XXVII engema

ISSN: 2359-1048
Dezembro 2025

DIGITAL-SUSTAINABLE SUPPLY CHAINS: A RESOURCE-BASED VIEW FRAMEWORK FOR COMPETITIVE ADVANTAGE

JAILSON DOS SANTOS SILVA
UNIVERSIDADE FEDERAL DE SANTA CATARINA - UFSC

JOÃO PAULO MAXIMIANO ALMEIDA
UNIVERSIDADE FEDERAL DE SANTA CATARINA - UFSC

MARINA BOUZON

NEIMAR FOLLMANN

JAMAL EL BAZ

Introdução
Digital transformation and sustainability are increasingly central in modern supply chains. They involve the strategic use of technology to promote environmental, economic, and social goals (Triple Bottom Line). This integration offers competitive advantages and aligns with stakeholder demands. However, effectively combining these constructs poses significant challenges, including resource consumption, limited support, and strategic gaps.

Problema de Pesquisa e Objetivo
The research gap lies in the lack of integrated studies that simultaneously address digital transformation, sustainability, and supply chains through a strategic theoretical framework. This article fills that gap by applying the Resource-Based View (RBV) to explore how supply chains can strategically leverage technological and managerial resources to achieve competitive advantage while enhancing sustainable performance.

Fundamentação Teórica
This study adopts the RBV as a theoretical basis, given its widespread use and emphasis on internal resources and capabilities. RBV explains competitive advantage through the strategic use of tangible and intangible assets, categorized as physical, human, and organizational capital. However, for resources to create advantage, they must meet the VRIO criteria: valuable, rare, inimitable, and organizationally aligned. Despite critiques of its internal focus, RBV remains relevant for identifying key digital resources that enhance supply chain performance.

Metodologia
Regarding methodology, a Systematic Literature Review (SLR) was conducted, adopting PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) as a tool for structuring the Bibliographic Portfolio (BP). Clear selection and eligibility criteria were defined as a research protocol to ensure the study's replicability, resulting in a final BP with 83 articles.

Análise e Discussão dos Resultados
The analysis showed that digital technologies, such as IoT, Big Data, AI, and Blockchain, support sustainable practices like Circular Economy, ESG, and green servitization, generating competitive advantages across the Triple Bottom Line. The framework proposed categorizes these technologies and practices as tangible or intangible resources, aligning with RBV principles. While economic and environmental benefits are well explored, the study highlights a persistent gap in leveraging social sustainability as a competitive advantage.

Considerações Finais
The study concludes that integrating both constructs into supply chains can drive competitive advantages. However, it also recognizes its theoretical nature and calls for empirical validation. It highlights the need for future research to explore the influence of contextual factors like culture, regulation, and institutions, ensuring a more robust and applicable understanding of how digital and sustainable strategies can be effectively integrated within global supply chains.

Referências
Barney, J. B. (1991). Firm Resources and Sustained Competitive Advantage. Journal of Management, 17(1), 99–120. Caiado, R. G. G., Scavarda, L. F., Azevedo, B. D., Nascimento, D. L. de M., & Quelhas, O. L. G. (2022). Challenges and Benefits of Sustainable Industry 4.0 for Operations and Supply Chain Management—A Framework Headed toward the 2030 Agenda. Sustainability (Switzerland), 14(2). https://doi.org/10.3390/su14020830 Cricelli, L., & Strazzullo, S. (2021). The economic aspect of digital sustainability: A systematic review. Sustainability (Switzerland), 13(15).

Palavras Chave
Digitalization, Triple Bottom Line, RBV

Agradecimento a orgão de fomento
This study was financed in part by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) and by the Fundação de Amparo à Pesquisa e Inovação do Estado de Santa Catarina (FAPESC).

DIGITAL-SUSTAINABLE SUPPLY CHAINS: A RESOURCE-BASED VIEW FRAMEWORK FOR COMPETITIVE ADVANTAGE

1 INTRODUCTION

Digital Transformation and Sustainability in supply chains emerge as prominent topics in the contemporary organizational context, altering how companies manage their operations (KANKAM-KWARTENG; DONKOR; FORKUOH, 2022; MENCHINI et al., 2022; TSOLAKIS et al., 2023). Their combination refers to the strategic and synergistic use of technologies and sustainable practices in various sectors of the economy. In practical terms, this implies using technological innovations to promote environmental, economic, and social sustainability – Triple Bottom Line (TBL) (DESPEISSE et al., 2022; LI et al., 2023).

Such integration provides competitive advantages, reduces adverse environmental impacts, and meets the growing demands of stakeholders for transparency and corporate social responsibility (MATTHESS et al., 2022; WIEGAND; WYNN, 2023). Its benefits are noted through energy and resource efficiency (BEIER et al., 2022; MOGHRABI et al., 2023), proper waste management (TREVISAN; FORMENTINI, 2023; TSUI et al., 2023), and increased transparency and engagement (MUNIR et al., 2022; SINGH; MAHESWARAN, 2023), among many others.

However, applying these concepts in practice and synergistically is not trivial. Supply chain managers face many challenges when balancing digital efficiency's imperatives with sustainability principles, such as high energy and natural resource consumption, lack of governmental support, organizational vision and strategy, lack of planning and technical knowledge, and others (CAIADO et al., 2022). Rapid technological obsolescence and the complexities and uncertainties inherent in supply chain operations compound these challenges (GHALEB et al., 2021).

From another perspective, Digital Transformation will not always equate to environmental benefits. There is a paradox between these constructs: while digitalization can offer solutions to environmental degradation, it can also be highly detrimental through high energy consumption and waste from the disposal of technological equipment (DESPEISSE et al., 2022; SARKIS; KOUHIZADEH; ZHU, 2021).

Numerous review articles on the interfaces between technology and environmental issues can be found in the literature. However, such works either lack depth in theoretical exploration (TAVARES-LEHMANN; VARUM, 2021) or have a unilateral focus, ranging from a specific technology like blockchain (PALIWAL; CHANDRA; SHARMA, 2020; WU et al., 2022), a particular practice such as Lean and Green (DESPEISSE et al., 2022), or even focusing on a single dimension of sustainability, such as economic (CRICELLI; STRAZZULLO, 2021) or environmental (CWIKLICKI; WOJNAROWSKA, 2020; DAYIOĞLU; TÜRKER, 2021), thereby lacking a holistic view for integrating these themes.

Thus, the distinctive feature of this article lies in addressing the three thematic axes in an integrated manner (digital transformation, sustainability, and supply chains) through the theoretical lens of the Resource-based View (RBV) as a strategy for obtaining competitive advantage. This approach is well-established and vital for understanding an organization's competitive mechanisms. Its usage is highlighted in numerous studies (HERVANI et al., 2022; KUMAR et al., 2024; NUDURUPATI et al., 2022; SARFRAZ et al., 2023); however, most do not employ it as an analytical unit in proposing theoretical models.

As these issues unfold, the following Research Questions (RQs) arise, which this study aims to address:

- RQ1 – What are the research trends and challenges regarding integrating digitalization and sustainability in supply chains?

- RQ2 - How can supply chains leverage technological and managerial resources to generate competitive advantages while promoting sustainable performance?
- RQ3 – What are the prospects for future research on the topic?

To address these inquiries, this study adopts the Systematic Literature Review method to explore how these areas are related and how their combination can leverage the organization's performance. Additionally, this article proposes a framework to explain the competitive advantage of supply chains through digitalization and sustainability, grounded in the RBV.

This article is structured into five sections. Section 2 presents the theoretical background of this study, while Section 3 outlines the methodological procedures. Finally, Sections 4 and 5 report the findings of this investigation and its conclusions, respectively.

2 THEORETICAL BACKGROUND

Regarding the theories commonly used in supply chain practices when evaluating digitalization and sustainability attributes, Schilling and Seuring (2023) highlight the following theoretical foundations: Resource-Based View Theory, Dynamic Capability Theory, Information Processing Theory, Institutional Theory, Practice-Based View Theory, Stakeholder Theory, and Transaction Cost Theory. Among these possibilities, this study adopts RBV theory as its theoretical basis for two reasons: (i) due to its widespread adoption and (ii) its focus on both tangible and intangible resources and supply chain capabilities.

This approach analyzes companies' competitive advantage through the conscious and optimized use of their internal resources. It provides a modern explanation for the heterogeneity in firm performance, in contrast to traditional paradigms such as the structure-conduct-performance (SCP) paradigm (VALLANDRO; TREZ, 2013).

According to Barney (1991), resources include all assets, capabilities, and knowledge that enhance a company's efficiency. These can be tangible (e.g., equipment) or intangible (e.g., brand), and are grouped into physical, human, and organizational capital. To generate a competitive advantage, resources must meet the VRIO criteria: be valuable, rare, inimitable, and organizationally aligned.

Despite criticism of RBV theory for focusing on internal resources while neglecting external factors such as demand (LACAZE; FERREIRA; SANTOS, 2024), authors like Salamah et al. (2023) emphasize the relevance of this approach in identifying digital resources and capabilities that most contribute to competitive advantage and, subsequently, improved supply chain performance.

3 MATERIALS AND METHODS

The Systematic Literature Review (SLR) was adopted as the research method. SLR involves the systematic exploration and analysis of previously published knowledge to ensure the replicability of the research and reduce the bias of subjectivity commonly associated with the method (PRODANOV; FREITAS, 2013; SEURING; GOLD, 2012). For this purpose, this article adopted the six steps for conducting an SLR outlined by Sauer and Seuring (2023): defining the research questions; specifying inclusion and exclusion criteria; defining search engines; selecting literature articles; synthesizing the literature; and reporting the results. Table 1 presents the Research Protocol used in this study.

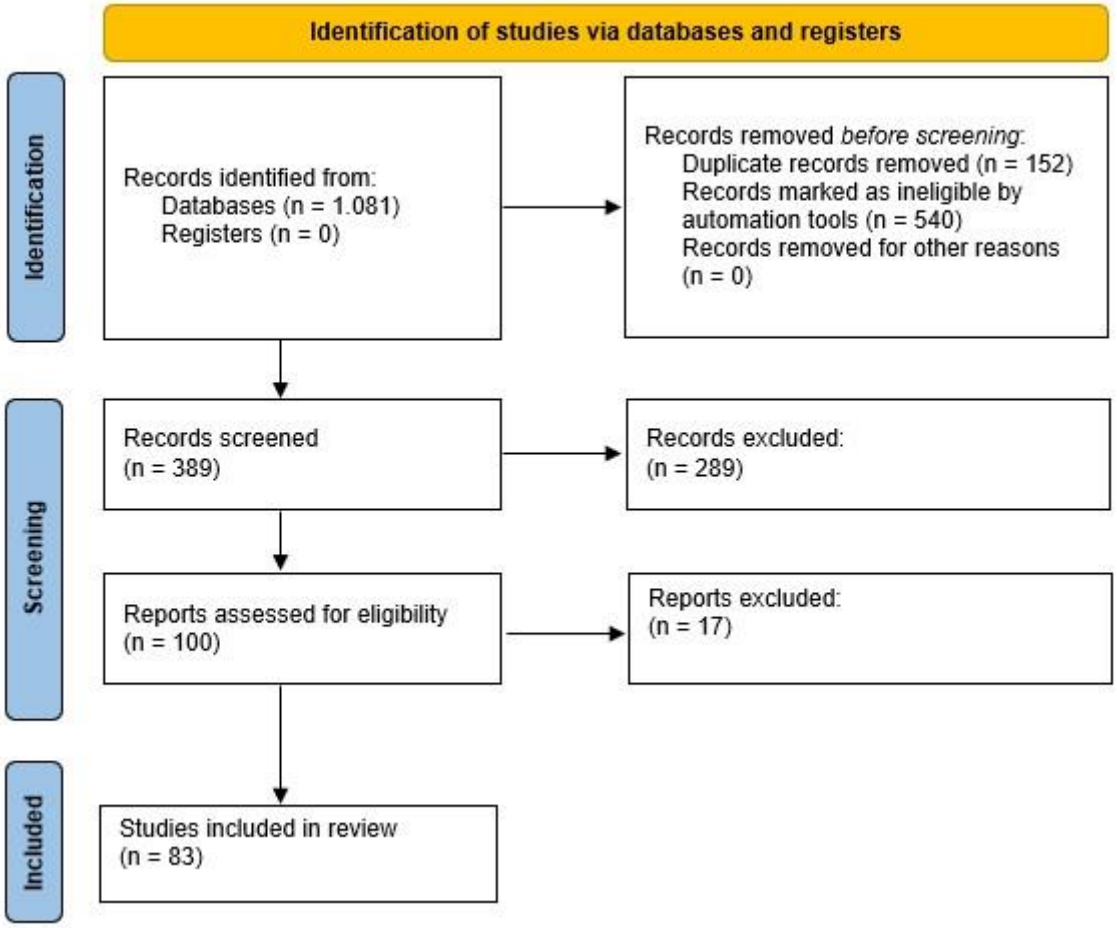
Table 1 - Research Protocol

Indexing databases	Scopus and Web of Science (WoS)
Time frame	2013 - 2024
Thematic Axes	Thematic Axis 1: Digital Transformation Thematic Axis 2: Sustainability Thematic Axis 3: Supply Chain
Searching String	(“digital transformation” OR digitalization OR digitalisation) AND (sustainability OR sustainable) AND (“supply chain”)
Review Strategy	Configurative
Initial Filters	- Only documents of type "Articles" and "Reviews"; - Only documents in English and Portuguese.
Eligibility Criteria	Number of citations
Evaluation Criteria	Inclusion: - Articles discussing digitalization and sustainability in an integrated aspect within the context of supply chains. Exclusion: - Articles that only list keywords as quoted expressions; - Articles that do not meet the scope of this research, i.e., those that did not fully address the three thematic axes of the research.

Source: The Authors.

The search for papers was conducted in the Scopus and Web of Science databases, as highlighted in Table 1. Their comprehensiveness justifies the choice of these repositories in indexing the prominent and most important international journals in various fields (GOVINDAN; HASANAGIC, 2018). Furthermore, a temporal limit was set to the last decade of publications to assess the state of the art of the topic. Regarding the search string used in the research, efforts were made to incorporate the main keywords representing the axes studied in this investigation. The exploration of these areas occurred through a configurative approach aimed at deepening the analysis of the examined articles more comprehensively, thus capturing the general nuances of the topic (BRIZOLA; FANTIN, 2016). For the formation of the Bibliographic Portfolio (BP) analyzed, the PRISMA methodology (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) by Moher *et al.* (2009) was adopted. Figure 1 presents the results of the searches in the databases.

Figure 1 - PRISMA Flow Diagram



Source: The Authors.

The search was conducted in February 2024, resulting in an initial sample of 1,081 papers (Scopus = 548 and WoS = 533). Of these, 152 duplicate articles were removed, and 540 were excluded through the initial filters (see Table 1) available in the databases to align the sample with the study's scope. In the next stage of sample screening, the remaining 389 articles, titles, abstracts, and keywords were analyzed, considering the inclusion and exclusion criteria previously established in the Research Protocol.

Regarding the Screening process, it is highlighted that the papers were independently evaluated by the authors, meaning each author assessed the articles' relevance without influence from others' judgments. Only the articles that had unanimous agreement remained in the sample. As a result of this evaluation, 289 articles were excluded, resulting in 100 papers. Of these, 17 articles were excluded in the eligibility analysis, formalizing a final BP with 83 articles.

It is important to emphasize that the eligibility analysis considered the number of citations of the articles, as defined in the protocol. This criterion assesses the quality of the works recognized by their peers (ENSSLIN et al., 2014). Therefore, the articles were classified in descending order by the number of citations, and a cutoff threshold of 95% was used. However, it is common for recent works to have few citations. Thus, to avoid this selection bias, those published in the last four years (2021, 2022, 2023, and 2024) were returned to the BP, with only 17 articles being effectively excluded due to ineligibility, as presented above.

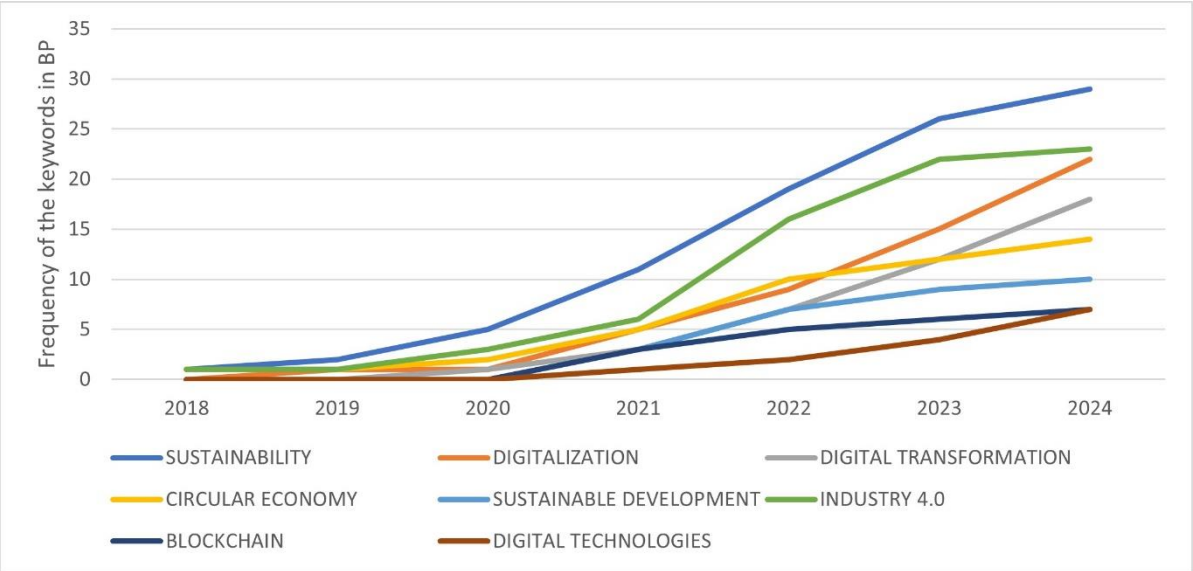
4 RESULTS AND DISCUSSION

4.1 BIBLIOMETRIC ANALYSIS

The initial insight concerns the progression of publications over time. The numbers are as follows: 2018 (1), 2019 (1), 2020 (6), 2021 (15), 2022 (20), 2023 (19), 2024 (21). There is a noticeable increasing trend in the number of publications on the topic, with an average annual growth rate of 66.1%. Notably, the last three years (2022, 2023, and 2024) account for 72.3% of the total publications in the BP. It is important to note that the quantity of papers from 2024 is underestimated since it is the year that the research was carried out. This growth underscores the current interest of the academic community in the subject, which is consistent with studies such as Bechtsis et al. (2017) and Rahman et al. (2023) that discuss the importance of technological innovations, particularly in terms of sustainable performance in supply chain operations.

Regarding the types of documents, 82% of the articles are empirical studies (compared to 18% of review articles). This observation indicates that field discussions are more focused on professional practice than on theoretical discussion. Indeed, topics such as digitalization and sustainability are well-established in the literature, so researchers' attention has turned to their application. Complementarily, regarding the geographical distribution of global scientific production, it can be noted that the highest volume of academic publications is concentrated in Europe and Asia, with the leading countries being China (32 articles), India (27 articles), and the United Kingdom and Italy (22 articles each). This result is justified by the fact that the United Kingdom is the birthplace of concepts such as the Circular Economy through the Ellen MacArthur Foundation, and thus, its environmental implications (VELENTURF et al., 2019), while China, due to its population configuration, has raised environmental and technological issues such as measures for waste recovery and efficient utilization of its natural and production resources (DISSANAYAKE; WEERASINGHE, 2022). To complement the analysis, Figure 2 shows the temporal trend of these words.

Figure 2 - Temporal keywords evolution



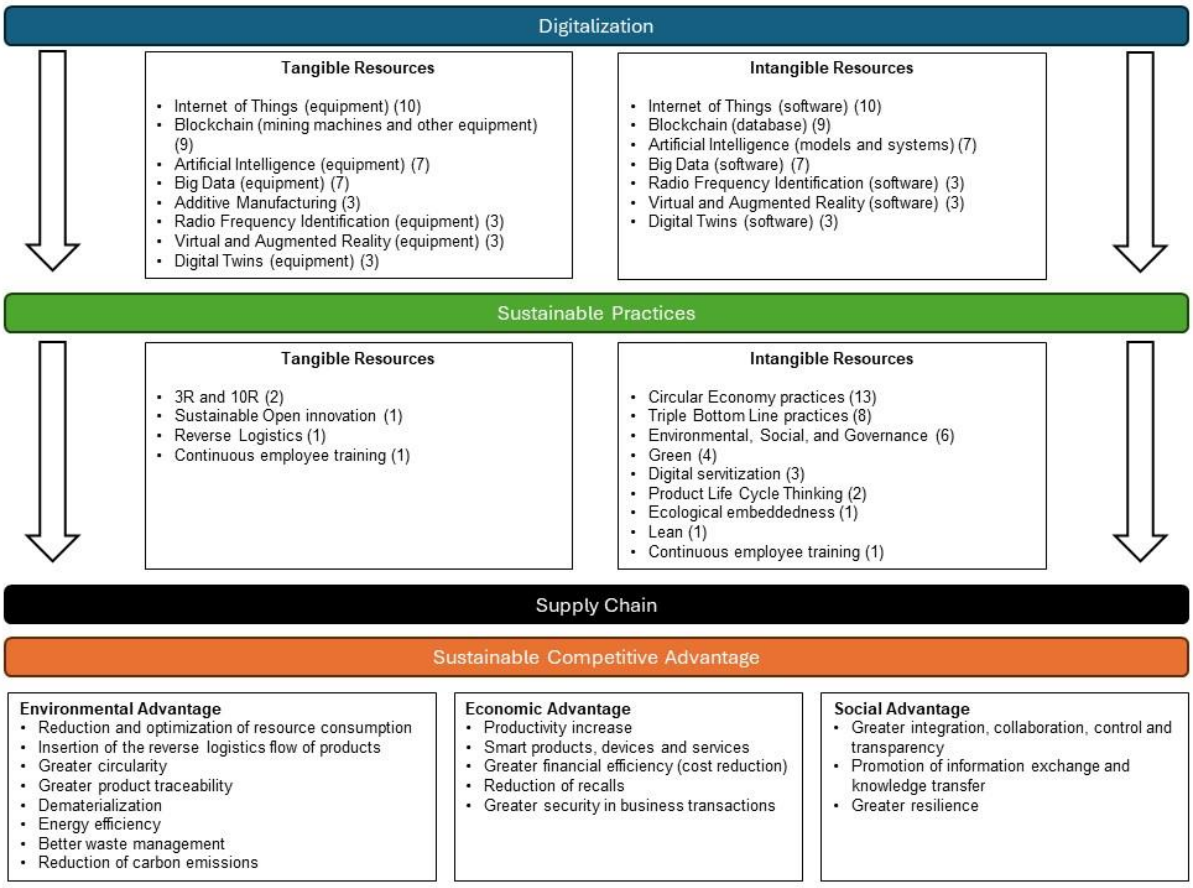
Source: The Authors.

Figure 2 reveals two significant findings: (i) the themes represented by the keywords are growing in the literature, especially the discussion on Sustainability, indicating a need corroborated by the literature (PARK; LI, 2021; TSOLAKIS et al., 2023); and (ii) the discussion on digitization is much more prominent in the literature than the actual Digital Transformation itself, which may indicate a potential gap in the literature for studies that seek to investigate beyond the adoption of technologies per se (digitization), but rather how they are reshaping organizations' strategies and culture (digital transformation).

4.2 DIGITAL-SUSTAINABLE SUPPLY CHAIN INTEGRATIVE FRAMEWORK

A framework was developed to demonstrate the relationships between digitalization and sustainable practices for competitive advantage considering the RBV, as depicted in Figure 3.

Figure 3 - Integrative Framework of Digitalization and Sustainability



Note: The numbers in parentheses indicate the number of articles that addressed a specific technology or practice.

Source: The Authors.

The examination of the BP revealed that digitalization enables sustainability, facilitating its practices, and that this interaction brings gains for organizations in all three dimensions of sustainability (SARKIS; KOUHIZADEH; ZHU, 2021; UMAR et al., 2023). However, it is possible to verify that social advantages still need to be explored more as a competitive advantage, confirming a gap that has existed in the literature for a long time (CAIADO et al., 2022; FERREIRA et al., 2023; SILVA; BOUZON; SILVA, 2023). Additionally, digital technologies and sustainable practices have been categorized as tangible and intangible

resources within the supply chain, as advocated by the RBV. This categorization considered the definition of tangible (materializable in the physical world) and intangible (immaterial in the physical world), as discussed in the theoretical background section of this article. For example, the connectivity of systems in an IoT network is an intangible resource of the organization used to improve the efficiency of its operations; however, for this to be possible, equipment such as sensors and computers/servers is needed to process the data, allowing the connection of multiple systems. Similarly, the practice of sustainable open innovation will result in the prototyping of new products, which are conceivable in the physical world and, therefore, seen as a tangible resource. This approach not only provides an overview of the resources supply chains use to generate competitive advantage but also offers insight into their nature.

A VRIO analysis was conducted to assess whether these digital capabilities provide a sustainable competitive advantage, as shown in Table 2.

Table 2 - VRIO analysis of digitalization for sustainable competitive advantage

Technology	Value	Rarity	Imitability	Organization	Ch
Internet of Things (IoT)	IoT is a technology that enables real-time data collection and sharing. Doing so enhances operational efficiency, supports Circular Economy practices and Product Life Cycle Thinking, and fosters innovative business models like Digital Servitization.	His innovation is far-reaching these days; for this reason, it may not be considered uncommon any longer. Nonetheless, integrating IoT with other technologies like Blockchain and Artificial Intelligence for advanced applications (e.g., waste management, reverse logistics) is an area under exploitation.	IoT is an easy-reproductive technology. However, particular applications and integrations may be challenging to replicate.	Companies that effectively coordinate IoT into their operations, bolstered by continuous worker preparation and vital execution, are likely to pick up a competitive advantage through moved-forward proficiency and imaginative benefit offerings.	- qual work - secu - stan inter equi syst - cons netw - impl cost - inac - exch
Blockchain	Blockchain includes critical esteem by ensuring supply chain trust, transparency, and	This innovation, whereas progressively received, is still moderately	Blockchain is difficult to imitate due to its complex and secure nature as a	For Blockchain to be effective, organizations must have the necessary	- D issu chai

	security. It supports circularity, ESG, and Green practices, making it an effective tool for organizations.	uncommon, particularly in its application to sustainability.	Distributed Ledger Technology (DLT).	infrastructure, expertise, and strategic alignment to deploy and manage this technology across the supply chain.	- tech matu - orga polic - gove regu - coor inte tech stak - amo men
Artificial Intelligence	AI is used to optimize resource consumption, improve production efficiency, enhance predictability, and increase supply chain resilience. It also supports Circular Economy practices and ESG initiatives.	Its use is growing, but its application in highly specialized areas like Sustainability and Lean production still holds some uncommonness.	AI systems are challenging to replicate, especially advanced algorithms tailored to specific needs.	Successful AI implementation requires high investments in technology, human resources, and training, which can be a barrier for many companies.	- Tec - Eth - Le - Hig - cons
Big Data	Big Data is valuable for	The use of Big Data is becoming	While big data tools are widely	Big Data Analytics has the	- D and

	improving supply chain performance, enhancing efficiency, reducing waste, and supporting sustainable innovations. It also plays a key role in analyzing large datasets to support decision-making.	more common, making it less rare.	available, leveraging them effectively for sustainability and competitive advantage requires expertise and resources, making them less easily imitable.	potential to assist organizations in designing innovative processes, learning, and selecting more environmentally friendly methods while dealing with large volumes of data from various supply chain partners	- impl costs - secu - resis com rega deve driv
Virtual and Augmented Reality (VR/AR), Additive Manufacturing, Radio Frequency Identification (RFID), and Digital Twins	These technologies are valuable as they contribute to sustainability by reducing physical resource consumption, improving efficiency, and enabling new business models. They also support decarbonization and dematerialization.	Some of them, such as Digital Twins, are emerging technologies, making them edge-cutting technologies.	The technical complexity and expertise required to develop and integrate these technologies (e.g., Digital Twins, VR/AR) into supply chains make them difficult to imitate.	A well-coordinated organizational strategy must be implemented to implement them successfully, including investment in R&D and a skilled workforce.	- Da - expe - Hig - issue

The analysis of Table 2 shows that some technologies, such as Blockchain and AI, are more likely to generate sustainable competitive advantages. In contrast, the others (e.g., IoT) need to be combined with other resources to leverage competitiveness.

4.3 DIRECTION FOR FUTURE RESEARCH

The topics were categorized into areas to show them more effectively.

- **Digital transformation in Supply Chains**
  - Future studies should investigate the impact of digitalization across vertical joints of the supply chain (JOSHI; SHARMA, 2022);
  - It is recommended to explore the maturity of technologies and practices for Sustainability in supply chains, such as which technologies are used at each level of maturity and how sustainability dimensions vary on this scale (KUNKEL et al., 2022; PHAM et al., 2024).
- **Sustainable aspects**
  - It is necessary to understand how circular business models generate and enable value in different parts of a circular supply chain (AWAN; SROUFE; BOZAN, 2022);
  - While studies are exploring the sustainable business model based on the network of technological platforms, the mechanisms for balancing and transferring economic, environmental, and social benefits within companies still need to be further explored, as well as research that deepens the relationship between technology and sustainable business models (LI et al., 2020);
  - Future studies need to discuss ESG metrics within the scope of SCM and demonstrate how different technologies support the acquisition of data necessary for analyzing an organization's ESG (CHAUHAN et al., 2023).
- **Stakeholders, Data Security, and Privacy**
  - Studies are needed to analyze the commitments involved in addressing digital concerns, such as data security and intellectual property protection, as well as the trade-off between privacy and transparency among the multiple members in the chain (EBINGER; OMONDI, 2020);
  - Future studies must investigate the effects of institutional factors, such as social and environmental pressure, regulations, policies, and industrial and digital technological infrastructure, which will likely influence sustainability practices (LEE, 2021).
- **Scope and Methodological Design**
  - There is a gap in empirical studies estimating the effects of technologies on the sustainable performance of supply chains (MESJAR et al., 2023; PARK; LI, 2021);
  - Longitudinal studies are needed to understand the implications of technology and sustainable performance in the long term (MUNIR et al., 2022; UMAR et al., 2023);
  - There is a lack of "sustainable-related application" studies. Many works present sustainability as a consequence of technology rather than an end goal (KUNKEL et al., 2022);
  - Given new concepts such as "Digital Servitization," investigations are needed to generate empirical evidence that this new practice's benefits outweigh traditional services' benefits (CALLE; FREIJE; OYARBIDE, 2021).

5 CONCLUSION

Through a critical analysis of the existing literature, this article aimed to investigate the integration between digitization as part of Digital Transformation and Sustainability in supply chains, resulting in a conceptual framework under the theoretical lens of the Resource-based View.

The results demonstrated the numerous technologies and their relationships to sustainable practices, generating competitive advantage and promoting sustainable performance within supply chains. For example, the use of IoT and Big Data Analytics to monitor the performance of engine

parts, contributing to preventive maintenance and lower emissions due to deregulation (green and digital servitization), or even the use of Digital Twins in prototyping new products, reducing the need for consumption of materials and, consequently, the waste generated (dematerialization and Circular Economy). Thus, it became evident that this relationship positively affects supply chains by promoting efficiency gains and cost reductions (economic impact), as well as dematerialization, improved waste management, reduced carbon emissions (environmental impact), and greater resilience and transparency among its links (social implications).

Therefore, this article provides valuable insights for managers and the academic community seeking to understand the dynamism of these concepts and their practical-theoretical implications. Furthermore, it offers theoretical contributions by fostering discussion in the literature considering the identified scarcity of works addressing these constructs holistically.

As a limitation, it is worth noting that the proposed framework is a theoretical representation of the relationships between these constructs and should, therefore, be validated with empirical studies confirming such relationships. Moreover, we understand that the influence of cultural differences, regulatory frameworks, and institutional contexts is an important element in the adoption and effectiveness of digital technologies and sustainability practices within supply chains, and this should be deeply studied. So, future research should address these issues to enhance the robustness and practical utility of these findings and provide a more nuanced understanding of the integration between digitization and sustainability in supply chains.

REFERENCES

AWAN, U.; SROUFE, R.; BOZAN, K. Designing Value Chains for Industry 4.0 and a Circular Economy: A Review of the Literature. **Sustainability (Switzerland)**, v. 14, n. 12, 2022.

BAGER, S. L.; SINGH, C.; PERSSON, U. M. Blockchain is not a silver bullet for agro-food supply chain sustainability: Insights from a coffee case study. **Current Research in Environmental Sustainability**, v. 4, n. April, p. 100163, 2022.

BARNEY, J. B. Firm Resources and Sustained Competitive Advantage. **Journal of Management**, v. 17, n. 1, p. 99–120, 1991.

BECHTSIS, D. et al. Sustainable supply chain management in the digitalisation era: The impact of Automated Guided Vehicles. **Journal of Cleaner Production**, v. 142, p. 3970–3984, 2017.

BEIER, G. et al. Impact of Industry 4.0 on corporate environmental sustainability: Comparing practitioners' perceptions from China, Brazil and Germany. **Sustainable Production and Consumption**, v. 31, p. 287–300, 2022.

BRESSANELLI, G. et al. Towards the Smart Circular Economy Paradigm: A Definition, Conceptualization, and Research Agenda. **Sustainability (Switzerland)**, v. 14, n. 9, p. 1–20, 2022.

BRIZOLA, J.; FANTIN, N. Revisão da literatura e revisão sistemática da literatura. **Relva - Revista de Educação do Vale do Arianos**, v. 3, n. 2, p. 23–39, 2016.

CAIADO, R. G. G. et al. Challenges and Benefits of Sustainable Industry 4.0 for Operations and Supply Chain Management—A Framework Headed toward the 2030 Agenda. **Sustainability (Switzerland)**, v. 14, n. 2, 2022.

CALLE, A. D. LA; FREIJE, I.; OYARBIDE, A. Digital product-service innovation and sustainability: A multiple-case study in the capital goods industry. **Sustainability (Switzerland)**, v. 13, n. 11, p. 1–29, 2021.

CHAUHAN, S. et al. Digitalization of Supply Chain Management with Industry 4.0 Enabling Technologies: A Sustainable Perspective. **Processes**, v. 11, n. 1, 2023.

CRICELLI, L.; STRAZZULLO, S. The economic aspect of digital sustainability: A systematic review. **Sustainability (Switzerland)**, v. 13, n. 15, 2021.

CWIKLICKI, M.; WOJNAROWSKA, M. Circular economy and industry 4.0: One-way or two-way relationships? **Engineering Economics**, v. 31, n. 4, p. 387–397, 2020.

DAYIOĞLU, M. A.; TÜRKER, U. Digital transformation for sustainable future-agriculture 4.0: A review. **Tarim Bilimleri Dergisi**, v. 27, n. 4, p. 373–399, 2021.

DESPEISSE, M. et al. A systematic review of empirical studies on green manufacturing: eight propositions and a research framework for digitalized sustainable manufacturing. **Production and Manufacturing Research**, v. 10, n. 1, p. 727–759, 2022.
DIÓFÁSI-KOVÁCS, O.; NAGY, J. Beyond CO2 emissions – The role of digitalization in multi-dimensional environmental performance measurement. **Environmental and Sustainability Indicators**, v. 18, n. March, 2023.
DISSANAYAKE, D. G. K.; WEERASINGHE, D. Towards Circular Economy in Fashion: Review of Strategies, Barriers and Enablers. **Circular Economy and Sustainability**, v. 2, n. 1, p. 25–45, 2022.
EBINGER, F.; OMONDI, B. Leveraging digital approaches for transparency in sustainable supply chains: A conceptual paper. **Sustainability (Switzerland)**, v. 12, n. 15, 2020.
ENSSLIN, S. R. et al. Processo de Mapeamento das Publicações Científicas de Um Tema : Portfólio Bibliográfico e Análise Bibliométrica sobre avaliação de desempenho de cooperativas de produção agropecuária. **Revista de Economia e Sociologia Rural**, v. 52, n. 03, p. 587–608, 2014.
FERREIRA, J. J. et al. Industry 4.0 implementation: Environmental and social sustainability in manufacturing multinational enterprises. **Journal of Cleaner Production**, v. 404, n. March, 2023.
GARCIA-MUIÑA, F. E. et al. The paradigms of Industry 4.0 and circular economy as enabling drivers for the competitiveness of businesses and territories: The case of an Italian ceramic tiles manufacturing company. **Social Sciences**, v. 7, n. 12, 2018.
GHALEB, E. A. A. et al. The assessment of big data adoption readiness with a technology–organization–environment framework: A perspective towards healthcare employees. **Sustainability (Switzerland)**, v. 13, n. 15, 2021.
GOVINDAN, K.; HASANAGIC, M. A systematic review on drivers, barriers, and practices towards circular economy: a supply chain perspective. **International Journal of Production Research**, v. 56, n. 1–2, p. 278–311, 2018.
HERVANI, A. A. et al. A performance measurement framework for socially sustainable and resilient supply chains using environmental goods valuation methods. **Sustainable Production and Consumption**, v. 30, p. 31–52, 2022.
JANKOVIC-ZUGIC, A. et al. Servitization 4.0 as a Trigger for Sustainable Business: Evidence from Automotive Digital Supply Chain. **Sustainability (Switzerland)**, v. 15, n. 3, 2023.
JOSHI, S.; SHARMA, M. Sustainable Performance through Digital Supply Chains in Industry 4.0 Era: Amidst the Pandemic Experience. **Sustainability (Switzerland)**, v. 14, n. 24, p. 1–25, 2022.
KANKAM-KWARTENG, C.; DONKOR, G. N. A.; FORKUOH, S. K. Corporate social responsibility, marketing capabilities and consumer behavioral responses. **Revista de Gestão**, v. 29, n. 4, p. 410–423, 2022.
KHAN, I. S.; AHMAD, M. O.; MAJAVA, J. Industry 4.0 and sustainable development: A systematic mapping of triple bottom line, Circular Economy and Sustainable Business Models perspectives. **Journal of Cleaner Production**, v. 297, p. 126655, 2021.
KUMAR, V. et al. Optimizing the digital transformation capability for enhancing economic sustainability of entrepreneurial venture: The moderating role of entrepreneurial orientation. **IEEE Transactions on Engineering Management**, v. PP, p. 1–15, 2024.
KUNKEL, S. et al. Industry 4.0 in sustainable supply chain collaboration: Insights from an interview study with international buying firms and Chinese suppliers in the electronics industry. **Resources, Conservation and Recycling**, v. 182, n. January, p. 106274, 2022.
LACAZE, A. S.; FERREIRA, F. A. F.; SANTOS, M. R. Adding value to the VRIO framework using DEMATEL. **Management Decision**, 2024.
LEE, S. Y. Sustainable supply chain management, digital-based supply chain integration, and firm performance: a cross-country empirical comparison between south korea and vietnam. **Sustainability (Switzerland)**, v. 13, n. 13, 2021.
LI, L. et al. Leveraging digitalization for sustainability: An affordance perspective. **Sustainable Production and Consumption**, v. 35, p. 624–632, 2023.
LI, X. et al. Sustainable business model based on digital twin platform network: The inspiration

from haier's case study in China. **Sustainability (Switzerland)**, v. 12, n. 3, 2020.
LI, Z. et al. Sustaining the future: How green capabilities and digitalization drive sustainability in modern business. **Heliyon**, v. 10, n. 1, p. e24158, 2024.
MARIĆ, D. et al. Analysis of Food Supply Chain Digitalization Opportunities in the Function of Sustainability of Food Placement in the Western Balkans Region. **Sustainability**, v. 16, n. 1, p. 2, 2023.
MATTHESS, M. et al. Supplier sustainability assessment in the age of Industry 4.0 – Insights from the electronics industry. **Cleaner Logistics and Supply Chain**, v. 4, n. January, p. 100038, 2022.
MENCHINI, F. et al. Strategic capabilities for business model digitalization. **Revista de Gestão**, v. 29, n. 1, p. 2–16, 2022.
MESJAR, L. et al. The Intersection of Fashion, Immersive Technology, and Sustainability: A Literature Review. **Sustainability (Switzerland)**, v. 15, n. 4, 2023.
MOGHRABI, I. A. R. et al. Digital Transformation and Its Influence on Sustainable Manufacturing and Business Practices. **Sustainability (Switzerland)**, v. 15, n. 4, p. 1–35, 2023.
MOHER, D. et al. Preferred reporting items for systematic reviews and meta-analyses: the PRIsMa statement. **Annals of internal medicine**, v. 151, n. 4, p. 264–269, 2009.
MUNIR, M. A. et al. Blockchain Adoption for Sustainable Supply Chain Management: Economic, Environmental, and Social Perspectives. **Frontiers in Energy Research**, v. 10, n. May, p. 1–24, 2022.
NASEREDDIN, A. Y. A comprehensive survey of contemporary supply chain management practices in charting the digital age revolution. **Uncertain Supply Chain Management**, v. 12, n. 2, p. 1331–1352, 2024.
NUDURUPATI, S. S. et al. Transforming sustainability of Indian small and medium-sized enterprises through circular economy adoption. **Journal of Business Research**, v. 149, p. 250–269, 2022.
OUBRAHIM, I.; SEFIANI, N.; HAPPONEN, A. The Influence of Digital Transformation and Supply Chain Integration on Overall Sustainable Supply Chain Performance: An Empirical Analysis from Manufacturing Companies in Morocco. **Energies**, v. 16, n. 2, 2023.
PALIWAL, V.; CHANDRA, S.; SHARMA, S. Blockchain technology for sustainable supply chain management: A systematic literature review and a classification framework. **Sustainability (Switzerland)**, v. 12, n. 18, p. 1–39, 2020.
PARK, A.; LI, H. The effect of blockchain technology on supply chain sustainability performances. **Sustainability (Switzerland)**, v. 13, n. 4, p. 1–18, 2021.
PEARSON, S. et al. Decarbonising our food systems: contextualising digitalisation for net zero. **Frontiers in Sustainable Food Systems**, v. 7, n. May, p. 1–8, 2023.
PHAM, T. N. et al. Combining digitalization and sustainability: unveiling the relationship of digital maturity degree, sustainable supply chain management practices and performance. **International Journal of Productivity and Performance Management**, 2024.
PRODANOV, C. C.; FREITAS, E. C. DE. **Metodologia do trabalho Científico: Métodos e Técnicas da Pesquisa e do Trabalho Acadêmico**. 2. ed. ed. Novo Hamburgo: Feevale, 2013.
RAHMAN, M. S. et al. Technology readiness of B2B firms and AI-based customer relationship management capability for enhancing social sustainability performance. **Journal of Business Research**, v. 156, n. December 2022, p. 113525, 2023.
RUSCH, M.; SCHÖGGL, J. P.; BAUMGARTNER, R. J. Application of digital technologies for sustainable product management in a circular economy: A review. **Business Strategy and the Environment**, v. 32, n. 3, p. 1159–1174, 2023.
SALAMAH, E.; ALZUBI, A.; YINAL, A. Unveiling the Impact of Digitalization on Supply Chain Performance in the Post-COVID-19 Era: The Mediating Role of Supply Chain Integration and Efficiency. **Sustainability**, v. 16, n. 1, p. 304, 2023.
SARFRAZ, M. et al. Sustainable supply chain, digital transformation, and blockchain technology adoption in the tourism sector. **Humanities and Social Sciences Communications**, v. 10, n. 1, p. 1–13, 2023.

SARKIS, J.; KOUHIZADEH, M.; ZHU, Q. S. Digitalization and the greening of supply chains. **Industrial Management and Data Systems**, v. 121, n. 1, p. 65–85, 2021.
SAUER, P. C.; SEURING, S. **How to conduct systematic literature reviews in management research: a guide in 6 steps and 14 decisions**. [s.l.] Springer Berlin Heidelberg, 2023. v. 17
SCHILLING, L.; SEURING, S. Linking the digital and sustainable transformation with supply chain practices. **International Journal of Production Research**, 2023a.
SCHILLING, L.; SEURING, S. Linking the digital and sustainable transformation with supply chain practices. **International Journal of Production Research**, 2023b.
SCHMIDT, D. et al. Digital Technologies, Sustainability, and Efficiency in Grain Post-Harvest Activities: A Bibliometric Analysis. **Sustainability (Switzerland)**, v. 16, n. 3, 2024.
SEURING, S.; GOLD, S. Conducting content-analysis based literature reviews in supply chain management. **Supply Chain Management: An International Journal**, v. 17, n. 5, p. 544–555, 2012.
SILVA, M. G. M. DA; BOUZON, M.; SILVA, J. DOS S. Value stream analysis of a waste picker cooperative: An approach based on sustainability and lean philosophy. **Brazilian Journal of Operations and Production Management**, v. 20, n. 3, p. 1–20, 2023.
SILVA, J. DOS S. et al. Barriers to digital transformation in fruit and vegetable supply chains : a multicriteria analysis using ISM. **OPSEARCH**, n. 0123456789, 2024.
SINGH, P. K.; MAHESWARAN, R. Analysis of social barriers to sustainable innovation and digitisation in supply chain. **Environment, Development and Sustainability**, n. 0123456789, 2023.
SRIDHAR, A. et al. Global impact of COVID-19 on agriculture: role of sustainable agriculture and digital farming. **Environmental Science and Pollution Research**, v. 30, n. 15, p. 42509–42525, 2023.
STROUMPOULIS, A.; KOPANAKI, E. Theoretical Perspectives on Sustainable Supply Chain Management and Digital Transformation: A Literature Review and a Conceptual Framework. **Sustainability (Switzerland)**, v. 14, n. 8, 2022.
TAVARES-LEHMANN, A. T.; VARUM, C. Industry 4.0 and sustainability: A bibliometric literature review. **Sustainability (Switzerland)**, v. 13, n. 6, p. 1–15, 2021.
TRABUCCO, M.; DE GIOVANNI, P. Achieving resilience and business sustainability during COVID-19: The role of lean supply chain practices and digitalization. **Sustainability (Switzerland)**, v. 13, n. 22, 2021.
TREVISAN, C.; FORMENTINI, M. Digital Technologies for Food Loss and Waste Prevention and Reduction in Agri-Food Supply Chains: A Systematic Literature Review and Research Agenda. **IEEE Transactions on Engineering Management**, v. PP, p. 1–20, 2023.
TROLLMAN, H. et al. Blockchain for Ecologically Embedded Coffee Supply Chains. **Logistics**, v. 6, n. 3, p. 43, 2022.
TSOLAKIS, N. et al. Artificial intelligence and blockchain implementation in supply chains: a pathway to sustainability and data monetisation? **Annals of Operations Research**, v. 327, p. 157–210, 2023.
TSUI, T. H. et al. Machine learning and circular bioeconomy: Building new resource efficiency from diverse waste streams. **Bioresource Technology**, v. 369, n. December 2022, p. 128445, 2023.
UMAR, M. et al. Unleashing the role of Blockchain technology and Government Support in Green Supply Chain. **LogForum**, v. 19, n. 2, p. 195–209, 2023.
VALLANDRO, L. F. J.; TREZ, G. Visão Baseada em Recursos, Estratégia, Estrutura e Performance da Firma: Uma Análise das Lacunas e Oportunidades de Pesquisas Existentes no Campo da Administração Estratégica. **Análise: A Revista Acadêmica da FACE**, v. 24, n. 1, p. 79–91, 2013.
VARRIALE, V. et al. Sustainable supply chains with blockchain, IoT and RFID: A simulation on order management. **Sustainability (Switzerland)**, v. 13, n. 11, 2021.
VELENTURF, A. P. M. et al. Circular economy and the matter of integrated resources. **Science of**

the Total Environment, v. 689, p. 963–969, 2019.
WIEGAND, T.; WYNN, M. Sustainability, the Circular Economy and Digitalisation in the German Textile and Clothing Industry. **Sustainability (Switzerland)**, v. 15, n. 11, 2023.
WU, S. R. et al. A Review on the Adoption of AI, BC, and IoT in Sustainability Research. **Sustainability (Switzerland)**, v. 14, n. 13, 2022.