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Reframing business intelligence & analytics use for the creation and dissemination of management accounting knowledge: an intellectual capital perspective

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Abstract

Purpose – The purpose of this paper is to offer a critical analysis of the enablers and barriers that influence the support of Business Intelligence and Analytics (BI&A) to the creation and dissemination of Management Accounting (MA) knowledge within organizations.

Design/methodology/approach – A review of 56 articles related to the use of BI&A systems in MA domain has been conducted. Literature has been critically interpreted adopting the lens of Intellectual Capital (IC), and the main findings have been presented and discussed according to the concepts of human, organizational and relational capitals.

Findings – The review shows that BI&A adoption in MA contexts depends not on static enablers and barriers but on the dynamic interaction between stocks and flows of IC. Stocks such as skills, managerial support, IT infrastructures and external expertise only sustain BI&A use when continuously renewed through flows of training, collaboration and trust-building. Without such flows, even strong initial conditions deteriorate, leading to stagnation or abandonment of BI&A.

Originality/value – This study advances knowledge by reframing BI&A adoption in MA not as the outcome of static enablers and barriers but as a dynamic process shaped by the continuous interaction between stocks and flows of IC. This perspective moves beyond deterministic models and highlights the fragile and evolving nature of BI&A assimilation.

Keywords Management accounting, Business intelligence and analytics, Intellectual capital, Knowledge management, Literature review

Paper type Literature review

1. Introduction

Business Intelligence and Analytics (BI&A) systems can be defined as information systems that integrate technologies and methodologies for collecting, organizing and analyzing structured and unstructured data from internal and external sources to generate and deliver information to support decision-making (Davenport, 2006). Within the field of Management Accounting (MA), intended as the set of tools and approaches managers use to support

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planning, controlling and decision-making activities (Ferreira and Otley, 2009), BI&A solutions are increasingly seen as a means that increases the effectiveness and efficiency of MA activities (Rikhardsson and Yigitbasioglu, 2018). By improving data accessibility (Appelbaum *et al.*, 2017), supporting advanced analyses (Schnegg and Möller, 2022) and enhancing reporting capabilities (Yigitbasioglu and Velcu, 2012), BI&A can reinforce the ability of MA to provide timely and relevant information that managers may use when they plan, control and decide (Mauludina *et al.*, 2023).

In view of this potential of creating and disseminating new MA knowledge, research has progressively turned its attention to the conditions that may facilitate or hinder the use of BI&A within MA contexts. Prior literature reviews on the nexus between digital technologies, including BI&A, and MA have identified a range of factors influencing assimilation, including user competences (Arkhipova *et al.*, 2024), organizational culture (Moll and Yigitbasioglu, 2019) and management support (Knudsen, 2020), to name a few. Overall, this body of work shows that the use of digital technologies in MA contexts is shaped by not merely their technical functionality but also by how they are embedded in organizational practices and interpreted by organizational actors.

However, even when recent studies have linked digital technology use to processes of knowledge creation and dissemination in MA (Ain *et al.*, 2019; Ain *et al.*, 2025; Böhm and Durst, 2025; Brescia *et al.*, 2025; Costa and Monteiro, 2016), most of this literature continues to conceptualize enablers and barriers as static "key factors" whose presence or absence explains success or failure. This view, while valuable, reflects a deterministic logic typical of classical Information Systems adoption models (Venkatesh *et al.*, 2003; DeLone and McLean, 1992), which assumes that the trajectory of assimilation can be predicted once the right conditions are in place. However, the adoption and assimilation of digital technologies in MA contexts unfolds in a dynamic manner, depending on the ongoing interplay of multiple, often intangible, conditions that evolve and interact with each other. This dynamic becomes particularly evident in the case of BI&A systems (Lasca and Montemari, 2025); the "success" or "failure" of BI&A projects for MA purposes cannot be determined *a priori* but depends on how intangible conditions, such as user social influence, interprofessional collaborations or access to industry networks, are mobilized and sustained in practice (Elbashir *et al.*, 2011; Järvenpää *et al.*, 2023; Popovič *et al.*, 2014).

This is precisely the limitation that also characterizes prior literature reviews on BI&A and MA. Rikhardsson and Yigitbasioglu (2018) offered a valuable overview of how BI&A intersects with MA, outlining the main areas of application and emerging research themes. However, their synthesis focuses on the tools and tasks affected, rather than on the mechanisms through which BI&A becomes embedded in practice or on the intangible conditions that sustain this process.

Similarly, Ain *et al.* (2019) provided a comprehensive and systematic review of BI&A adoption, use and success, adopting a general information-systems perspective grounded in factor-based models. While their analysis effectively consolidates two decades of research, it conceptualizes assimilation as the linear outcome of predefined antecedents, offering limited attention to the relational and knowledge-based dynamics that shape BI&A use in practice.

In both cases, intangible resources such as expertise, collaboration, trust and organizational learning are acknowledged but treated as background elements rather than as core components of the assimilation process.

Both Rikhardsson and Yigitbasioglu (2018) and Ain *et al.* (2019) recognize the need to explore the intangible dimensions of BI&A adoption. Rikhardsson and Yigitbasioglu (2018), in particular, call for studies exploring behavioral and organizational mechanisms such as trust, power redistribution and cross-functional communication that underpin BI&A use.

Ain *et al.* (2019) identify the "user perspective" and the role of individual competencies, perceptions and decision-making processes as underexplored areas, emphasizing the need to move beyond technological factors.

Seen in this way, the exploration of the assimilation of BI&A systems requires a lens able to account for the dynamic, intangible and interdependent nature of these processes.

The Intellectual Capital (IC) perspective provides such a lens by conceptualizing the enabling and hindering conditions as a stock of human capital (knowledge, skills and competences), organizational capital (structures, processes and culture) and relational capital (relationships with stakeholders), together with the flows that enable their development and renewal over time (Edvinsson and Malone, 1997; Mouritsen *et al.*, 2003; Dumay, 2009; Guthrie *et al.*, 2012). Adopting an IC perspective offers a valuable opportunity to reframe prior findings, by interpreting the factors that shape BI&A use in MA as elements of an intangible resource system that sustains or constrains MA knowledge dynamics.

Therefore, the aim of this paper is to shed light – through the lenses of IC – on enablers and barriers that influence the support of BI&A to the creation and dissemination of MA knowledge within organizations.

To achieve this aim, we conducted a review of extant literature on the interplay between BI&A and MA domains (Thorpe *et al.*, 2005; Tranfield *et al.*, 2003; Webster and Watson, 2002) and reinterpreted it through a critical, interpretive approach inspired by Alvesson and Deetz (2000). This approach goes beyond descriptive synthesis to reframe existing knowledge and, in doing so, delineate a set of future research avenues that extend the conversation between BI&A and MA.

The remainder of this paper is organized as follows. Section 2 outlines the methodology to conduct the literature review. Section 3 develops a critical examination of extant literature, drawing on the lens of IC. Section 4 concludes with the main contribution and outlines avenues for future research.

2. Research method

To achieve the aim of this paper, we carried out a transparent search process of the relevant literature about the enabling and hindering factors to the use of BI&A systems in MA context (Petticrew and Roberts, 2008; Thorpe *et al.*, 2005; Tranfield *et al.*, 2003; Webster and Watson, 2002). Rather than following a prescriptive structured literature review protocol, this study adopts an interpretive approach consistent with Modell (2022) and Boomsma (2024). This perspective goes beyond producing a structured summary of prior work, as it aims to generate new interpretations by connecting and recontextualizing existing findings. This review logic is fully consistent with the purpose of the study, which seeks to reframe prior evidence through the lens of IC, highlighting the dynamic and intangible mechanisms through which BI&A supports MA knowledge creation and dissemination. We first established criteria for inclusion and exclusion of previous studies, the electronic database, keywords and search filters to effectively conduct the search (Petticrew and Roberts, 2008; Tranfield *et al.*, 2003). As regards inclusion and exclusion criteria, we established to consider only publications that focused on both MA and BI&A. Therefore, we excluded articles that only briefly mentioned these topics or solely focused on either MA or BI&A solutions. In addition, as the aim of the paper is to analyze the enabling and the hindering factors in the use of BI&A to the creation and dissemination of MA knowledge, we decided to consider only empirical papers for analyzing previous empirical findings on this issue (Boomsma, 2024). This choice led to the exclusion of previous literature reviews and conceptual papers (Ndemewah and Hiebl, 2022). Scopus was selected as the appropriate database to conduct the search, as it is one of the most used ones and covers a wide range of journals in line with

the aim of the research (Massaro *et al.*, 2016; Secundo *et al.*, 2020). Finally, we defined the search string to search for relevant papers discussing enabling and hindering factors in the use of BI&A in the context of MA.

Consequently, we formulated the search string as a combination of terms referring to three main conceptual domains: MA, BI&A and enablers and barriers to its use. The first part of the search string consists of terms focusing on our main field of interest, that is MA and control ("manag control*"/"manag* account*"). The second part, instead, includes words specifically focused on the technology under scrutiny, that is BI&A ("business intelligence"/"business analytics"/"analytics"). Finally, as our interest is in enablers and barriers about the use of BI&A in MA, the third part of the string consists of words related to the levers and barriers to BI&A use ("use"/"util*"/"barrier*"/"lever*"/"enabler*/"hinder*"). According to these choices, the final string results as it follows: [("manag* control*" OR "manag* account*") AND ("business intelligence" OR "business analytics" OR "analytics") AND ("use" OR "util*" OR "barrier*" OR "lever*" OR "enabler*" OR "hinder*)"].

Then, the search process was limited to title, abstract and keywords of English-written papers included in the "Business, Management, and Accounting" area. The first search was performed in January 2025 and later updated in September 2025 to include most research publications. From the search, 87 papers resulted.

The abstract, and when necessary, the full text, of the articles included in the sample were read according to the inclusion and exclusion criteria defined in the review protocol and mentioned above. First, the choice to include only articles with an empirical basis led to the exclusion of 23 contributions. Second, a total of 34 papers were deemed inconsistent to the subject matter of our study because they did not focus explicitly on the use of BI&A system in the MA context but referred to the broader organizational context. For the remaining papers, to enhance the comprehensiveness and quality of our sample, we performed backward and forward citation search (Webster and Watson, 2002). This enabled us to include 26 relevant articles within our sample that were consistent with our inclusion criteria. The final sample consisted of 56 papers, which were downloaded and read by all the authors. Table 1 summarizes the database search process and results.

An analysis of the distribution of publications over time indicates that research interest in this topic began in the 1990s, coinciding with the introduction of early BI&A systems within organizations. Since then, literature has shown a growing interest, peaking in 2012 and 2013 with the publication of four papers, respectively. In recent years, the topic has become well-established, with 25 of 56 papers published in the past five years, showing the need to advance research in this field and to identify new avenues of research. Regarding publication outlets, the articles have appeared in 37 different journals, highlighting a high degree of fragmentation. Notably, at least three papers examining the enablers and barriers to the use of BI&A systems in MA context have been published in the following journals: *Information*

Table 1. Database search process and results

Search process and results	*N*
Scopus	87
Exclusion based on research methodology	−23
Exclusion based on title, abstract and keywords analysis (and full text analysis when necessary)	−34
Inclusion based on backward and forward citation search	+26
Final sample	*56*

Source(s): Authors' own work

and Management (three), *Journal of Management Information Systems* (three), *Journal of Accounting and Organizational Change* (four) and the *International Journal of Accounting Information Systems* (seven). The relatively high concentration of publications in these outlets suggests that the topic lies at the intersection between the management, accounting and information systems domains, thereby reflecting its inherently interdisciplinary nature.

Following an individual analysis of the themes addressed in each paper, we conducted several meetings to discuss the main topics emerging from literature and to develop a comprehensive understanding of the existing body of research. To further strengthen the critical stance of this review, we decided to adopt a critical thinking perspective (Dumay, 2024). This implies moving beyond a merely descriptive approach, that simply summarizes existing contributions, toward "problematization, in the sense of identifying and challenging the assumptions underlying existing theories" (Alvesson and Sandberg, 2011, p. 247). Therefore, we decided to follow the critical framework of Alvesson and Deetz (2000), which encompasses insight, critique and transformative redefinition. According to this perspective, literature reviews aim to gain new insights about extant literature, to critique the current research context identifying strengths and limitations of prior studies as well as challenging dominant discourses and to reframe existing understandings, with the aim of opening alternative perspectives and inspiring new research avenues, through transformative redefinition processes (Alvesson and Deetz, 2000).

Therefore, after examining of how literature has evolved over time and which main themes have been discussed regarding enablers and barriers to the use of BI&A systems within MA context (*insight*), we move beyond pure descriptive categorization, by questioning and problematizing assumptions taken for granted within literature drawing on an IC perspective (Edvinsson and Malone, 1997; Guthrie *et al.*, 2012) (*critique*). The adoption of this view allows us to interpret previous studies according to the human capital, organizational capital and relational capital definition mentioned above to shed light on the enabling and hindering factors to the use of BI&A for MA purposes. Thus, we discuss our novel findings and identify new research avenues for setting a future research agenda (*transformative redefinition*). Next section illustrates the main findings of our critical analysis.

3. Insights and critique

Drawing on an IC perspective (Edvinsson and Malone, 1997; Mouritsen *et al.*, 2003; Dumay, 2009; Guthrie *et al.*, 2012), our analysis interprets prior studies on the enablers and barriers to the use of BI&A systems within MA contexts. In doing so, we simultaneously provide *insights* into how literature has conceptualized these factors and offer a *critique* by reframing them as stocks and flows of IC.

3.1 Human capital-related factors

Research has shown that the level of use of BI&A systems in MA contexts is deeply affected by not only the development of human capital, here understood as the stock of knowledge, skills, competences and personal attributes held primarily by management accountants but also managers who directly interact with BI&A outputs in planning, control and decision-making. Yet, human capital is not a static asset. It continuously evolves through flows of learning, interaction and adaptation, which determine whether and how BI&A capabilities are absorbed and mobilized.

A first fundamental stock concerns the basic skills and competences of users. Training initiatives have been repeatedly recognized as key flows that increase this stock, equipping management accountants and managers with the abilities required to exploit BI&A functionalities and thereby raising the likelihood of actual use (Bedford *et al.*, 2025;

Spraakman *et al.*, 2021). For example, Martins *et al.* (2025) describe how a firm faced with a shortage of BI&A analysts trained its own staff in analytics tools, creating an internal flow of learning that reduced external dependence and increased user ownership of BI&A outputs. Training not only strengthens competences but also creates a flow that shapes motivation, as individuals who feel prepared and capable are more willing to use BI&A systems even for complex tasks (Nguyen *et al.*, 2024). However, the literature also stresses that training flows must be tailored to participants' backgrounds, as only context-specific initiatives can transform into effective human capital stocks (Abdelhalim, 2024; Ippolito *et al.*, 2024). Flows of skill formation also extend beyond organizational settings: in the field of accounting education, students are increasingly introduced to BI&A and data analytics through dedicated teaching cases designed for MA (Libby *et al.*, 2022; Loftus *et al.*, 2023).

Recent contributions underline that training should not be seen as a one-off investment, but as a continuous flow of up-skilling and re-skilling. This is crucial as management accountants are expected to expand their competences in reading and interpreting complex data sets (Reinking *et al.*, 2020), strengthen their digital literacy regarding emerging technologies (Steens *et al.*, 2024) and develop advanced analytics capabilities to translate data into high-quality decisions (Franke and Hiebl, 2023). Importantly, even routine accounting tasks often contain non-programmable elements that require contextual judgment. For example, Korhonen *et al.* (2021) show that pricing decisions remained more fit for humans than digital technologies because approval by a human specialist is perceived as a sign of credibility that a fully automated decision is lacking. This reveals that static human capital stocks are insufficient: continuous flows of learning are necessary to maintain BI&A use, and the lack of such flows undermines BI&A adoption (Sinarasri and Chariri, 2023; Trinh, 2024).

Interaction with BI&A systems constitutes another critical flow. Through engagement with functionalities, such as designing reports, selecting visualization techniques and navigating information via drill down, roll up, slicing, dicing and pivoting (Peng *et al.*, 2007), management accountants and managers consolidate and expand their competences. Interaction transforms training into practical know-how and enables human capital to grow dynamically. Empirical evidence supports this view. Spraakman *et al.* (2021) found that management accountants are not merely users of outputs but also engage in data extraction, cleaning and transformation before analysis. This expansion of their role illustrates how human capital stocks evolve through continuous flows of technical learning and practical engagement with BI&A tools. This flow is particularly effective because it allows customization and experimentation, which in turn fosters use (Dilla *et al.*, 2013; Peters *et al.*, 2018). Yet, interaction flows are vulnerable to contextual constraints: without sufficient training or when workload pressures are high, these opportunities may be underexploited and the stock of usable competences may stagnate (Bedford *et al.*, 2025; Martins *et al.*, 2025).

The perception of ease of use, together with the satisfaction that is derived, is also part of this dynamic. Such perceptions reduce cognitive barriers and facilitate more effective interactions with BI&A systems. In particular, technical features such as user-friendly interfaces, alerts and automated information delivery support these perceptions by lowering the threshold for flows of learning and adoption (Hou, 2016; Mudau *et al.*, 2024; Reinking *et al.*, 2020; Ippolito *et al.*, 2024). When users, that is, management accountants and managers, perceive outputs as useful and of high quality, satisfaction acts as a reinforcing flow that strengthens the stock of positive attitudes and routines (Hou, 2012; Jaklič *et al.*, 2018; Popovič *et al.*, 2012). For example, Fahlevi *et al.* (2022) show that scenario analyses and simulations provided by BI&A can be seen as tangible benefits that consolidate the perception of usefulness and stimulate further adoption.

Expertise constitutes another form of human capital stock, shaped by differentiated flows of engagement (Fehrenbacher *et al.*, 2023). Power users, who frequently interact with the system and participate in design processes, accumulate a deeper stock of knowledge, making them less likely to abandon BI&A despite technical issues. Conversely, regular users, who lack comparable flows of exposure, often struggle with limited understanding and are more prone to discontinuing use (Deng and Chi, 2012). Higher expertise lowers abandonment rates and promotes exploration of advanced features (Lee *et al.*, 2008). Moreover, task complexity influences these flows: users handling complex tasks are more likely to adopt advanced features, but in the absence of sufficient expertise, they may lose confidence and disengage (Mudau *et al.*, 2024).

Absorptive capacity further reflects the dynamic interplay between stocks and flows. It reflects the ability of management accountants and managers to acquire, assimilate and transform new technological knowledge into practice (Elbashir *et al.*, 2011, 2022). This capacity expands when competences are continuously updated and adapted, continuously regenerating the underlying stock of knowledge. Relatedly, sensemaking processes further illustrate how experienced professionals transform flows of information into trusted knowledge, thereby reinforcing BI&A use (Järvenpää *et al.*, 2023). Therefore, seniority and experience also create a flow that shapes absorptive capacity (Fehrenbacher *et al.*, 2023), while a sound understanding of company processes can be considered both a stock of contextual knowledge and a flow that supports BI&A use (Popovič *et al.*, 2012).

Finally, softer individual dimensions also contribute to shape human capital. Computer anxiety (Sievert *et al.*, 1988; Hart *et al.*, 2007) acts as a negative stock that inhibits engagement, while personality traits such as openness, conscientiousness, extraversion and emotional stability act as positive stocks enabling BI&A use (Yu-Wei *et al.*, 2015). Flows of training and experience can mitigate anxiety and reinforce positive dispositions (Hou, 2014). Yet resistance to change, another personal trait, can interrupt these flows, by preventing the renewal of competences and hindering system use (Ippolito *et al.*, 2024; Martins *et al.*, 2025).

3.2 Organizational capital-related factors

The effective use of BI&A systems in MA contexts does not depend solely on human capital. It also rests on the strength of organizational capital, understood as the stock of codified knowledge embedded in organizational structures, routines and procedures. These stocks, however, acquire meaning only through the flows of organizational practices and support that allow BI&A to be continuously embedded into MA routines (Hart *et al.*, 2007; Hou, 2014).

A first set of factors concerns organizational configuration, where management support, communication, social influence and data-driven culture act as structural stocks (Nguyen *et al.*, 2024; Franke and Hiebl, 2023). Top management support, in particular, emerges as a critical stock (Elbashir *et al.*, 2022; Sinarasri and Chariri, 2023) that, once mobilized through flows of active resource allocation, can sustain BI&A use (Lautenbach *et al.*, 2017). Empirical evidence from Martins *et al.* (2025) reinforces this view: the company's steering committee played a central role in sustaining BI&A adoption by allocating resources, promoting a shared data-driven vision and visibly using dashboards during decision meetings, thus creating a reinforcing flow of legitimacy and commitment.

Sponsorship does matter in not only early phases but also after implementation, when continuous flows of attention and resources are needed to ensure system continuity and avoid abandonment (Hou, 2016; Wieder *et al.*, 2012). Management support is also intertwined with social influence (Hou, 2012). When BI&A use becomes socially legitimized and widely recognized across the organization, the stock of shared meaning encourages individuals to align with collective expectations, reinforcing BI&A system use (Hou, 2014). For example,

Elbashir *et al.* (2021) show that, in a large public organization, senior executives' consistent reliance on BI&A reports during performance reviews triggered a ripple effect across departments, transforming management sponsorship into a flow of cultural reinforcement that normalized BI&A use.

In parallel, organizational culture operates as a stock of shared values and routines that shape BI&A usage (Elbashir *et al.*, 2013; Nguyen *et al.*, 2024). When this stock is oriented toward analytical and data-driven decision making, BI&A adoption and integration are more likely to occur (Franke and Hiebl, 2023). Conversely, in contexts where such cultural stocks are absent or weak, assimilation stagnates (Popovič *et al.*, 2012).

Another crucial component of organizational capital is the configuration of teams entrusted with the design and implementation of BI&A systems. Mixed teams that combine technical, business and MA expertise represent a structural stock of diverse knowledge and competences (García and Pinzón, 2017; Martins *et al.*, 2025). On the one hand, data scientists and IT employees are technical experts, but they lack understanding of functional domains; on the other hand, management accountants who possess accounting expertise and business knowledge lack the understanding of the true potential of data analytics (Elbashir *et al.*, 2011) and the ability to solve IT-related issues (Popovič *et al.*, 2014). The effectiveness of this configuration, therefore, depends on flows of collaboration and knowledge sharing that integrate these complementary stocks into a coherent organizational capability (Munir *et al.*, 2023). Thus, the flow of collaboration across IT staff, data scientists and management accountants enables effective BI&A use. The lack of such collaborative flows, instead, may exacerbate professional frictions, hindering BI&A use in MA contexts (Elbashir *et al.*, 2021, 2022; Nguyen *et al.*, 2024). These coordination dynamics are illustrated by Spraakman *et al.* (2021), who found that management accountants and IT professionals often operate on "different islands" that must be connected through "bridges" of communication and shared understanding (p. 142). This metaphor captures how organizational capital depends on flows of collaboration and mutual learning that integrate technical and accounting expertise, enabling BI&A systems to become embedded in MA practices.

Moreover, an active involvement of end users in design and implementation processes create stronger stocks of contextual fit and increase actual use (Hunton and Gibson, 1999; Järvenpää *et al.*, 2023; Eldenburg *et al.*, 2010; Ippolito *et al.*, 2024), as managers can exert a tangible influence on system features (Lynch and Gregor, 2004).

Organizational capital also interacts with power dynamics. BI&A adoption can erode existing informational monopoly traditionally held by management accountants, redistributing knowledge across broader groups. This reconfiguration of power can be perceived as a loss, discouraging BI&A use (Elbashir *et al.*, 2022; Heinzelmann, 2018; Popovič, 2017). Historical evidence shows how such shifts can generate frustration when BI&A emerges as the main provider of decision-relevant information, weakening the perceived centrality of management accountants (Smith and McKeen, 1992). Yet, when BI&A capabilities reinforce the business partner role of management accountants, these potential losses can be offset, transforming power redistribution into an opportunity to strengthen controllership effectiveness (Boerner *et al.*, 2025).

Service quality constitutes another relevant form of organizational capital, as it represents structured stocks of routines and practices that support BI&A system users (Mudau *et al.*, 2024). These routines and practices through which IS teams support end-users are not neutral technicalities but continuous flows of assistance, training and troubleshooting that consolidate intangible stocks such as user trust and confidence (Lautenbach *et al.*, 2017). When these flows are consistent and reliable, they build a durable stock of user satisfaction (Wieder *et al.*, 2012), encouraging the adoption of advanced BI&A features such as

interactive visualizations, dashboards enhancements or predictive analytics (García and Pinzón, 2017; Popovič *et al.*, 2014).

A second set of factors relates to BI&A functionalities codified in system design. These include the way information is delivered and presented by BI&A systems (Dilla *et al.*, 2013), the ways users can interact with them through selecting, browsing or drilling down information (Peng *et al.*, 2007) and the feedback and recommendations they provide to support decision-making (Seow, 2011). These functionalities can be interpreted as stocks of organizational capital embedded in system design (Dilla *et al.*, 2013; Peng *et al.*, 2007; Seow, 2011). However, their value emerges only when activated by flows of interaction and used by management accountants and managers.

Regarding information delivery, BI&A systems leverage a wide range of visualization techniques (Dilla *et al.*, 2013). In the MA context, these visual approaches to communicating performance measures can ease and accelerate interpretation and facilitate the identification of actions related to results (Peters *et al.*, 2018). All in all, the combination of these stocks and flows may lead to higher rates of BI&A usage in MA contexts (Wieder *et al.*, 2012).

Similarly, feedback and recommendations generated by BI&A can act as enabling flows that encourage BI&A use by drawing users' attention to unknown patterns or correlations, thus improving their decision-making process (García and Pinzón, 2017; Peng *et al.*, 2007). However, the literature also demonstrates that these flows can become problematic. On the one hand, if not aligned with task type or user knowledge (Seow, 2011), then feedback can be perceived as a threat, especially when it contradicts users' judgments, leading to resistance or abandonment of the BI&A system (Elkins *et al.*, 2013). On the other hand, overly persuasive feedback may foster overconfidence, encouraging risky behavior and overestimation of success probabilities (Chen and Koufaris, 2015). These contrasting dynamics highlight that organizational capital embedded in BI&A does not automatically translate into effective use. Only when feedback and recommendations are carefully designed and balanced can the stocks of BI&A functionality be transformed into flows of meaningful adoption, avoiding misuse or non-use and reinforcing MA knowledge creation (Fehrenbacher *et al.*, 2023).

3.3 Relational capital-related factors

While prior research has extensively examined the role of human and organizational capital in shaping the use of BI&A systems within MA contexts, relational capital has received comparatively less attention. Yet, relational capital, defined as the stock of resources embedded in relationships with external stakeholders such as consultants, technology providers, customers and broader professional networks, can significantly influence whether BI&A systems are effectively adopted and assimilated. These stocks, however, are not static: they evolve through flows of interaction, trust-building, knowledge exchange and collaboration that either strengthen or weaken the relational assets available to organizations.

In the early phases of BI&A implementation, organizations often rely heavily on external experts to configure, adapt and maintain systems (Abdelhalim, 2024). This reliance illustrates a relational capital stock in the form of specialized expertise possessed by consultants and vendors, which can be mobilized through flows of collaboration to reduce errors and ensure an effective implementation process. As Elbashir *et al.* (2021) highlight, such knowledge importation links with consultants and vendors can accelerate system implementation and fill early skill gaps, effectively functioning as enabling relational flows that support initial assimilation. At the same time, these flows may become unbalanced, leading to excessive dependence on external actors. Such dependence risks slowing down implementation and, more critically, preventing the internalization of capabilities within the organization, thereby hindering the accumulation of internal stocks of knowledge and

competences, in terms of human capital. In Abdelhalim's (2024) case study, for example, prolonged reliance on external vendors for BI&A customization led to stagnation in internal capability building, demonstrating how relational flows can turn constraining when they substitute rather than complement human capital development. In other words, external relationships may act both as enabling flows and as constraints, depending on whether they complement or substitute internal human capital.

Beyond the relationship with individual consultants, relational capital also encompasses broader professional and industry networks. Being embedded in such relational structures represents a stock of access to collective knowledge, while active engagement in these networks constitutes a flow that strengthens BI&A assimilation for MA purposes. Organizations with strong ties to these networks are more likely to sustain BI&A as an integral part of their MA practices, as these connections expose them to benchmarks and learning processes that reinforce adoption (Oyewo *et al.*, 2021). The influence of relational capital also extends to other external stakeholders, such as customers or strategic partners, who may act as drivers of BI&A adoption. External pressures and expectations, for example, can create demand that stimulates organizations to introduce BI&A systems to enhance transparency or responsiveness (Sinarasri and Chariri, 2023). At the same time, once BI&A systems are in place, they can foster reciprocal flows of communication and engagement with stakeholders, enhancing trust and collaboration. In this sense, relational capital stocks, such as established trust and credibility, are both reinforced and expanded by the ongoing flows of information exchange enabled by BI&A (Abdelhalim, 2024; Sinarasri and Chariri, 2023).

From an IC perspective, these dynamics show that relational capital is not merely an external condition but also a relevant dimension of BI&A usage for MA purposes. External expertise and networks provide essential initial stocks that reduce uncertainty, while continuous flows of interaction and trust-building determine whether these resources are assimilated internally and translated into system use. Conversely, when relational flows are unbalanced, because dominated by dependence on consultants, the potential of BI&A systems in MA contexts remains underused.

4. Transformative redefinition and concluding remarks

Following Alvesson and Deetz's (2000) notion of *transformative redefinition*, this paper does not merely synthesize existing knowledge but seeks to reframe it.

The analysis has shown that the contribution of the IC perspective lies in showing that BI&A adoption and assimilation in MA contexts are not determined by static enablers and barriers but by dynamics between stocks and flows of IC. Stocks such as managerial support, technical expertise or IT infrastructure can deteriorate and ultimately lead to BI&A abandonment in MA contexts if they are not continuously renewed by flows of training, cross-functional coordination and interprofessional collaboration.

Conversely, sustained flows can generate new stocks, such as organizational routines, trusted data environments or interprofessional trust, that enhance BI&A use for MA purposes. Therefore, our analysis highlights that what truly matters is not the mere presence of IC stocks, but the continuous renewal of these stocks through flows of intangible resources. Without such flows, even the most solid initial conditions risk deteriorating, leading to stagnation or abandonment of BI&A systems for generating and disseminating MA knowledge.

This shift questions one of the most taken-for-granted assumptions in both accounting and IS literature, namely, that the success or failure of BI&A projects can be explained in a rather deterministic manner by identifying "key factors" at a point in time (Venkatesh *et al.*, 2003; DeLone and McLean, 1992; Goodhue and Thompson, 1995). Our analysis suggests

instead that the trajectory of BI&A assimilation for generating and disseminating MA knowledge is inherently dynamic, fragile and contingent upon the ongoing reproduction of IC. Figure 1 highlights that BI&A assimilation in MA contexts is sustained by the continuous renewal and interaction of human, organizational and relational capital through intangible flows.

Although findings are dependent on the body of literature that we analyzed and on our interpretation of it, the review suggests that future research might embrace a dynamic, interconnected view, moving beyond siloed IC categories to investigate how the interaction and evolution of human, organizational and relational capital shape the long-term trajectories of BI&A usage in MA contexts.

Building on this critical synthesis and in line with the phase of transformative redefinition (Alvesson and Deetz, 2000), several research gaps and questions emerge that extend current understandings of BI&A assimilation.

For example, while existing studies have highlighted the importance of management support in promoting BI&A system usage (Elbashir *et al.*, 2022; Sinarasri and Chariri, 2023), the IC perspective stresses the intangible foundations of such support. Managerial sponsorship can be seen as a stock of organizational capital that only persists when sustained by flows of communication routines and sense giving practices. Research should, thus, investigate how these flows contribute to the accumulation of a stable stock of managerial commitment and how this stock may erode or be renewed over time.

Similarly, prior work has pointed to the relevance of mixed teams combining technical and business competences (García and Pinzón, 2017; Munir *et al.*, 2023). However, what remains unclear is how management accountants should cooperate with other company actors, such as data scientists and IT professionals, to foster the use of BI&A systems as well as how interprofessional frictions could be limited, if not avoided. From an IC perspective, this points to the need to explore how human capital flows, through practices of knowledge sharing, co-design and trust-building, translate into a stock of interprofessional collaboration that reduces friction and enhances BI&A use.

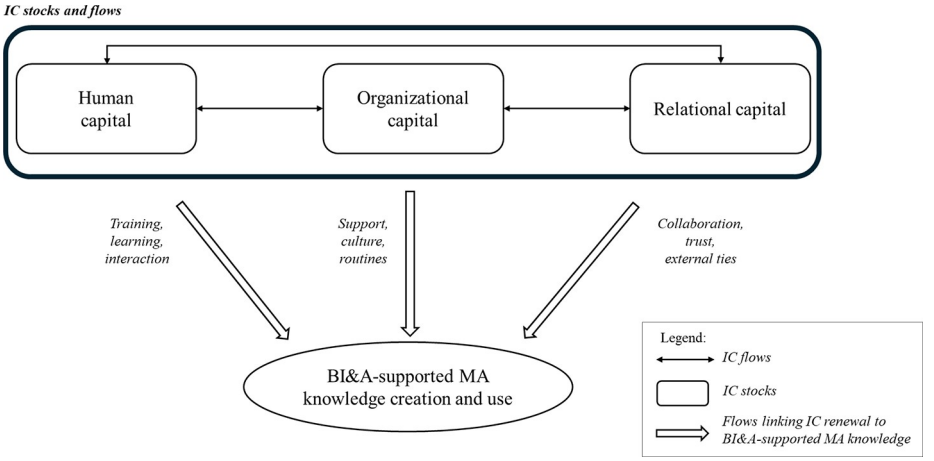

Figure 1. Dynamic interactions between stocks and flows of intellectual capital sustaining business intelligence and analytics-supported management accounting knowledge creation and use

Source: Authors' own work

The insights-critique steps have also revealed that when BI&A systems are socially accepted within an organization, users are more likely to use them (Hou, 2014). However, the factors that contribute to social acceptance of BI&A systems within an organization need to be explored further from an IC perspective. More in particular, future research could examine how flows of organizational capital (rituals, narratives and practices of cultural embedding) contribute to building a stock of shared values and norms that position BI&A systems as legitimate tools within MA contexts.

Data quality, a central technical factor (Popovič *et al.*, 2012), also gains new meaning from an IC lens. Rather than a purely technical prerequisite, trusted data can be seen as a stock of organizational capital built through flows of human capital (competences and absorptive capacity) and organizational capital (data governance procedures and quality standards). Research should explore how these flows interact to sustain data quality over time and whether and how management accountants can act as custodians of this process.

The absorptive capacity of management accountants and managers (Elbashir *et al.*, 2011; Järvenpää *et al.*, 2023) further shows that human capital is deeply intertwined with relational and organizational dimensions. Individual expertise acts as a stock, but it is strengthened by flows of learning and exposure to networks that expand capabilities. Research could explore how organizations can support these flows over time to ensure that BI&A is actually used in MA contexts.

Finally, relational capital (relationships with consultants, vendors and professional networks) can be understood as external stocks of knowledge that are activated through flows of collaboration and trust-building. Over-reliance on external expertise risks stalling the internal accumulation of internal competences, while well-managed flows can convert external stocks into internal human and organizational capital. Future research should explore how organizations balance these dynamics to avoid dependence while leveraging external connections to strengthen BI&A assimilation.

Rather than a conventional research agenda that simply extends existing models, the set of future avenues of research proposed here should be understood as a reframing agenda. In this sense, it seeks to redirect BI&A and MA research from the search for static determinants to the exploration of how knowledge infrastructures are continually produced, maintained and sometimes eroded within organizational life.

Finally, from a managerial perspective, the findings highlight that the effectiveness of BI&A systems in MA depends on the continuous activation of flows that renew and connect different forms of IC. In practical terms, sustaining these flows requires managerial actions that keep human, organizational and relational capital aligned over time. This implies, for example, developing governance mechanisms for intangible flows, such as assigning clear responsibilities for maintaining the interaction between accounting, IT and business units, or introducing learning and collaboration metrics, such as tracking participation in cross-functional BI&A projects or measuring the frequency of data review sessions. The adoption of BI&A systems for MA purposes should not be considered as a one-off investment in technology but as an ongoing commitment to nurturing and renewing human, organizational and relational capital. Companies that neglect this effort run the risk of creating systems that are technically advanced but practically irrelevant. Conversely, those that manage these flows deliberately are more likely to sustain the relevance and impact of their BI&A systems in MA contexts over time.

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