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# Management Accounting and Digital Technologies: A Science mapping review

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***Abstract***

*This study applied science mapping techniques to provide an overview of the scientific production of management accounting and digital technologies. It was considered a sample of 128 articles extracted from Scopus and WoS. Results showed that almost 80% of the articles analyzed were published in the last five years. This growth in scientific production is mainly due to technological advancements, demand for real-time information, regulatory changes and accounting standards, the need for efficiency and cost control, and the growing interest in sustainability and social responsibility issues. The conceptual structure of this sample was grouped into four clusters: digital strategy adoption, digital financial innovation, digital transformation strategies, and digital and financial sustainability. Based on the gaps identified, future research should explore management accounting and AI-based technologies within the government sector, SMEs, environmental sustainability issues, and curricular changes in university accounting courses.*

***Keywords:*** *Management accounting; digital technology; big data; artificial intellingence; bibliometric analysis; science mapping.*

## 1. Introduction

Management accounting has experienced a significant transformation due to the digital revolution. It has evolved from reporting historical data, to also include performance measurement and providing decision-making information (Appelbaum et al., 2017). This change is a result of several factors, including changing needs of the regulatory environment (Rautiainen et al., 2024). In this context, scientific production on Management Accounting (M.A.) and digital technologies has increased considerably in recent years, especially regarding

its transformation due to technological advancements to understand how it may improve strategic decision-making. Studies related to adopting M.A. innovation is motivated mainly due to the demand for real-time information, regulatory and accounting standards change, the need for efficiency and cost control, and growing interest in sustainability and social responsibility. Such discussions have been developed multidisciplinary, including debates related to big data, business intelligence and analytics (BI&A) tools, management control systems, Artificial Intelligence (A.I.), Machine Learning (M.L.), and blockchain.

Adopting M.A. innovation brings many benefits, such as efficiency, productivity, security and time and cost reductions (Poyda-Nosyk et al., 2023). However, the challenges are also the debated in academic literature, such as the lack of digital competencies (Steens et al., 2024) which is considered barrier to adopting digital technology for management accountants. From an organizational perspective, the lack of technological infrastructure is also considered a barrier to the adoption of these technologies (Dogru et al., 2023).

Despite the growing increase in academic production, there are still many gaps involving these issues. Thus, the purpose of this study is to understand this field through a science mapping analysis applied to a sample of (128) articles extracted from the Scopus and the Web of Science (WoS) to provide an overview of the scientific production and to map its conceptual structure. This study is relevant to understanding the multidimensional approaches regarding M.A. and digital technologies, contributing to shed light on how advanced tools are redefining its practices. This study may also contribute to academics, managers, and policymakers interested in understanding how research has been developed in this knowledge area.

## 2. Methods

This study adopted systematic literature review protocols, bibliometric analysis, and science mapping explore M.A. digital technologies studies indexed on the Scopus and the WoS. The combination of such multiple approaches helps the researcher to understand the topic in a more comprehensive way. Additionally, conducing a literature reviews systematically can provide quality, replicability, reliability, and validity of these reviews (Page et al., 2021; Xiao & Watson, 2019). In recent years, an increasing attention has been dedicated to the systematic study of the scientific literature, due to the availability of online databases and development of tools able to perform automatic analyses (Aria et al., 2020). Indeed, many innovations in conducting systematic reviews have emerged, including new methods (Pagani et al., 2023) and technological advances that have enabled the use of natural language processing and machine learning to identify relevant evidence (Page et al., 2021). However, researchers in business, management and related disciplines still develop cursory and narrative reviews that lack a systematic investigation of the literature developments (Linnenluecke et al., 2020).

Although systematic literature review and bibliometric analysis are different types of review methods with different purposes, as highlighted by Donthu et al. (2021), these review methods are complementary, and if integrated they may offer unique advantages in advance theory and practice in a scientific domain (Mukherjee et al., 2022). Considering this, scholars should cultivate novelty within research on business and management (Kraus et al., 2022). It includes using bibliometric analysis and science mapping techniques because it may offer unique opportunities for making a theoretical contribution, understanding their foundations, and fostering new paradigms (Paul et al., 2021; Post et al., 2020).

In general, bibliometric analysis is defined in the literature as a method applied for analyzing large volumes of scientific data to explore the evolutionary nuances and shed light on the emerging areas in a specific field (Donthu et al., 2021), based on statistical techniques (Aria et al., 2020). However, it is important to highlight that bibliometric research involves two main categories of analytical techniques: performance analysis and science mapping (Aria et al., 2020; Donthu et al., 2021; Mukherjee et al., 2022). The performance analysis is an evaluative technique for assessing productivity and impact, and science mapping is a relational technique for uncovering knowledge clusters in a field (Mukherjee et al., 2022). Thus, considering the relevance of these integrated methods to ensure a comprehensive, transparent, and replicable exploration of the literature, this study applied bibliometric performance analysis and science mapping techniques to explore the state of the art of this topic.

### 2.1. Research strategies

The research strategies applied included a longitudinal analysis of a bibliographic sample, the *Methodi Ordinatio* (Pagani et al., 2023), the PRISMA statement (Page et al., 2021), bibliometric analysis, and science mapping (Aria & Cuccurullo, 2017; Donthu et al., 2021; Mukherjee et al., 2022; van Eck & Waltman, 2010) to answer the following research questions:

**Research Question 1:** What is the current development of M.A. research on digital technologies? RQ1 aims to provide an overview of the scientific production based on bibliometric performance analysis: annual scientific production, journals, and authors.

**Research Question 2:** What are the main characteristics of the conceptual structure of the bibliographic sample on M.A. and digital technologies? RQ2 aims to understand this field knowledge applying science mapping techniques through term co-occurrence analysis.

## 2.2. Sample selection process and workflow

To answer the research questions, this study applied three main stages, as depicted in Figure 1.

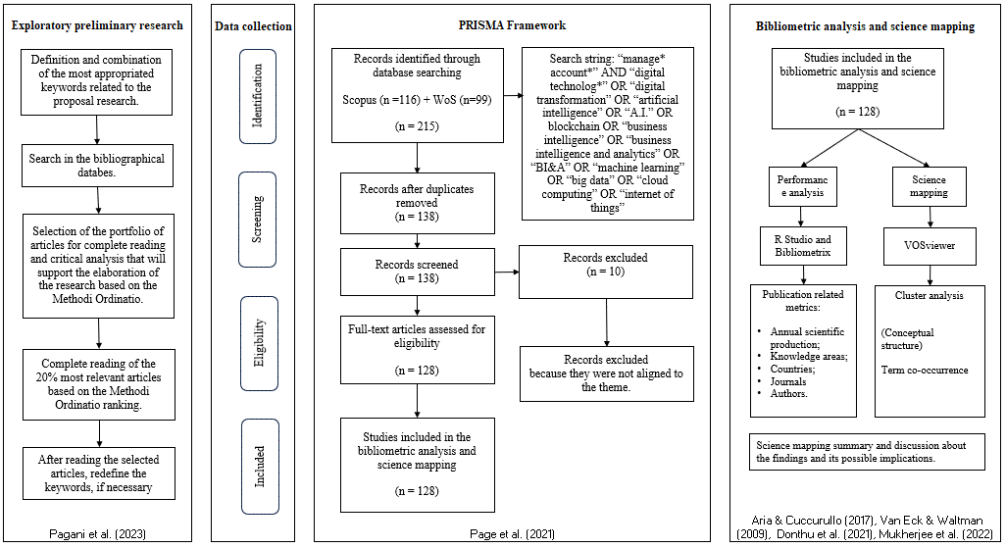


*Figure 1. Scicence mapping workflow. Source: Based on Van Eck & Waltman, (2009), Aria & Cuccurullo (2017), Donthu et al. (2021), Page et al. (2021), Pagani et al. (2023).*

The first phase starts with the exploratory preliminary stage to establish the subject foundation, thereby selecting the most appropriate keywords associated with the research proposal (Pagani et al., 2015; Rikhardsson & Yigitbasioglu, 2018). At this stage, the *Methodi Ordinatio*[1] was applied to systematically select articles for full reading, considering impact factor, year of publication, and number of citations (Pagani et al., 2015). The second phase included PRISMA statement to ensure a systematic search process. The query string and filters led to the retrieval of (116) articles from Scopus and (99) articles[2] from WoS, as shown in Figure 1. The same query string was applied to both databases, and the filters "Article" for document type, and "English" for language. As strategy, the authors decided not to filter by area of knowledge, considering the multidisciplinary nature of the thematic discussions identified in the initial exploratory analysis.

The next step was to export the metadata files in the BibTex file format in both databases and merge them in the RStudio using the Bibliometrix package. In this process, (77) duplicated

[1] *Methodi Ordinatio* is a methodological strategy for selecting, collecting, and ranking a bibliographic portfolio and systematically reading it (Pagani et al., 2015). This methodology aims to select and rank the papers according to their scientific relevance using three criteria in the *InOrdinatio* equation: number of citations, year of publication, and impact factor, or journal metrics (Pagani et al. 2023).

[2] Metadata retrieve reference in Scopus and WoS: February 2024.

registers were removed, resulting in a sample of (138) articles for analysis. Then, after reading all the titles and abstracts, (10) articles were excluded, considering they were not aligned with the theme, resulting in a final sample with (128) articles[3].

Then, bibliometric performance analysis and science mapping were carried out using the Bibliometrix (Aria & Cuccurullo, 2017) and the VOSviewer (van Eck & Waltman, 2010). To execute the bibliometric performance analysis, the RStudio was applied to enable visualization and analysis using the Bibliometrix. The Bibliometrix is an open-source tool R-package for performing bibliometric analyses developed by Aria & Cuccurullo (2017). The Bibliometrix package was applied to visualize information related to the evolution of scientific production, journals, and authors. The science mapping through the cluster analysis of the conceptual structure was performed using the VOSviewer, a free computer program developed by van Eck & Waltman (2010) for bibliometric maps visualization.

## 3. Results

### 3.1. Bibliometric performance analysis (RQ1)

#### *3.1.1. Annual scientific production*

Although advances in digital technologies have been considered the most important forces driving change in M.A. field, it is only recently that their impacts have attracted the attention of academics (Steens et al., 2024). This was observed in this bibliometric analysis, which showed that almost 80% of the articles analyzed were published in the last five years. Figure 2 illustrates the annual scientific production of the (128) articles, which shows this growth in recent years.

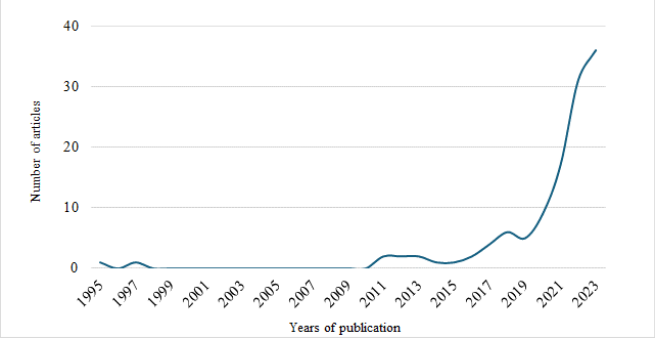


*Figure 2. Annual scientifc production. Source: According to bibliographic data from Scopus and WoS.*

[3] The list of 128 articles that compose the bibliographic database analyzed in this study can be accessed through the following link: https://ciencipca.ipca.pt/handle/11110/2943

The highest annual growth rates occurred in 2021 and 2022, an increase of 89% and 82%, respectively, compared to the previous years. This growth can be explained due to technological advancements (Steens et al., 2024), demand for real-time information, regulatory changes and accounting standard, need for efficiency and cost control, and growing interest in sustainability and social responsibility (Appelbaum et al., 2017; Nielsen, 2022).

### *3.1.2. Journals*

This analysis revealed that the (128) articles were published in (91) different scientific journals. This variety of journals suggests the multidisciplinary perspectives and discussions related to M.A. and digital technologies within this sample. Despite this multidisciplinary degree, most articles were published in accounting, management, and business journals, followed by others specialising in information systems and computational-related fields. Table 1 presents the proportion of such journals, including their impact factor according to the Scimago and the Clarivate metrics. Additionally, to broaden the spectrum of analysis in relation to this other journal evaluation, the respective Academic Journal Guide (AJG) ranking, a specific journal assessment for business and management-related fields, was also provided.

**Table 1. Most relevant journals.** Source: Scopus, WoS, Scimago, Clarivate, and the Chartered Association of Business Schools.

| Sources | 2022 SJR | SJR Quartile | 2022 JIF | JIF Quartile | AJG 2021 | Articles | (%) |
|---|---|---|---|---|---|---|---|
| Journal of Accounting and Organizational Change | 0.4 | Q2 | 1.9 | * | 2 | 7 | 5.5% |
| International Journal of Accounting Information Systems | 1.1 | Q1 | 4.6 | Q3 | 2 | 6 | 4.7% |
| Computational Intelligence and Neuroscience | * | * | * | * | * | 5 | 3.9% |
| Journal of Management Control | 0.7 | Q2 | 3.3 | * | 2 | 4 | 3.1% |
| European Accounting Review | 1.0 | Q1 | 3.3 | Q2 | 3 | 3 | 2.3% |
| Journal of Information Systems | 1.0 | Q1 | 1.9 | Q3 | 1 | 3 | 2.3% |
| Sustainability | 0.6 | Q1 | 3.9 | Q2 | * | 3 | 2.3% |
| Accounting, Auditing and Accountability Journal | 1.7 | Q1 | 4.2 | Q2 | * | 2 | 1.6% |
| Accounting Education | 0.7 | Q1 | 3.2 | * | 2 | 2 | 1.6% |
| Accounting Horizons | 1.0 | Q1 | 2.5 | Q3 | 3 | 2 | 1.6% |

The analysis revealed that the *Journal of Accounting and Organizational Change* published the most articles in this sample (7). Followed by the *International Journal of Accounting Information Systems* (6). These Journals are considered relevant in the accounting field regarding issues associated with integrating accounting and information technology.

### *3.1.3. Authors*

Figure 3 presents the top 20 productive authors on M.A. and digital technologies within this sample. The most productive author in this sample was Anca Vărzaru, with four articles published between 2022-2023, focusing on A.I. under different perspectives, such as cost, sustainability, and ethical issues. The most influential paper was *Assessing Artificial*

*Intelligence Technology Acceptance in Managerial Accounting* (Vărzaru, 2022), which focused in the barriers in adopting A.I. technology in M.A., such as resistance to change, organizational culture, lack of trust, and the cost of technology.

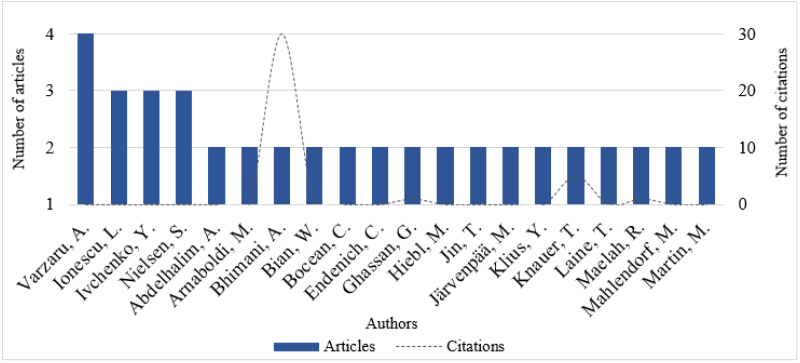


*Figure 3. Most productive authors. Source: According to bibliographic data from Scopus and WoS.*

Then, Luminiţa Ionescu, Yevhen Ivchenko, and Steen Nielsen that developed research related to big data processing techniques and algorithmic decision-making tools. Under the perspective of the number of citations, Alnoor Bhimani was the most cited author in *Digitisation, Big Data and the transformation of accounting information* (Bhimani & Willcocks, 2014).

### 3.2. Science mapping (RQ2)

#### *3.2.1. The conceptual structure*

The conceptual structure was mapped through the text-mining functionality of VOSviewer, which supports creating term maps to visualize the conceptual structure of a field (van Eck & Waltman, 2010), based on the co-occurrence of the most relevant terms within the titles and abstracts of the (128) articles. For this proposal, a full counting method and considering the minimum number of five occurrences of a term were applied in the software. Considering the algorithm default choice parameters, the 152 most relevant terms were initially selected, resulting in a sample of 71 most relevant terms after four cleaning stages to exclude terms not directly related to the topic. These terms were grouped into four clusters. Figure 4 illustrates these four clusters, revealing the four main research streams within these studies.

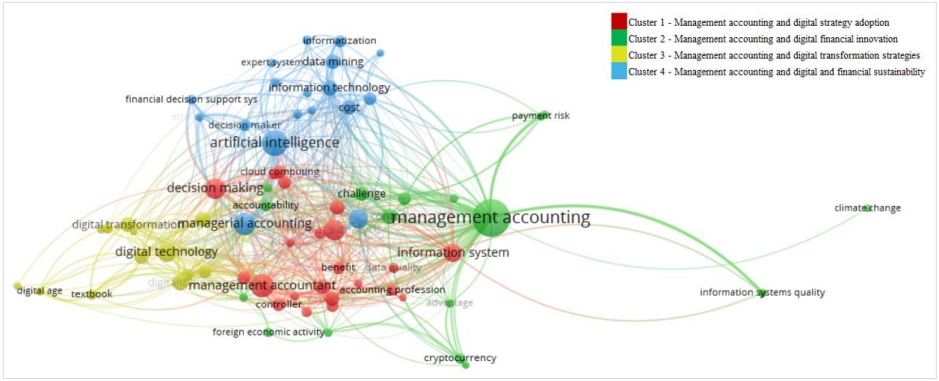


*Figure 4. Term map on management accounting and digital technologies.* Source: Elaborated using VOSviewer software.

Considering this analysis perspective, Table 2 presents the most relevant terms related to each cluster and their main research lines: digital strategy adoption, digital financial innovation, digital transformation strategies, and digital and financial sustainability.

**Table 2. Most relevant terms in each cluster.** Source: Based on Scopus and WoS, using VOSviewer.

| Cluster | Cluster name | Most relevant terms |
|---|---|---|
| Cluster 1 - Red (22 terms) | M.A. and digital strategy adoption | Management accountant; decision making; big data analytic; information system; management accounting practice; capability; business analytic; cloud computing; controller; benefit. |
| Cluster 2 - Green (18 terms) | M.A. and digital financial innovation | Management accounting; control; challenge; machine learning; accountability; cryptocurrency; circular economy; foreign economic activity; payment risk; stakeholder. |
| Cluster 3 - Yellow (18 terms) | M.A. and digital transformation strategies | Artificial intelligence; blockchain; information technology; cost; data mining; management accounting system; informatization; decision maker; big data technology; competitive advantage. |
| Cluster 4 - Blue (13 terms) | M.A. and digital and financial sustainability | Digital technology; digitalization; financial accounting; sustainability; digital transformation; requirement; forecasting; digital age; economic crisis; healthcare organization. |

In cluster 1 (M.A. and digital strategy adoption), the central discussion is related to the impact and benefits of adopting digital technologies, such as big data analytics, BI systems, and cloud computing, including new competencies requirements, and responsibilities. In summary, the focus of discussions in articles associated with this cluster revolves skills and capabilities necessary to extract the maximum benefit from digital technologies to subsidize the decision-making process. Some subtopics discussed in this cluster includes data quality and security.

In cluster 2 (M.A. and digital financial innovation), most discussions are related mainly to the potential and challenges of technological innovation tools in M.A., with emphasis on machine learning. Beyond expanding the efficiency and effectiveness in data evaluation processes, studies highlight the advantage of using M.L. in predictive analytics, improving capabilities for reporting and decision-making. Additionally, discussions embrace the relevance of control

mechanisms to provide accountability and effectiveness in management control, including payment risk reduction, especially within the blockchain and cryptocurrency discussions.

Cluster 3 (M.A. and digital transformation strategies) discusses mostly the importance of digital transformation strategies, emphasising changing paradigms and adapting processes due to emerging technologies, such as A.I. and blockchain. The central theme discusses how A.I. solutions can be strategically applied to create value, reduce costs, and improve competitive advantage through its potential to expand the efficiency and accuracy of accounting practices and decision-making. Blockchain technology is frequently discussed within this cluster, with studies highlighting its potential to make registration processes more transparent, safe, and efficient, ensuring control and accountability in transactions. An example of a secondary theme refers to applying this technology in the government sector and ethical issues related to A.I.

In cluster 4 (M.A. and digital and financial sustainability), most terms are associated with theoretical aspects of M.A. digitalization. Such discussions also highlight the requirements for its implementation, including the need for adaptations in financial accounting, moving it from the historical perspective practices to a more predictive perspective based on forecasting analysis to provide financial sustainability, especially during economic crises. The term "sustainability" was also applied in some studies on improving accounting information systems through new digital technologies to promote environmental sustainability practices.

## 5. Conclusion

This study applied science mapping techniques to explore the scientific production of M.A. and digital technologies based on a sample of (128) articles indexed in Scopus and WoS. The analysis revealed how multidisciplinary the approaches of this sample, ranging from the practical application of digital tools to issues regarding security, data quality, and the need for constant innovation and the development of skills necessary for their use. The most discussed technologies include business intelligence and analytics tools, A.I., and blockchain under different perspectives. According to the literature, the strategic adoption of digital technologies in M.A. practices produces several benefits, such as efficiency and accuracy of the information produced, supporting decision-making with more precise and real-time insights, transparency, security, and enabling better tracking and analysis of operational and financial performance.

Regarding RQ1, the analysis revealed that almost 80% of the articles analyzed were published in the last five years, due to technological advancements, demand for real-time information, regulatory changes and accounting standards, need for efficiency and cost control, and the growing interest in sustainability and social responsibility issues. The Journals that publish the most articles were the *Journal of Accounting and Organizational Change* (7) and the *International Journal of Accounting Information Systems* (6). The most productive author was Anca Vărzaru, focusing on investigations on A.I. (cost, sustainability, and ethical issues).

In response to RQ2, the science mapping revealed that the conceptual structure of this set of articles may be grouped into four main research streams: digital strategy adoption, digital financial innovation, digital transformation strategies, and digital and financial sustainability. Based on the gaps identified in this analysis, some themes are suggested as future research. The first topic suggestion concerns how digital technologies based on A.I. and blockchain can be applied in the government sector to improve financial reporting, increase the transparency of governmental management, and encourage social participation, for example, through participatory budgeting and social control mechanisms. Second, regarding SMEs, studies should research how A.I and blockchain could be applied to expand access to credit and assist managers easily and intuitively in managing financial resources. Third, it is necessary to understand how all these technological advances and A.I, combined with advances in management accounting methods, can increasingly contribute to improve social and environmental sustainability. Fourth, and no less important, studies should explore how accounting courses in universities should be adapted, emphasising statistical skills for big data analysis techniques, to encourage the minimum skills to management accountants use the potential of digital technologies, including AI and blockchain, more accurately.

This study has some limitations regarding research strategies and methods applied. Considering this, future research using other query string strategies, other bibliographic databases, and different science mapping techniques may offer additional insights.

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