The focus group guidebook*, Sage.
Mouritsen, J. (2006), Problematising intellectual capital research: ostensive versus performative IC, *Accounting, Auditing & Accountability Journal*, 19(6), pp. 820-841. https://doi.org/10.1108/09513570610709881.
Mouritsen, J., Roslender, R. (2009), Critical intellectual capital, *Critical Perspectives on Accounting*, 20(7), pp. 801-803. https://doi.org/10.1016/j.cpa.2009.08.004.
Mouritsen, J., Bukh, P. N., Flagstad, K., Thorbjørnsen, S., Johansen, M. R., Kotnis, S., Stakemann, B. (2003), Intellectual Capital Statements - The new guideline. Technology and Innovation (DMSTI), Copenhagen: Danish Ministry of Science.
Mouritsen, J., Larsen, H. T., Bukh, P. N. (2001), Intellectual capital and the 'capable firm': narrating, visualising and numbering for managing knowledge, *Accounting, Organizations and Society*, 26(7-8), pp. 735-762. https://doi.org/10.1016/S0361-3682(01)00022-8.
Mouritsen, J., Thorsgaard Larsen, H., Bukh, P. N. (2005), Dealing with the knowledge economy: intellectual capital versus balanced scorecard. Journal of intellectual capital, 6(1), pp. 8-27. https://doi.org/10.1108/14691930510574636.
Nonaka, I., Takeuchi, H. (1995), *The knowledge-creating company: How Japanese companies create the dynamics of innovation*, Oxford University Press.
Novas, J. C., Alves, M. D. C. G., Sousa, A. (2017), The role of management accounting systems in the development of intellectual capital, *Journal of Intellectual Capital*, 18(2), pp. 286-315. https://doi.org/10.1108/JIC-08-2016-0079.
Ohehmichen, J., Heyden, L.M.M., Georgakakis, D., Volberda, H.W. (2017), Boards of directors and organizational ambidexterity in knowledge-intensive firms, *The International Journal of Human Resource Management*, 28(2), pp. 283-306. https://doi.org/10.1080/09585192.2016.1244904.
Pigatto, G., Corrado, M., Tenucci, A., Chiucchi, M. S., Cinquini, L. (2023), Integrare gli SDG nella valutazione degli investimenti aziendali: risultati da un approccio interventista, *Management Control*, 2, pp. 69-91.
Pirozzi, M. G., Ferulano, G. P. (2016), Intellectual capital and performance measurement in healthcare organizations: an integrated new model, *Journal of Intellectual Capital*, 17(2), pp. 320-350. https://doi.org/10.1108/JIC-07-2015-0063.
Qu, S. Q., Dumay, J. (2011), The qualitative research interview, *Qualitative research in accounting & management*, 8(3), pp. 238-264. https://doi.org/10.1108/11766091111162070.
Roos, G., Roos, J. (1997), Measuring your company's intellectual performance, *Long range planning*, 30(3), pp. 413-426. https://doi.org/10.1016/S0024-6301(97)90260-0.
Seo, M.G., Taylor, M.S., Hill, N.S., Zhang, X., Tesluk, P.L. and Lorinkova, N.M. (2012), The role of affect and leadership during organizational change, *Personnel Psychology*, 65(1), pp. 121-165. https://doi.org/10.1111/j.1744-6570.2011.01240.x.
Shimazoe, J. (2021), Research Managers and Administrators in Conflicting Organizational Cultures: How Does Their Human Capital Help Professional Survival in Knowledge-Intensive Organizations?, *Journal of Research Administration*, 52(1), pp. 102-140.
Skoog, M. (2003), Visualizing value creation through the management control of intangibles, Journal of Intellectual Capital, 4(4), 487-504. https://doi.org/10.1108/14691930310504527.
Spender, J. C. (1996), Making knowledge the basis of a dynamic theory of the firm, *Strategic Management Journal*, 17(S2), pp. 45-62. https://doi.org/10.1002/smj.4250171106.

Stewart, T. A. (1997), *Intellectual capital: the new wealth of organizations*, Bantam Doubleday, Dell Publishing Group, New York, NY.

Sveiby, K. E. (1997), *The new organizational wealth: Managing & measuring knowledge-based assets*. Berrett-Koehler Publishers.

Sveiby, K. E., Lloyd, T. (2010), *Methods for measuring intangible assets*.

Teece, D. J., Pisano, G., Shuen, A. (1997), Dynamic capabilities and strategic management, *Strategic management journal*, 18(7), pp. 509-533. https://doi.org/10.1002/(SICI)1097-0266(199708)18:7<509::AID-SMJ882>3.0.CO;2-Z.

Trequattrini, R., Nappo, F., Cuozzo, B., & Manzari, A. (2021). The emerging of enhanced intellectual capital: the impact of enabling technologies on the professional football clubs. *Intellectual Capital, Smart Technologies and Digitalization: Emerging Issues and Opportunities*, 93-106.

Trequattrini, R., Lardo, A., Cuozzo, B., Manfredi, S. (2022), Intangible assets management and digital transformation: evidence from intellectual property rights-intensive industries, *Meditari Accountancy Research*, 30(4), pp. 989-1006.

Wu, L.C., Ong, C.S. and Hsu, Y.W. (2008), Knowledge-based organization evaluation, *Decision Support Systems*, 45(3), pp. 541-549. https://doi.org/10.1016/j.dss.2007.06.013.

Yin, R. K. (2018), *Case Study Research and Applications: Design and Methods*, (6th ed.), Thousand Oaks, CA: Sage.

Zambon, S., Marasca, S., Chiucchi, M. S. (2019), Special issue on The role of intellectual capital and integrated reporting in management and governance: a performative perspective, *Journal of Management and Governance*, 23, pp. 291-297. https://doi.org/10.1007/s10997-019-09469-x.