

THE ROLE OF DIGITALIZATION IN BUSINESS MANAGEMENT PRACTICES: A VOSVIEWER ANALYSIS

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ABSTRACT

The shift in business management has been mainly attributed to digitalization, which has improved operational efficiency, cut costs, and promoted sustainable development. This study highlights major themes and trends in the impact of digitalization on management practices by a thorough bibliometric analysis of recent literature using VOSviewer. The analysis identifies five main clusters focusing on digital transformation in supply chains, integration of digital technology within firms, strategies for achieving competitive advantage, adoption of information technology, and leveraging information and social media. The findings underline the crucial role of digital technologies for encouraging innovation, enhancing output and attaining sustainability in business environments. By exploring the interconnectedness of various keywords, this research provides valuable insights into the integration of digitalization in business strategies and its implications for long-term success. Ultimately, this study emphasizes the necessity of embracing digital transformation to thrive in the competitive and rapidly evolving environment of contemporary business.

KEYWORDS: *business management, competitive advantage, digitalization, innovation, sustainability.*

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1. INTRODUCTION

Digitalization has become essential for business management, significantly impacting companies by improving operations and productivity. Due to the substantial effect that digital technologies have on organizational transformation, the human resource sector has begun to evolve much more rapidly. Digitalization is not just a technological change. It represents a profound shift in how companies operate, collaborate, and create value (Vial et al., 2019). Additionally, digital transformation underscores the role of digital technologies in creating new products and services, facilitating long-term innovation and sustainable development (Müller et al., 2018).

Sustainability is a crucial component of digitalization. Research shows that digitalization creates more environmentally friendly and sustainable business environments (Stock et al., 2018). To minimize both resource consumption and carbon emissions, sustainability objectives must also be included in digitalization strategies (Huang et al., 2024). Digitalization also involves advanced risks, such as data

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management and cybersecurity. Kreutzer (2019) highlighted the importance of cybersecurity in protecting personal data, while Culot et al. (2019) warned that cyberattacks related to digital technologies are extremely dangerous and increasingly common.

According to Wang et al. (2023), digital technologies play an important role in enhancing performance, innovation, and sustainability in business management practices. To emphasize the impact and importance of digitalization in this field, the VOSviewer program provides a complex bibliometric analysis. VOSviewer, a powerful visualization tool, enables the creation and interpretation of bibliometric maps based on bibliographic data from academic literature sources.

This study examines the keywords from recent literature on digitalization and management practices using the VOSviewer application. This analysis helps identify the main themes and trends in current research. It also provides a clear picture of how digitalization is integrated into business strategies and operations. Furthermore, the analysis highlights how different ideas are interconnected and how they contribute to a deeper understanding of how digitalization affects organizational performance.

Digitalization is an essential element in changing the way business management operates. Studies indicate that implementing digital technologies not only improves current performance but also creates opportunities for sustainable long-term development and innovation. By using VOSviewer, the analysis offers an overview of the current state of research in this field and underscores the importance of incorporating digitalization into business strategies to achieve long-term success.

2. LITERATURE REVIEW

In recent years, increased attention has been given to digitalization in the modern business environment. For this reason, several authors have provided an overview of the latest findings and trends in this field (Filippov et al., 2023; Turienzo et al., 2024). The process of digital transformation, supported by digital technologies, involves major changes within an organization. Calderon-Monge and Ribeiro-Soriano (2024) have studied the effects of digitalization on business environments and recommend that technologies will increase firms' efficiency, allowing them to respond more quickly and effectively to market changes. Implementing new principles is necessary to keep pace with digitalization. Hermann et al. (2020) examine the fundamental concepts of Industry 4.0 and how they influence traditional supply chains through the integration of advanced Internet of Things (IoT) technologies and data analysis. Dalenogare et al. (2018) investigate the adoption of these principles in different industries, highlighting the advantages and disadvantages for the business environment. These studies demonstrate how digitalization can streamline various logistical processes, reduce company expenses, and improve operational efficiency.

In the digital era, organizational performance is another major subject of interest. Digital technologies influence firms' performance and emphasize that technology implementation is linked to significant improvements in financial and operational performance (Yoo et al., 2012). In addition, Nambisan et al. (2019) mark the relationship between digitalization and innovation, arguing that open and collaborative innovation processes are facilitated by digital technologies for creating new goods and services. These findings highlight that digitalization not only improves current performance but also paves the way for long-term development and innovation. Concerning digital transformation, another essential aspect is sustainability. They also emphasize the importance of including sustainability goals in digitalization strategies. These studies indicate that digitalization not only increases economic efficiency, but it also opens a new way for achieving social and environmental responsibility goals. Data management and cybersecurity are two other important elements of digitalization. Cremer et al.

(2022) have outlined the importance of cybersecurity for protecting sensitive data, examining various issues and finding solutions related to proper data management in the digital age. In contrast, Culot et al. (2019) examine the effects of digitalization on cybersecurity and argue that, although digital technologies offer multiple benefits, they also pose a high risk of cyberattacks. To cope with rapid innovation, organizational employees are required to acquire advanced digital skills (Fonseca & Azevedo, 2020). Moreover, Brynjolfsson et al. (2018) present how digitalization affects the labor market, emphasizing the importance of adapting requirements to new needs. Thus, digitalization is a crucial element in transforming business management practices.

3. DATA AND RESEARCH METHODOLOGY

Publications on the topic of enhancing business management practices by adopting digitalization have multiplied in the last years. Since this field of study needs to be consolidated, an in-depth bibliometric analysis gives an overview of the current level of research and knowledge. VOSviewer software, a tool for generating and examining bibliometric maps, is used to create network data-based maps of keywords derived from co-occurrence data or of researchers, research institutions, scientific journals or countries by leveraging co-citation data and to examine the maps displayed in three different ways of viewing: network, overlay and density (van Eck & Waltman, 2010). This research seeks to emphasize the influence and importance of digitalization in business management practices based on specific keywords related to digitalization and management approaches in the business area.

The data used for creating the bibliometric maps was extracted from the Web of Science Core Collection, one of the widely used databases for academic citation indexes worldwide (Guo et al., 2019). When the study's topic field was searched for keywords linked to digitalization in business management practices, the findings revealed that the first publication that includes terms related to this topic first appeared in 2000 (Chivers, 2020). 3 stages were performed in this analysis.

Firstly, a total of 1570 papers that were relevant to the aim of this study were selected based on relevant keywords related to digitalization (digitization, digital transformation, digital innovation, digital technologies, digital integration, digital evolution, digital conversion, digital upgrade) and business management (management practices, organizational management, management strategies, operational management, corporate management, leadership practices) using "OR" and "AND" as Boolean operators. Then, there were performed 2 refinements; the papers had to be published between 2015-2024 and four primary documents kinds were selected, as follows: articles (n = 1125, 70.98%), proceeding papers (n = 325, 20.5%), reviews (n = 122, 7.7%) and book chapters (n = 13, 0.82%).

The second stage consisted of exporting the database in plain text file format to VOSviewer. Finally, in the third step, there were selected the following options: co-occurrence as type of analysis, all keywords as unit of analysis and full counting method. Also, the minimum number of occurrences of a keyword was set to be 20 to display more accurate maps.

4. VOSVIEWER RESEARCH RESULTS

Item descriptions are displayed in the network visualization, accompanied by a circle. This view consists of several linked points (nodes or keywords) grouped in clusters and the connections, also known as links, that connect them. It allows to get important insights from massive amounts of bibliometric data.

Table 1. Red cluster occurrences and links assessment

Keyword	Occurrences	Links	Total link strength
artificial intelligence	47	49	121
barriers	29	48	125
bibliometric analysis	25	43	106
big data	90	64	364
big data analytics	31	52	157
blockchain	28	43	110
challenges	73	60	304
circular economy	21	38	87
design	39	44	115
digital technologies	52	55	157
digitalization	200	64	537
framework	76	59	287
future	61	60	241
implementation	49	52	208
Industry 4.0	89	55	308
management practices	39	54	172
supply chain	31	50	154
supply chain management	23	52	111
sustainability	88	58	335
sustainable development	25	45	99
technologies	37	50	164

Source: VOSviewer output

The green cluster focuses on the integration of digital technology and innovation within firms, highlighting the impact of performance and strategy. This cluster underscores the importance of capabilities, knowledge, and business model innovation in driving digital transformation. It explores how firms leverage digital capabilities and knowledge to innovate business models, enhance performance and implement effective governance structures.

Table 2. Green cluster occurrences and links assessment

Keyword	Occurrences	Links	Total link strength
Analytics	29	46	134
Business model innovation	23	45	99
Capabilities	47	56	227
Digital innovation	25	42	88
Digital technology	27	41	87
digitization	50	47	138
firms	28	45	137
governance	23	40	87
knowledge	58	52	199
performance	52	64	599
perspective	43	57	213
servitization	20	35	97
strategy	56	57	259
systems	56	55	233

Source: VOSviewer output

The focus on the above-mentioned themes is supported by the strongest correlations found between the keywords performance (link strength = 599), strategy (link strength = 259), systems (link strength = 233) and capabilities (link strength = 227) (Table 2).

The third cluster (blue) focuses on digital transformation and innovation, as well as on strategies for achieving competitive advantage. The keywords in this cluster reflect a comprehensive approach to integrating digital technologies, developing innovative business models and enhancing firm performance through strategic initiatives and effective governance. The strongest correlations identified within this cluster are between the keywords digital transformation (total link strength = 843), innovation (total link strength = 828), impact (total link strength = 706), and dynamic capabilities (total link strength = 315). These connections underscore the critical role of digital transformation and innovation in achieving a high level of business performance (Table 3).

Table 3. Blue cluster occurrences and links assessment

Keyword	Occurrences	Links	Total link strength
antecedents	21	37	83
capability	20	43	105
competitive advantage	27	40	117
digital transformation	294	64	843
dynamic capabilities	71	56	315
entrepreneurship	28	39	103
firm performance	51	53	231
impact	178	64	706
innovation	224	64	828
leadership	42	48	146
mediating role	28	47	129
resource-based view	22	35	89

Source: VOSviewer output

Table 4 shows the keywords for the yellow cluster. The keywords in this cluster explores the role of adoption the information technology within businesses in the context of digital transformation, including the impact of the COVID-19 pandemic. The strongest correlations identified within this cluster are between the keywords management (total link strength = 665), model (total link strength = 308), information technology (total link strength = 288) and business (total link strength = 266). These connections underscore the critical role of management and structured models in successfully adopting and integrating digital technologies within organizations, particularly in response to the challenges posed by COVID-19.

Table 4. Yellow cluster occurrences and links assessment

Keyword	Occurrences	Links	Total link strength
adoption	62	59	240
business	65	58	266
COVID-19	72	55	211
determinants	26	48	108
information-technology	65	54	288
integration	30	46	130
management	197	63	665
model	104	62	308
organizations	26	40	94
user acceptance	21	33	85

Source: VOSviewer output

5. CONCLUSIONS

Digitalization has proven to be a critical element in transforming business management practices. This study underscores the importance of digital technologies in enhancing operational performance, reducing costs and fostering sustainable development. By analysing recent literature using VOSviewer, there were identified five primary clusters that highlight key themes and trends in this field. The internet and information technology facilitate digital transformation. The significance of technology, information, and transformation in contemporary business environments is highlighted by the necessity of managing knowledge and social media effectively to leverage digital initiatives within firms. This illustrates how innovation and strategic alignment may be promoted by digital tools and platforms.

Digital transformation within supply chains and its associated challenges are crucial for optimizing operations and achieving sustainability. In this process, the integration of big data analytics and Internet of Things with Industry 4.0 principles is essential. This significantly advances business practices by enabling more precise and data-driven decision-making, streamlining operations and driving technological advancement. Particularly, Industry 4.0 technologies, such as big data analytics and Internet of Things, allow companies to predict market trends and consumer behaviors, as well as to enable real-time data collection and analysis. This combined power of digital tools not only makes processes more efficient but also strengthens the capacity of businesses to adapt quickly to market changes, resulting in increased productivity and a stronger competitive edge. The demand for digital technology has increased because of the COVID-19 pandemic, which has highlighted the importance of management and organized approaches in efficiently addressing new difficulties.

While digitalization offers many advantages, it is important to recognize the potential challenges and limitations that come with digital transformation. The implementation of advanced technologies can involve significant costs such as acquisition of necessary equipment (hardware) and software, employees' training for new system integration. As organizations increasingly rely on complex digital solutions, the risks associated with cybersecurity and data protection increase. These vulnerabilities, namely security gaps, can lead to cyberattacks, confidentiality breaches and other incidents that may severely impact operations and reputation. Moreover, employee and management reluctance to change presents additional challenges as does the integration of new technologies with current systems. A more balanced perspective on digital transformation within businesses practices that emphasizes both the potential opportunities and the risks involved can be achieved by addressing these barriers.

This study emphasizes the importance of digitalization for modern business management. Incorporating cutting-edge digital technologies not only improves performance now but also opens the door for future growth and innovation. Embracing digital transformation is critical for achieving sustainable business practices and addressing complex challenges in today's rapidly evolving business environment. Future research should continue to explore these themes to support data-driven decision-making and the effective implementation of digital strategies, as well as how challenges associated with advanced technologies implementation can be effectively managed to facilitate a smoother and more secure transition to digital transformation.

REFERENCES

- Brynjolfsson, E., Mitchell, T., Rock, D. (2018). What can machines learn and what does it mean for occupations and the economy? *AEA papers and proceedings*, 108, 43–47.
<https://doi.org/10.1257/pandp.20181019>

- Calderon-Monge, E., & Ribeiro-Soriano, D. (2024). The role of digitalization in business and management: a systematic literature review. *Review of Managerial Science*, 18, 449–491. <https://doi.org/10.1007/s11846-023-00647-8>
- Chivers, L. C. (2000). Electronic document supply: experience at the British Library. *Interlending & Document Supply*, 28(1), 27–37. <https://doi.org/10.1108/02641610010314867>
- Cremer, F., Sheehan, B., Fortmann, M., Kia, A. N., Mullins, M., Murphy, F., & Materne, S. (2022). Cyber risk and cybersecurity: a systematic review of data availability. *The Geneva Papers on Risk and Insurance Issues and Practice*, 47(3), 698–736. <https://doi.org/10.1057/s41288-022-00266-6>
- Culot, G., Fattori, F., Podrecca, M., & Sartor, M. (2019). Addressing Industry 4.0 Cybersecurity Challenges. *IEEE Engineering Management Review*, 47(3), 79–86. <https://doi.org/10.1109/EMR.2019.2927559>
- Dalenogare, L. S., Benitez, G. B., Ayala, N. F., & Frank, A. G. (2018). The expected contribution of Industry 4.0 technologies for industrial performance. *International Journal of Production Economics*, 204, 383–394. <https://doi.org/10.1016/j.ijpe.2018.08.019>
- Filippov, V., Kyfyak, V., Tanashchuk, K., Krylov, D., Mandra, V., & Skomorovskyi, A. (2023). Adaptive Management of the Innovative Development of Enterprises in the Conditions of the National Economy Digitalization. *Management Theory and Studies for Rural Business and Infrastructure Development*, 45(2), 105–112. <https://doi.org/10.15544/mts.2023.11>
- Fonseca, L. M., & Azevedo, A. L. (2020). COVID-19: outcomes for Global Supply Chains. *Management & Marketing*, 15(s1), 424–438. <https://doi.org/10.2478/mmcks-2020-0025>
- Guo, Y.-M., Huang, Z.-L., Guo, J., Li, H., Guo, X.-R., & Nkeli, M. J. (2019). Bibliometric analysis on smart cities research. *Sustainability*, 11(13), 3606. <https://doi.org/10.3390/su11133606>
- Hermann, M., Bücker, I., & Otto, B. (2020). Industrie 4.0 process transformation: findings from a case study in automotive logistics. *Journal of Manufacturing Technology Management*, 31(5), 935–953. <https://doi.org/10.1108/jmtm-08-2018-0274>
- Huang, J., Chen, X., & Zhao, X. (2024). How Digital Technology Reduces Carbon Emissions: From the Perspective of Green Innovation, Industry Upgrading, and Energy Transition. *Journal of Knowledge Economy*. <https://doi.org/10.1007/s13132-024-01895-z>
- Kreutzer, R. T. (2019). *Toolbox for Marketing and Management: Creative Concepts, Forecasting Methods, and Analytical Instruments*. Springer Cham.
- Müller, J. M., Kiel, D., & Voigt, K. I. (2018). What drives the implementation of Industry 4.0? The role of opportunities and challenges in the context of sustainability. *Sustainability*, 10(1), 247. <https://doi.org/10.3390/su10010247>
- Nambisan, S., Wright, M., & Feldman, M. (2019). The digital transformation of innovation and entrepreneurship: Progress, challenges and key themes. *Research policy*, 48(8), 103773. <https://doi.org/10.1016/j.respol.2019.03.018>
- Stock, T., Obenaus, M., Kunz, S., & Kohl, H. (2018). Industry 4.0 as enabler for a sustainable development: A qualitative assessment of its ecological and social potential. *Process Safety and Environmental Protection*, 118, 254–267. <https://doi.org/10.1016/j.psep.2018.06.026>

- Turienzo, J., Blanco, A., F. Lampón, J., & Muñoz-Dueñas, M. del P. (2024). Logistics business model evolution: digital platforms and connected and autonomous vehicles as disruptors. *Review of Managerial Science*, 18, 2483–2506. <https://doi.org/10.1007/s11846-023-00679-0>
- Wang, Z., Lin, S., Chen, Y., Lyulyov, O., & Pimonenko, T. (2023). Digitalization Effect on Business Performance: Role of Business Model Innovation. *Sustainability*, 15, 9020. <https://doi.org/10.3390/su15119020>
- van Eck, N. J., & Waltman, L. (2015). *VOSviewer Manual*. Retrieved July 8, 2024, from https://www.vosviewer.com/documentation/Manual_VOSviewer_1.6.2.pdf
- van Eck, N. J., & Waltman, L. (2010). Software survey: VOSviewer, a computer program for bibliometric mapping. *Scientometrics*, 84(2), 523–538. <https://doi.org/10.1007/s11192-009-0146-3>
- van Eck, N. J., & Waltman, L. (2023). *VOSviewer Manual*. Retrieved July 9, 2024, from https://www.vosviewer.com/documentation/Manual_VOSviewer_1.6.19.pdf
- Vial, J., Vogel, R., Bony, S., Stevens, B., Winker, D. M., Cai, X., Hohenegger, C., Naumann, A. K., & Brogniez, H. (2019). A new look at the daily cycle of trade Wind Cumuli. *Journal of Advances in Modeling Earth Systems*, 11(10), 3148–3166. <https://doi.org/10.1029/2019ms001746>
- Yoo, Y., Boland, R. J., Lyytinen, K., & Majchrzak, A. (2012). Organizing for innovation in the digitized world. *Organization Science*, 23(5), 1398–1408. <https://doi.org/10.1287/orsc.1120.0771>
- Zhao, R., Chen, B. (2014). Applying author co-citation analysis to user interaction analysis: a case study on instant messaging groups. *Scientometrics*, 101(2), 985–997. <https://doi.org/10.1007/s11192-014-1314-7>