

Redefining the Management Controller Profession in the Business Intelligence and Analytics (BI&A) Era: Current knowledge and insights from an empirical study

Fatima BOUCHOUAR, (PhD Student)

*Research Laboratory on Economic Competitiveness and Managerial Performance
Faculty of Legal, Economic and Social Sciences-Souissi
Mohammed V University in RABAT, Morocco*

Bouchra LKHOYAALI, (Full Professor)

*Research Laboratory on Economic Competitiveness and Managerial Performance
Faculty of Legal, Economic and Social Sciences-Souissi
Mohammed V University in RABAT, Morocco*

Correspondence address :	Faculty of Legal, Economic and Social Sciences - Souissi Mohammed Ben Abdallah Ragragui Avenue, Al Irfane, BP 6430, Rabat fsjes-souissi@um5r.ac.ma
Disclosure Statement :	The authors declare that they have not received any financial support that could have influenced the objectivity of this study. They take full responsibility for any potential plagiarism, the use of artificial intelligence in the writing process, as well as for the results presented in this article.
Acknowledgement :	The authors would like to acknowledge the support of The National Center for Scientific and Technical Research (CNRST) – Morocco within the framework of the « PhD-ASsociate Scholarship – PASS » Program.
Conflict of Interest :	The authors report no conflicts of interest.
Cite this article :	BOUCHOUAR, F., & LKHOYAALI, B. (2026). Redefining the Management Controller Profession in the Business Intelligence and Analytics (BI&A) Era: Current knowledge and insights from an empirical study. <i>International Journal of Accounting, Finance, Auditing, Management and Economics</i> , 7(9), 394–406. https://doi.org/10.5281/zenodo.21807326
License	This is an open access article under the CC BY-NC-ND license

Received: 02/07/2026

Accepted: 03/08/2026

International Journal of Accounting, Finance, Auditing, Management and Economics - IJAFAME

ISSN: 2658-8455

Volume 7, Issue 09 (2026)

Redefining the Management Controller Profession in the Business Intelligence and Analytics (BI&A) Era: Current knowledge and insights from an empirical study

Abstract:

Business Intelligence and Analytics (BI&A) is fundamentally transforming the traditional nature of management control work. Therefore, this study adopts an exploratory qualitative research design in order to examine how the management controller profession is expected to evolve in the age of BI&A. Although research on the implications of BI&A for the profession of management controllers has expanded considerably in recent years, empirical evidence from the Moroccan context remains scarce, leaving this context insufficiently investigated. To this end, we conducted eight semi-structured interviews with Moroccan management control professionals, and the resulting data were analyzed using thematic analysis. Our findings showed that BI&A is redefining the role of management controllers, enabling them to move beyond routine tasks toward a Business Partner role. This transformation, however, requires the acquisition of new skills and our results highlighted the core skills management controllers are expected to possess in the BI&A era, namely: data manipulation skills, data analytics skills, analytical skills, programming skills and communication skills. Notably, data manipulation skills and data analytics skills were identified by all participants. Furthermore, the findings indicated that management controllers acquire BI&A skills through various learning pathways, including self-learning, organizational training programs, and academic education. Despite variations in learning modalities among participants, all participants emphasized the crucial role of self-learning in continuously updating their skills. Finally, participants highlighted the need to integrate Business Intelligence and Analytics knowledge into management accounting and control education, arguing that such an initiative would better equip future management controllers with the skills required to meet the evolving demands of the labor market.

Keywords: Business Intelligence and Analytics, Management Controllers, Roles, Skills, Management Accounting and Control Education.

Classification JEL: M15, M41

Paper type: Empirical Research

1. Introduction

Business Intelligence and Analytics (BI&A) tools enable the collection and manipulation of data to aid in the decision-making process (Rikhardsson & Yigitbasioglu, 2018). Since management control is an essential function that supports decision-making within the organization, there is a clear link between BI&A and management control (Rikhardsson & Yigitbasioglu, 2018). Management control is a practice that involves processing and analyzing a company's data to assist decision-makers in making the right decisions. In fact, data are the foundation of management controllers' work and with the phenomenon of Big Data, these professionals may encounter several challenges. These challenges include handling enormous amounts of data and integrating data from various sources. To overcome these challenges, management controllers must effectively use technological tools to transform the company's raw data into useful information. In this context, BI&A is an essential tool for management controllers.

Since our research is conducted in Morocco, we adopt the term management controller as a translation of the term « Contrôleur de gestion » which is used in most Moroccan organizations. Management accountant and management controller are often employed interchangeably in the literature (Oesterreich & Teuteberg, 2019), which is why in this paper, the two terms are viewed as interchangeable.

Before proceeding, it is important to draw a clear distinction between Business Intelligence (BI) and Business Analytics (BA). Indeed, there are two distinct viewpoints regarding BI and BA: Certain researchers consider that BI and BA are the same (Bayrak, 2015; Sircar, 2009), whereas others maintain that BI and BA are different. Chen et al. (2012) introduced the term Business Intelligence & Analytics (BI&A) to describe BI and BA without causing confusion. They define BI&A as a broad concept encompassing techniques, technologies and methodologies that analyze data to make timely and better business decisions (Chen et al., 2012). In this paper, we consider BI and BA to be interconnected and we will refer to them collectively as BI&A.

BI&A tools change how management controllers analyze and interpret data for decision-making (Brands & Holtzblatt, 2015). Consequently, BI&A tools reduce the time devoted to routine tasks including data collection and report preparation, enabling management controllers to focus more on analytical and value-adding tasks (Nespeca & Chiucchi, 2018). This development supports the transition of management controllers toward a business partner role (Nespeca & Chiucchi, 2018; Fähndrich, 2023), which in turn increases the required skills for management controllers (Fähndrich, 2023; Nespeca & Chiucchi, 2018).

Accordingly, the literature suggests that BI&A tools reshape the management controller profession in three main ways. First, they transform tasks by shifting management controllers from routine activities toward value-adding activities. Second, they transform roles from an information provider to a business partner. Third, they transform skills by increasing the need for BI&A skills. Throughout this work, we conceptualize BI&A skills as the ability to effectively use BI&A tools.

This paper responds to calls for further research on the implications of digital technologies for the accounting profession (Moll & Yigitbasioglu, 2019; Möller et al., 2020). Given the rise of BI&A, it is of paramount importance to study the changing role of management controllers, to determine the skills needed for management controllers and to investigate whether BI&A should become a mandatory component of accounting curricula (Rikhardsson & Yigitbasioglu, 2018). In the same vein, Fähndrich (2023) calls for further research to better define management controllers' evolving tasks and skills in the digital era, the author also highlights the need to investigate whether higher education is adapting to equip future management controllers with the skills required in the age of digitalization (Fähndrich, 2023).

Building on these calls, this work seeks to develop a deeper understanding of how BI&A is being perceived and experienced within the profession of management controllers. This research adopts an exploratory qualitative design based on an interpretivist perspective. Drawing on data from eight semi-structured interviews, our study investigates how BI&A tools reshape the management controller profession within Moroccan organizations. As this topic remains underexplored in Morocco, this study offers a valuable contribution to the literature. The Moroccan context provides a relevant setting for examining the transformation of the management controller profession. In recent years, the Moroccan labor market is characterized by an increasing demand for new skills, as Moroccan firms are accelerating their digital transformation. Accordingly, this paper intends to answer these research questions:

- 1) *How do BI&A tools reshape the tasks and roles of management controllers within Moroccan organizations?*
- 2) *What skills are essential for Moroccan management controllers in the age of BI&A, and through which learning pathways do they acquire BI&A skills?*

Taken together, professional transformation can be understood as a sequential process in which changes in tasks lead to the evolution of roles, as roles shift, new skills become essential. In turn, acquiring new skills relies on continuous learning and skill development.

This paper contributes to the emerging literature on management control in the digital era. BI&A is increasingly changing the management controller profession and this transformation raises important questions about the skills management controllers need and the ways in which they acquire them. Beyond identifying these skills, the paper calls for management control curricular changes, it advocates for ongoing educational reforms that are in line with technological progress to better prepare future management controllers.

2. Current Knowledge on the influence of BI&A on management controllers: Evolving roles, required skills and implications for education

Before reviewing the current state of knowledge on the topic, it is necessary to define the key concepts of our study.

In the first place, the term Business Intelligence was introduced by Luhn in 1958, he described it as a method for managing and delivering information to support decision-making (Luhn, 1958), since then, a number of definitions of BI have appeared in the literature. We can simply describe BI as the process of turning data into knowledge (Golfarelli et al., 2004), it is a collection of decision support technologies used to make better decisions (Chaudhuri et al., 2011).

In the second place, Business Analytics (BA) involves using analytics techniques to generate insights that support decision-making (Delen & Ram, 2018). There are four main types of BA (Banerjee et al., 2013; Delen & Ram, 2018):

- o Descriptive analytics explains what happened by summarizing data through reports or dashboards;
- o Diagnostic analytics answers why something happened using data exploration tools like drill-down;
- o Predictive analytics focuses on what is likely to happen, using machine learning techniques to forecast trends;
- o Prescriptive analytics recommends what best action should be taken by applying optimization or simulation.

Hence, descriptive and diagnostic analytics are part of Business Intelligence (BI), while predictive and prescriptive analytics are categorized as advanced analytics due to their complexity and sophistication (Delen & Ram, 2018).

To address the ambiguity surrounding the concepts of Business Intelligence (BI) and Business Analytics (BA), Chen et al. (2012) introduce the unified term Business Intelligence and Analytics (BI&A), they conceptualize BI&A as a comprehensive concept that integrates the techniques, technologies, practices, methodologies, and applications used to transform business data into insights that support decision-making (Chen et al., 2012). BI&A tools provide a range of functionalities that help organizations turn data into insights, they consolidate data from multiple sources and offer advanced features such as modelling, real-time information, interactive visualizations and in-depth analysis (Chugh & Grandhi, 2013). Today, management control uses BI&A tools for interactive reports, optimized planning processes, and automated consolidation workflows (Marx et al., 2012). Additionally, BI&A tools are applied to track KPIs, run forecasts, simulations, and scenario analysis (Marx et al., 2012).

Building on these definitions, this section examines the existing body of research on how BI&A tools have reshaped the management controller profession. Specifically, the literature highlights important changes in the tasks and roles of management controllers, as well as in the skills they should possess.

BI&A is reshaping the tasks of management controllers, particularly reporting (Nespeca & Chiucchi, 2018), by changing the way management controllers manage data (Brands & Holtzblatt, 2015). BI&A tools reduce the time spent on data handling, allowing management controllers to devote more time to data interpretation (Nespeca & Chiucchi, 2018) and to focus on value-added tasks (Oesterreich et al., 2019). Therefore, the role of the management controller is evolving into a Business Partner (Nespeca & Chiucchi, 2018).

As BI&A tools have changed and expanded management controllers' roles toward analysis and strategic advisory roles (Pargmann et al., 2023), they are required to acquire new skillsets (Moll & Yigitbasioglu, 2019; Nielsen, 2018; Oesterreich & Teuteberg, 2019; Richins et al., 2017). Some researchers argue that management controllers should only have basic data analytics skills without requiring expertise (Bhimani & Willcocks, 2014; Spraakman et al., 2021). In contrast, other authors have a different view and consider that management controllers should be experts in data analytics (Oesterreich & Teuteberg, 2019; Richins et al., 2017). They should also acquire the knowledge to work with massive structured and unstructured data sets and understand principles of programming (e.g. Python) (Richins et al., 2017).

This lack of consensus highlights an important gap in the literature regarding the skills that management controllers actually need in the digital era. To address this gap, the present study explores the skills perceived as essential in practice, thereby providing empirical evidence to clarify this ongoing debate.

However, the growing need for management controllers to develop new skills should not decrease the importance of traditional management accounting and control skills (Möller et al., 2020), the development of new skills should complement rather than replace these foundational skills.

Finally, it is worth noting that these changes have implications for the management accounting and control education. Researchers have called for the revision of accounting curricula to incorporate new skills that better prepare future management controllers for technology-driven contexts (Oesterreich & Teuteberg, 2019; Pargmann et al., 2023; Vysotskaya & Prokofieva, 2025). Moreover, Vysotskaya and Prokofieva (2025) argue that integrating data analytics into management accounting and control courses is essential for developing graduates' skills and enhancing their employability.

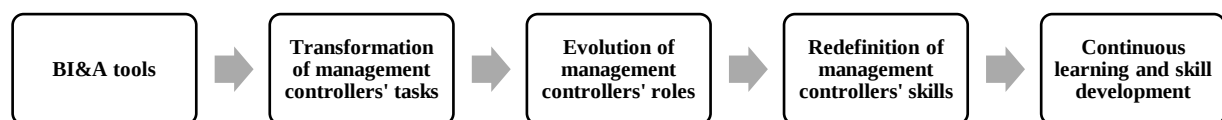
To the best of our knowledge, the Moroccan literature offers relatively limited empirical evidence on how BI&A tools are changing the management controller profession. This lack of empirical research highlights the need for further investigation and reinforces the contribution of our study.

The sociotechnical approach provides the theoretical lens for this study. Sociotechnical systems theory originated in the 1950s following studies on the impact of technological changes on work (Trist & Bamforth, 1951). This theory conceptualizes organizations as comprising two interdependent subsystems: the technical subsystem (technology) and the social subsystem (people). Drawing on this theory, the organizational effectiveness is achieved when both the social and technical subsystems are managed together, meaning that a change in one subsystem inevitably influences the other.

When applied to our topic, this approach highlights that the integration of BI&A tools drives transformations within the technical subsystem, leading to changes in the social subsystem. Following the transformation of the social subsystem, management controllers must adapt their tasks, roles, and skills to effectively work with BI&A tools.

Based on the current body of knowledge, the conceptual framework presented in Figure 1 serves as a conceptual guide for organizing the main concepts of this study.

Figure 1: Conceptual framework



Source: Developed by the authors based on the existing body of knowledge

3. Methodology

Our study adopted a qualitative research design to investigate how BI&A is changing the profession of management controllers. Qualitative research is suitable for investigating social and organizational phenomena where understanding participants' perceptions is essential.

Primary data were collected through semi-structured interviews. Our interview guide consisted of two main sections: The first section dealt with the changing tasks and roles of management controllers in the BI&A age, while the second section focused on the essential skills required by management controllers in the BI&A era and the learning pathways to develop them. This method was selected because it allows to study our topic in greater depth and examine participants' experiences regarding professional changes, with particular emphasis on the evolving nature of the management control's role, the skills deemed necessary, how those skills are acquired, and the perceived need for curriculum reform.

The sample consisted of 8 management controllers employed by private Moroccan companies. Qualitative research does not aim at statistical generalizations, instead, it strives to describe a phenomenon. Therefore, in a qualitative study, the number of interviewees is not necessarily critical, what is more important is that the interviewees have as much knowledge and experience as possible on the phenomenon being studied.

Guest, Bunce, and Johnson (2006) demonstrated that in qualitative studies, data saturation can often be achieved within 6 to 12 interviews, making this range sufficient for capturing the majority of key information (Guest et al., 2006). After each interview, we compared the collected data with the findings from previous interviews to determine whether new themes were emerging. Data saturation was achieved after 7 interviews, as no new themes or insights were identified. The last interview confirmed the existing findings and did not provide additional information.

Furthermore, interviews were carried through Google meet or phone calls and were conducted during the time period of October - December 2024, they lasted between 30 and 60 min, they were audio-recorded with prior consent from the participants and subsequently transcribed. All interviewees except one agreed to have their interviews recorded. For the interview in which audio recording was declined, we took detailed notes to capture the responses. To maintain confidentiality, all personal information was removed from the transcripts and participants were assigned anonymous codes during the analysis. The recorded interviews and transcripts were securely stored and protected, given the confidential nature of the information provided by participants.

The sampling technique was a purposive method, resulting in participants who actively use BI&A tools in their daily workflows. Purposeful sampling allows researchers to deliberately select information-rich cases that best address the goals of the study. Therefore, participants had to possess sufficient experience using BI&A in their professional activities to provide informed insights into its influence on their work. To capture a broad range of perspectives, we also sought diversity in participants' professional experience and industry sectors. Interviews were conducted in French, Arabic and sometimes in English, participants were free to express themselves in the language of their choice. The interview transcripts were translated into English without changing their original meaning. Then, each translated quotation was carefully compared with the original text to preserve the participants' intended meaning.

Our collected data were analyzed using thematic analysis following the framework developed by Braun and Clarke (2006). First, we familiarized ourselves with the dataset through multiple readings of the interview transcripts to gain an understanding of the participants' responses. Next, initial codes were organized into themes and then the themes were reviewed (Braun & Clarke, 2006). To ensure the rigor of this process, codes and themes were continuously checked against the original transcripts to ensure that they accurately reflected participants' perspectives. Finally, we identified the following themes: the role of BI&A tools in reducing time spent on routine management control tasks, the evolution of the management controller's role in the BI&A era, the skills required for management controllers in the age of BI&A, the pathways through which management controllers develop BI&A skills, and the need to incorporate BI&A knowledge into management accounting and control education.

4. Results

A total of 8 semi-structured interviews were conducted for this study. Table 1 provides an overview of the interviews and table 2 presents the participant profiles, detailing their industry sector, company size and professional experience.

Table 1: Description of the interviews

Interview	Participant	Mode of Conduct	Date
1	Management Controller 1	Google Meet	5/10/2024
2	Management Controller 2	Google Meet	8/10/2024
3	Management Controller 3	Google Meet	11/10/2024
4	Management Controller 4	Google Meet	18/10/2024
5	Management Controller 5	Telephone	01/11/2024
6	Management Controller 6	Google Meet	15/11/2024
7	Management Controller 7	Google Meet	06/12/2024
8	Management Controller 8	Google Meet	30/12/2024

Source: Authors' own elaboration based on the study findings

Table 2: Profile of the participants

Participant	Industry Sector	Company size	Management Control Experience	BI&A Experience
P1	Recycling industry	Medium-sized company	8 years	5 years
P2	Health	Large company	3 years	1 year
P3	Transportation	Large company	5 years	1 year
P4	Agri-food industry	Large company	10 years	3 years
P5	Construction and Public Works	Medium-sized company	5 years	5 years
P6	Information Technology (IT)	Large company	3 years	2 years
P7	Information Technology (IT)	Large company	5 years	5 years
P8	Furniture industry	Large company	4 years	4 years

Source: Authors' own elaboration based on the study findings

The findings indicated that BI&A tools have become indispensable for management controllers, particularly in an environment characterized by digitalization and the exponential growth of organizational data:

« I had a very large amount of data that I needed to transform into information, I couldn't do it manually and Excel couldn't do it either. So, I had to learn a tool that would allow me to process this data and make it usable » P1

One of the key findings concerns the automation of reporting activities through BI&A tools, participants indicated that tasks such as collecting, consolidating, and updating data are now automated, resulting in a more faster report generation process.

All participants emphasized that BI&A tools reduce the time required for data manipulation and report preparation, and these tools enable management controllers to devote greater attention to higher-value activities. As a result, the role of management controllers is evolving toward a more strategic role within organizations:

« With BI&A tools, data processing no longer takes much time. We have time left to analyze the data, provide recommendations, and help management make strategic decisions. The role of the management controller has therefore become more strategic » P2

« With BI&A tools, we can easily refocus on our core activities, which is in-depth analysis, business risk detection, and being closer to operational teams. Today, the management controller is moving beyond his basic scope and evolving into a Business Partner role » P4

« BI&A automates data collection ... so we have more time for strategic tasks » P5

« BI&A simplifies tasks, reduces manual reporting, increases accuracy, and frees up more time for other things like analyzing data, proposing solutions... » P7

Given that BI&A is reshaping management controller's roles, it is also transforming the skills requirements associated with the profession:

« In the era of BI&A, the profession of the management controller is evolving to adapt to an increasingly digital and data-driven environment. Therefore, management controllers must strengthen their skills, moving from traditional skills to the skills a modern management controller must possess » P6

Besides, our results indicated that traditional management accounting and control skills remain fundamental, however, these skills must now be supplemented by emerging skills to address the evolving requirements of the profession in the context of BI&A.

All participants agreed that management controllers should effectively utilize BI&A tools to perform their work and acknowledged that doing so requires the development of new skills. Participants mentioned a variety of skills that are presented in Table 3. Some skills were mentioned by all participants, suggesting a strong collective perception of their importance. In contrast, other skills were identified by only a limited number of participants.

Table 3: Distribution of management controllers' skills across participants

Skills	P1	P2	P3	P4	P5	P6	P7	P8
Data manipulation skills	✓	✓	✓	✓	✓	✓	✓	✓
Data analytics skills	✓	✓	✓	✓	✓	✓	✓	✓
Analytical skills			✓	✓		✓		
Programming skills						✓		✓
Communication skills			✓	✓	✓	✓		

Source: Developed by the authors based on interview findings

While all participants emphasized that data manipulation skills and data analytics skills are essential for management controllers to use BI&A tools effectively, programming skills was mentioned by only a few participants. Participant 6 noted that programming skills constitute a valuable capability for management controllers, Participant 6 also added that Python can be integrated with Power BI to perform advanced data processing, analysis, and visualization. Another important point is that participants revealed the existence of several pathways through which management controllers acquire BI&A skills. They reported diverse learning approaches, including self-learning, training programs provided by organizations, and academic education. While these learning modalities varied across participants depending on their professional context and career trajectory, a common pattern emerged: all participants emphasized the importance of self-learning as a continuous means of developing and updating their skills:

« I do one to two hours of training every day, it's self-learning ... » P1

« I received training provided by my company, it was just basic training. To improve my skills, I engage in self-learning » P2

« I studied BI&A tools during my final year of my master's degree, I particularly remember a module entitled Business Intelligence for Management Accounting. Currently, I continue to develop my skills through self-learning » P5

Table 4 provides an overview of the pathways through which participants acquired the skills needed to use BI&A tools effectively in their work.

Table 4: Distribution of management controllers' learning pathways across participants

Learning pathways	P1	P2	P3	P4	P5	P6	P7	P8
Self-learning	✓	✓	✓	✓	✓	✓	✓	✓
Training programs provided by organizations		✓		✓			✓	
Academic education					✓			

Source: Developed by the authors based on interview findings

Towards the end of the interview, participants collectively highlighted the need for a stronger integration of BI&A tools into academic curricula. They argued that traditional management accounting and control programs often provide limited exposure to emerging digital technologies, creating a gap between academic training and the skills demanded by the profession. According to the participants, incorporating BI&A knowledge into higher education programs would better prepare future management controllers to align with the evolving needs of the labor market:

« Today, I no longer see management control job postings where BI&A tools are not required ... It is essential for universities to add Business Intelligence and Analytics modules to the management control curriculum » P1

Participant 2 indicated that the integration of BI&A modules into academic programs would represent an advantage for management control students. Moreover, participant 2 added that an increasing number of job advertisements now require proficiency in BI&A tools, companies increasingly seek candidates who can use these tools effectively from their first day of work.

5. Discussion

The findings showed that BI&A tools have reduced the manual effort required for tasks such as data manipulation and report preparation. Activities that were previously time-consuming are now largely automated, making the report generation process faster and more efficient. These results are consistent with previous studies, which suggest that management controllers rely on these tools to produce interactive reports and automate consolidation processes (Marx et al., 2012). Thus, management controllers are able to devote more attention to higher-value activities (Nespeca & Chiucchi, 2018; Oesterreich et al., 2019). In practical terms, less time spent on data handling means more time available for data interpretation and higher-value contributions to the organization.

The expansion of management controllers' roles through BI&A has required them to acquire new skills (Moll & Yigitbasioglu, 2019; Nielsen, 2018; Oesterreich & Teuteberg, 2019; Richins et al., 2017). Likewise, our study highlights the need to update the skills required for management controllers and table 5 presents the management controller's skill set identified in this study.

Table 5: Overview of skills required for management controllers in the BI&A age

BI&A Skill	Description
Data manipulation skills	Collecting, cleaning and transforming data
Data analytics skills	Examining data to identify patterns and trends
Analytical skills	Interpreting data, solving problems, and supporting decision-making
Programming skills	Using code to automate tasks and perform advanced data science activities
Communication skills	Presenting and explaining analytical insights clearly

Source: Authors' own synthesis based on the empirical findings of this study and the reviewed literature

As discussed in the current knowledge section, the literature presents different perspectives on the data analytics skills required for management controllers. While some researchers argue that management controllers do not need to be experts in data analytics (Bhimani & Willcocks, 2014; Spraakman et al., 2021), others maintain that management controllers should possess strong data analytics skills (Oesterreich & Teuteberg, 2019; Richins et al., 2017). Our findings support the latter perspective, as participants consistently emphasized that data analytics skills are becoming an essential skill for modern management controllers. In addition, a few participants emphasized the value of programming skills, thereby supporting the argument advanced by Richins et al. (2017).

BI&A skills equip management controllers with the capabilities required to effectively use BI&A tools in their daily professional tasks. However, management accounting and control skills, including reporting, budgeting, forecasting, variance analysis, cost control..., remain indispensable. Thus, management controllers should require a balanced combination of both skills.

In the Moroccan context, as organizations are accelerating their digital transformation and adopting BI&A across their business processes, the development of BI&A skills has become important for Moroccan management controllers.

Next, the study found that management controllers develop BI&A skills through multiple channels, including self-learning, organizational training programs, and academic education. However, BI&A upskilling is mainly driven by individual efforts rather than structured programs. Participants emphasized the importance of incorporating BI&A knowledge into academic curricula and perceived a gap between the skills taught at universities and those required today. This finding aligns with earlier studies that call for integrating BI&A skills into management accounting and control education (Oesterreich & Teuteberg, 2019; Pargmann et al., 2023; Vysotskaya & Prokofieva, 2025).

Our results emphasize that Moroccan higher education institutions should prioritize equipping management control students with BI&A skills, as management controllers currently acquire these skills mainly through self-learning rather than through formal academic education. Without such changes, graduates may face difficulties adapting to the demands of modern management control practice.

6. Conclusion

Using a qualitative approach based on the experiences of Moroccan management controllers, our study has generated an understanding of how BI&A is reshaping the profession. By automating routine and time-consuming tasks, BI&A tools are enabling management controllers to redirect their efforts toward higher-value activities.

At the same time, the results highlighted several important challenges that the profession must address. The development of BI&A skills is mainly self-directed, reflecting the absence of structured upskilling pathways within universities. Traditional management accounting and control education may need to evolve by integrating the latest technological advancements, thereby ensuring that future management controllers acquire the essential skills for success, our study contributes to the literature by clarifying which skills are seen as essential and it helps universities adapt curricula by identifying which skills should be integrated.

While participants argued that BI&A integration into management accounting and control curricula is indispensable, there is a need to examine how educational programs can respond to the growing use of BI&A in the accounting profession (Rikhardsson & Yigitbasioglu, 2018). Research on how management accounting and control education should be redesigned to meet these evolving requirements remains limited. In particular, future research should investigate how BI&A skills should be taught, and how educators can effectively prepare management accounting and control students for a BI&A-driven profession.

Beyond educational implications, BI&A also has significant professional implications, raising questions about the future of the management controller profession. As a matter of fact, the future of the profession depends on how management controllers respond to the emerging technologies. As the role of management controllers evolves in the BI&A age, they must acquire new skills to secure their positions and prevent being replaced by other professionals. We therefore consider it important to acknowledge this point in our conclusion and encourage future research to examine the professional implications of BI&A.

Management controllers are responsible for conducting data analytics tasks to assist managers in making decisions, but this responsibility is being challenged by data scientists (Möller et al., 2020). This issue is particularly relevant given that data collection, data transformation and data analysis are central to the work of both data scientists and management controllers.

There are two approaches to take into consideration: The first approach is that management controllers acquire BI&A skills and directly provide data analysis to managers for decision-making, and the second approach is that data scientists perform the analysis while management controllers collaborate with them (Sprakman et al., 2021). So, organizations should decide whether it is essential to develop the skills of their management controllers or to employ data scientists for analytical activities (Oesterreich & Teuteberg, 2019).

Ultimately, to secure their role, management controllers must acquire BI&A skills, if not, they risk being replaced by data scientists (Nielsen, 2018). Therefore, a clear distinction between the respective tasks, roles and skills of the management controller and the data scientist should be ranked at the top of the future research priority list. Future research should also provide a deeper examination of how management controllers and data scientists should interact and collaborate to achieve organizational objectives.

While our research offers valuable insights, it is not without limitations. This study relies on a qualitative approach based on eight semi-structured interviews, which allows for an in-depth understanding of the participants' perceptions but does not permit statistical generalization of the results to all management controllers. Moreover, the sample included only professionals already using BI&A tools in their work environment. Consequently, participants' experiences were predominantly positive and no divergent cases were identified.

In conclusion, this study affirms that BI&A is not an abstract concept for the management controller profession but a reality that is reshaping tasks, roles, skills, and educational needs. Meeting the challenges that BI&A presents will require coordinated effort from practitioners, professional bodies and educators, guided by a commitment to prepare highly competent management controllers who can effectively use BI&A tools.

References

- (1). Bayrak, T. (2015). A Review of Business Analytics : A Business Enabler or Another Passing Fad. *Procedia - Social and Behavioral Sciences*, World Conference on Technology, Innovation and Entrepreneurship, 195, 230-239.
- (2). Bhimani, A., & Willcocks, L. (2014). Digitisation, 'Big Data' and the transformation of accounting information. *Accounting and Business Research*.
- (3). Brands, K., & Holtzblatt, M. (2015). Business Analytics : Transforming the Role of Management Accountants. 16(3).
- (4). Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77-101.
- (5). Chen, H., Chiang, R. H. L., & Storey, V. C. (2012). Business Intelligence and Analytics : From Big Data to Big Impact. *Management Information Systems Quarterly*, 36(4), 1165-1188.
- (6). Delen, D., & Ram, S. (2018). Research challenges and opportunities in business analytics. *Journal of Business Analytics*, 1(1), 2-12.
- (7). Fährndrich, J. (2023). A literature review on the impact of digitalisation on management control. *Journal of Management Control: Zeitschrift Für Planung Und Unternehmenssteuerung*, 34(1), 9-65.
- (8). Guest, G., Bunce, A., & Johnson, L. (2006). How Many Interviews Are Enough? : An Experiment with Data Saturation and Variability. *Field Methods*, 18(1), 59-82.
- (9). Marx, F., Wortmann, F., & Mayer, J. H. (2012). A Maturity Model for Management Control Systems. *Business & Information Systems Engineering*, 4(4), 193-207.
- (10). Moll, J., & Yigitbasioglu, O. (2019). The role of internet-related technologies in shaping the work of accountants : New directions for accounting research. *The British Accounting Review, Innovative Governance and Sustainable Pathways in a Disruptive Environment*, 51(6), 100833.
- (11). Möller, K., Schäffer, U., & Verbeeten, F. (2020). Digitalization in management accounting and control : An editorial. *Journal of Management Control*, 31(1), 1-8.
- (12). Nespeca, A., & Chiucchi, M. S. (2018). The Impact of Business Intelligence Systems on Management Accounting Systems : The Consultant's Perspective. In R. Lamboglia, A. Cardoni, R. P. Dameri, & D. Mancini (Éds.), *Network, Smart and Open* (Vol. 24, p. 283-297). Springer International Publishing.
- (13). Nielsen, S. (2018). Reflections on the applicability of business analytics for management accounting – and future perspectives for the accountant. *Journal of Accounting & Organizational Change*, 14(2), 167-187.

- (14). Oesterreich, T. D., & Teuteberg, F. (2019). The role of business analytics in the controllers and management accountants' competence profiles. *Journal of Accounting & Organizational Change*, 15(2), 330-356.
- (15). Oesterreich, T. D., Teuteberg, F., Bensberg, F., & Buscher, G. (2019). The controlling profession in the digital age: Understanding the impact of digitisation on the controller's job roles, skills and competences. *International Journal of Accounting Information Systems*, 35, 100432.
- (16). Pargmann, J., Riebenbauer, E., Flick-Holtsch, D., & Berding, F. (2023). Digitalisation in accounting: A systematic literature review of activities and implications for competences. *Empirical Research in Vocational Education and Training*, 15(1), 1.
- (17). Richins, G., Stapleton, A., Stratopoulos, T. C., & Wong, C. (2017). Big Data Analytics: Opportunity or Threat for the Accounting Profession? *Journal of Information Systems*, 31(3), 63-79.
- (18). Rikhardsson, P., & Yigitbasioglu, O. (2018). Business intelligence & analytics in management accounting research: Status and future focus. *International Journal of Accounting Information Systems*, 29, 37-58.
- (19). Sircar, S. (2009). Business Intelligence in the Business Curriculum. *Communications of the Association for Information Systems*, 24.
- (20). Spraakman, G., Sanchez-Rodriguez, C., & Tuck-Riggs, C. A. (2021). Data analytics by management accountants. *Qualitative Research in Accounting & Management*, 18(1), 127-147.
- (21). Trist, E. L., & Bamforth, K. W. (1951). Some Social and Psychological Consequences of the Longwall Method of Coal-Getting: An Examination of the Psychological Situation and Defences of a Work Group in Relation to the Social Structure and Technological Content of the Work System. *Human Relations*, 4(1), 3-38.
- (22). Vysotskaya, A., & Prokofieva, M. (2025). Management accounting and data analytics: Technology acceptance from the educational perspective. *Accounting Education*, 34(3), 410-433.