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Research Article

Bibliometric Analysis of Digital Servitization Research

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Abstract.

This bibliometric study provides a comprehensive examination of the research landscape surrounding digital servitization from 2014 to 2024, using data sourced from the Scopus database. The analysis was conducted using Bibliometrix and RStudio, and focused on key themes such as digitization, servitization, manufacturing, and sustainability. A total of 101 documents were analyzed, revealing that the *Journal of Business Research* and *Industrial Marketing Management*, each with an H-index of 9, are the leading sources in this field. The study highlights the significant contributions of Nordic countries, especially Sweden and Finland, which lead in institutional output and citation impact. Major emerging themes include the growing role of data analytics, digital platforms, and sustainable business models in advancing servitization efforts. Keyword co-occurrence networks emphasize innovation and data-driven decision-making, while collaboration networks highlight Parida V. and Sjödin D. as key contributors to the field. Although citation rates have declined since 2020, the discipline continues to grow, with new research directions emerging in areas such as artificial intelligence and autonomous solutions. This study highlights the diverse nature of digital servitization and its pivotal role in transforming traditional manufacturing into service-oriented, sustainable industries. To expand the global perspective, future research should explore deeper integration of advanced digital technologies and promote more international cooperation.

Keywords: bibliometric analysis, data analytics, digitalization, digital servitization, sustainability

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1. Introduction

The digital era has ushered in a transformation across industries, fundamentally changing how businesses operate, deliver value, and compete in the marketplace [1-2]. One of the most significant shifts emerging from this transformation is the concept of digital servitization. Digital servitization refers to how firms move from traditional product-centric business models to service-oriented offerings enabled by digital technologies [3-4]. This transition has been particularly evident in sectors such as manufacturing, where companies now augment their physical products with digital services, creating enhanced customer value and establishing more sustainable, adaptive business models.

The core premise of digital servitization lies in integrating advanced digital tools and technologies—such as the Internet of Things (IoT), Artificial Intelligence (AI), big data analytics, cloud computing, and digital platforms—into traditional product-based operations [5-7]. These technologies enable firms to offer new services, such as predictive maintenance, remote monitoring, and customized software solutions, that enhance the performance and usability of physical products. As a result, firms can improve customer satisfaction by offering tailored services and generating new revenue streams through service-based contracts and long-term customer relationships.

The growing importance of digital servitization has prompted considerable academic and industrial interest, leading to an expanding body of research on the topic [8-9]. In recent years, scholars from diverse fields such as innovation management, business strategy, engineering, and information systems have contributed to a rich array of studies exploring various dimensions of digital servitization [10-13]. These studies examine issues such as the impact of digital servitization on business performance, the technological capabilities required for successful servitization, the role of customer co-creation, and the challenges firms face in adopting these new business models [11, 13-16].

However, as the literature on digital servitization grows, it becomes increasingly challenging for researchers and practitioners to keep track of the key developments, influential studies, and emerging themes in this rapidly evolving field. To address this challenge, bibliometric analysis offers a comprehensive and quantitative approach to mapping the intellectual structure of digital servitization research. By analyzing the publication patterns, citation networks, authorship collaborations, and thematic clusters within the literature, a bibliometric study can uncover valuable insights into research dynamics in this area.

A bibliometric analysis allows us to identify the most prolific authors, influential institutions, and leading journals contributing to the body of knowledge on digital servitization. It also enables us to explore the geographical distribution of research outputs, shedding light on how different regions and countries engage with servitization in the digital age. Moreover, by examining the co-citation patterns and co-authorship networks, we can map the collaboration between scholars and institutions, offering a clearer picture of how knowledge is shared and developed across academic communities.

In addition to understanding the current state of research, a bibliometric approach provides insights into the evolution of key themes and research trends over time. As

digital servitization continues to advance, it is essential to explore how the focus of research has shifted from early explorations of the concept to more specific areas, such as the role of digital ecosystems, the impact of Industry 4.0, or the development of digital business models. Identifying these trends helps highlight areas of consensus, debate, and gaps in the literature, guiding future research efforts.

Furthermore, digital servitization is not just an academic topic; it has practical implications for industries striving to remain competitive in an increasingly digitized world. For businesses, understanding the potential of digital servitization can be a key driver of innovation, allowing them to adopt new technologies and develop service-oriented strategies that lead to greater customer loyalty and operational efficiency. Thus, a bibliometric analysis that maps the trajectory of digital servitization research is crucial for advancing academic knowledge and providing actionable insights to industry leaders and policymakers seeking to harness the power of digital transformation.

This study aims to conduct a detailed bibliometric analysis of digital servitization research, focusing on the patterns of publication output, the most cited papers, and the collaboration networks among scholars. By analysing the keywords and thematic clusters associated with digital servitization, the study will provide a macroscopic overview of the key trends shaping the field. The findings will help uncover the intellectual structure of digital servitization, offering insights into its past developments, current state, and future directions.

2. Literature Review

2.1. The Resource-Based View (RBV) Theory

The Resource-Based View (RBV) posits that a firm is an entity that optimizes profits under the direction of rational managers within a defined market, achieving a predictable level and progressing towards equilibrium [17-18]. RBV developed to understand how the integration of valuable, rare, inimitable, non-substitutable, and organized resources (VRIN/O) can generate competitive advantages for a firm [19-20]. Resources must be reallocated to leverage emerging business prospects, including digital servitization [21].

Resources encompass both tangible and intangible assets of a company, which might acquire external resources deemed essential for the production process [22]. The RBV idea posits that businesses ought to concentrate on managing resources that might yield greater value while neglecting those with diminished potential to improve value

propositions [23]. Huikkola and Kohtamäki [24] identified critical resources and strategic processes that create strategic competencies and competitive advantages. These competencies include fleet management, technology innovation, mergers and acquisitions, valuation, project management, supplier network management, and collaborative value creation.

The digital dimension of digital servitization offers chances for advancing process and capability development, leading to increased value generation and capture, higher efficiency in customizing, and more efficient order fulfillment procedures. It also enables efficient resource reallocation when organizations explore new business opportunities, including unexploited client segments, creative initiatives, and intelligent solutions [21]. A company's preparedness for digital servitization will depend on its historical context and its capacity to reorganize internal processes and external resources.

2.2. Digital Servitization

Digital servitization is a complex and ongoing process, resulting from the integration of servitization with digitalization. As enterprises progressively use digital technology and transform their business models, they must address the difficulties and possibilities associated with this transformation, including adaptation to more dynamic and interconnected markets. Digital servitization can transpire inside ecosystems, wherein enterprises collaborate to establish value-creating and capturing mechanisms [21].

The utilization of digital technologies such as big data and cloud computing enables organizations to collect and analyze large datasets, providing critical insights and fostering innovation. Digital servitization sometimes involves the implementation of innovative business models focused on delivering bundles that include products, services, and digital technologies such as IoT, big data, and cloud computing [27]. Digital servitization facilitates connectivity across products, services, and customers, enhancing monitoring, control, and optimization.

Digital servitization, as defined by Parate et al. [28], encompasses leveraging digital technology to elevate existing business models or devise new ones. Paschou et al. [9] expand on this concept by introducing a maturity model for digital servitization, incorporating dimensions such as strategy, business processes, customer experience, and organizational culture. Tronvoll et al. [29] contribute to this discussion by pinpointing three pivotal shifts - transitioning from planning to discovery, from scarcity to abundance, and from hierarchy to partnership - crucial for effective digital servitization. Finally,

Lerch [30] examines the fusion of digitalization with service innovation, underscoring the potential ramifications for service provision.

3. Material and Methods

This bibliometric analysis investigates the research domain of digital servitization by examining publications indexed in the Scopus database from 2014 to 2024. Scopus was selected as the data source due to its extensive coverage of peer-reviewed literature across various disciplines. The focus of this study is to map the trends, key contributors, and thematic development in digital servitization, with specific attention to publications related to the intersection of digitalization and servitization.

3.1. Data Collection

To collect relevant data, the following procedures were carried out using Scopus and RStudio:

1) Selection of Search Terms: The search terms used in this analysis were “Digitalization” AND “Servitization”. These terms were chosen to capture the breadth of research exploring the fusion of digital technologies with service-based business models.

2) Search Strategy: The search was conducted in Scopus using the following query syntax: TITLE-ABS-KEY (“Digitalization” AND “Servitization”). This targeted publications with these terms in the title, abstract, or keywords.

3) Filtering the Results: The results were refined using a set of filters to ensure relevance and quality:

a. Open Access: All access types (LIMIT-TO (OA, “all”)) were included.

b. Publication Stage: Only fully published and peer-reviewed articles (LIMIT-TO (PUBSTAGE, “final”)) were considered.

c. Source Type: Only journal articles (LIMIT-TO (SRCTYPE, “j”)) were selected to focus on high-quality, peer-reviewed research.

d. Language: Publications were limited to those written in English (LIMIT-TO (LANGUAGE, “English”)).

After applying these filters, 101 documents were identified for the period 2014-2024.

4) Saving the Search Results: The search results were saved in a file with a .bib extension, which contains bibliographic data required for further analysis.

3.2. Data Analysis

The data analysis was conducted using RStudio and the bibliometrix package, which is widely used for bibliometric analysis.

1) Installing and Setting Up RStudio: The latest versions of R and RStudio were installed. The following packages were used for analysis:

◦ bibliometrix: This package was installed by typing the following command in RStudio:

install.packages ("bibliometrix")

library(bibliometrix)

◦ biblioshiny: This interactive web interface of bibliometrix was used to streamline the bibliometric analysis process by typing:

biblioshiny()

This launched an interactive interface for bibliometric analysis.

2) Uploading Data: The .bib file containing the search results from Scopus was uploaded to the biblioshiny web interface for further processing.

3) Analyzing the Data: Various bibliometric analyses were performed, including:

◦ Publication Trends: Analyzing the growth of digital servitization research from 2014 to 2024.

◦ Citation Analysis: Identifying the most cited papers, authors, and institutions.

◦ Authorship and Collaboration: Mapping the co-authorship networks and institutional collaborations.

◦ Keyword and Thematic Analysis: Detecting the most frequently used keywords and clustering research topics.

◦ Geographical Distribution: Analyzing the regional contributions to digital servitization research.

These analyses provided insights into the structure and development of the digital servitization research domain. The bibliometric tools in RStudio and biblioshiny helped visualize co-authorship networks, citation patterns, and the evolution of key themes over time, contributing to a comprehensive understanding of the research landscape.

4. Results

A thorough summary of the state of research in digital servitization is given by the bibliometric study that was carried out. The most important sources, citation patterns, networks of collaboration, and thematic areas of focus in the field are highlighted in this report. The findings demonstrate the wider financial and environmental ramifications of these changes as well as the growing scholarly interest in the relationship between digital technology and servitization.

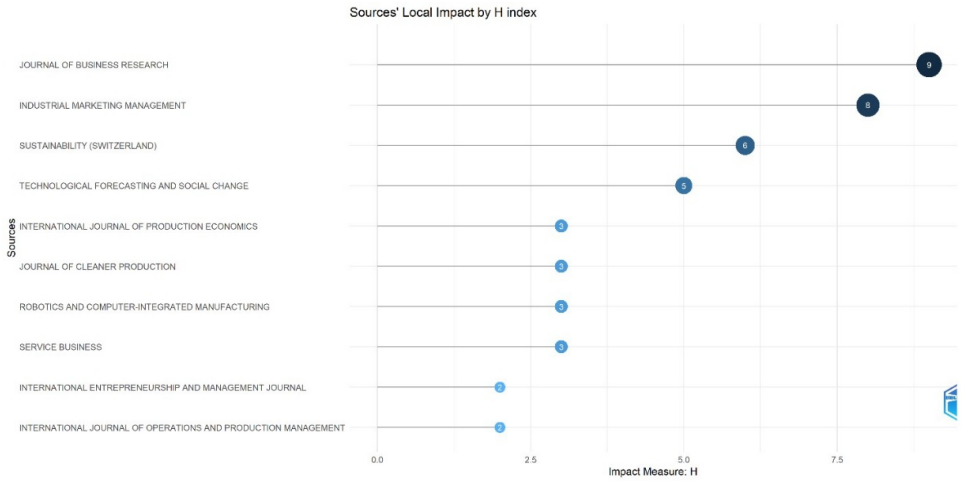

Figure 1: Journal Impact Analysis.

The journal impact analysis (Figure 1) reveals that the most influential publications on digital servitization are found in well-established journals such as the *Journal of Business Research* and *Industrial Marketing Management*. Both of these journals have an H-index of 9, suggesting that they play a central role in shaping the academic discourse around servitization, particularly with respect to how digitalization influences business models and industrial practices. Other key journals, including *Sustainability (Switzerland)*, *Technological Forecasting and Social Change*, and the *Journal of Cleaner Production*, are also prominent, indicating that digital servitization research is interdisciplinary, drawing on insights from business, sustainability, and technological innovation. The significant presence of sustainability-related journals highlights the increasing recognition of digital servitization's potential to contribute to more sustainable business practices, aligning with global efforts to achieve Sustainable Development Goals (SDGs).

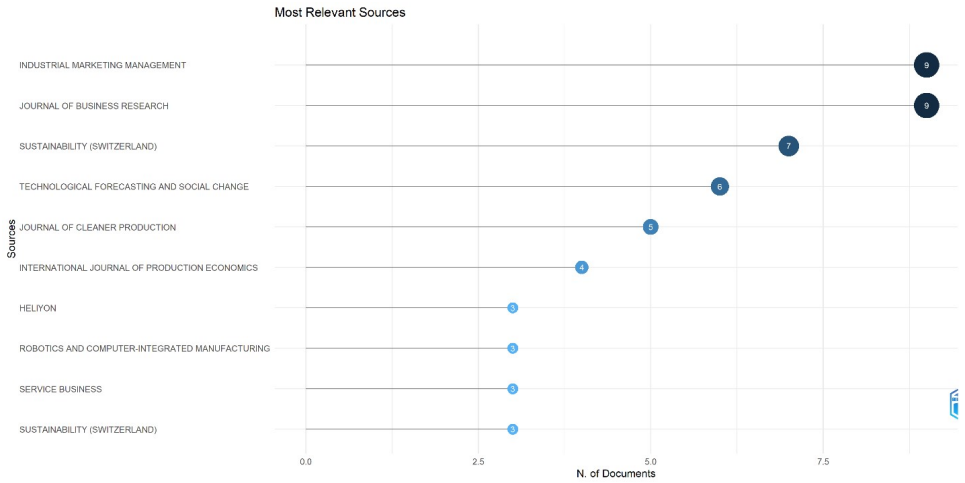

Figure 2: Publication Frequency.

In terms of publication frequency (Figure 2), *Industrial Marketing Management* and the *Journal of Business Research* are again the leaders, each contributing nine documents to the field. These findings suggest that business and marketing perspectives are integral to the exploration of digital servitization, particularly in understanding how companies can transition from product-oriented to service-oriented models through the integration of digital technologies. The involvement of sustainability journals, as seen in the regular publications in *Sustainability (Switzerland)*, reflects an expanding focus on how digital servitization can promote both economic and environmental resilience.

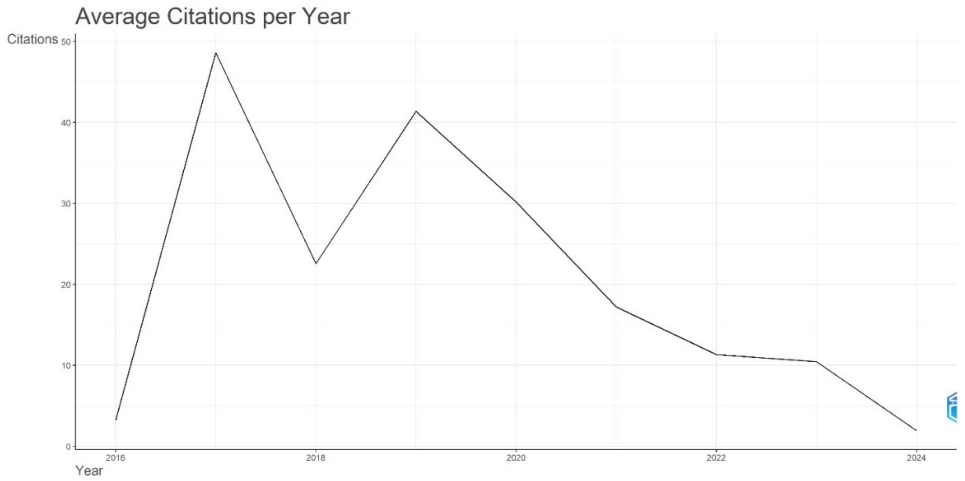

Figure 3: Citation Trends.

The citation trends (Figure 3) show that digital servitization reached a peak in academic interest around 2017-2018, with average citations per article surpassing 40. However, a notable decline in citation rates after 2020 suggests that while foundational research has made a significant impact, newer studies are still in the process of gaining

academic traction. This decline may reflect a saturation of the initial exploratory research on digital servitization and a need for the field to evolve by engaging with emerging trends such as artificial intelligence, Internet of Things (IoT), and advanced data analytics. As the technological landscape continues to change, it is likely that future research will need to address how these advancements can be harnessed to further refine servitization strategies, particularly in enhancing customer experiences and operational efficiency.

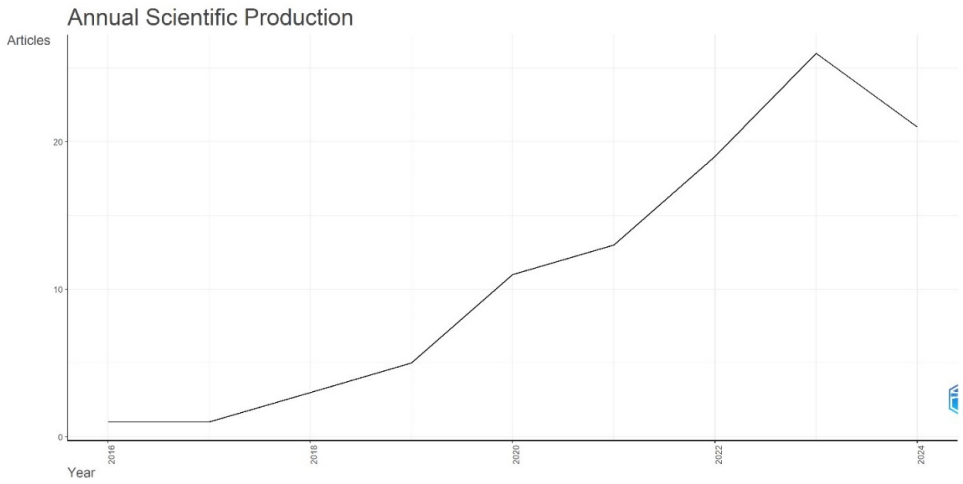

Figure 4: Annual Scientific Production.

The annual scientific production (Figure 4) further illustrates the growing interest in digital servitization, with a steady increase in publications from 2016 to 2022. The sharp rise in 2022, with over 20 articles, indicates that this topic remains a fertile area for academic inquiry, though the slight dip in 2024 may suggest a shift in research focus or delays in indexing. This trend aligns with broader academic and industrial interest in digital transformation, where servitization is seen as a critical strategy for firms to remain competitive in increasingly digital and service-oriented markets.

An analysis of institutional contributions (Figure 5) reveals that Luleå University of Technology is the most prolific institution, with 28 publications in the field. Other notable contributors include the University of Vaasa and the Hanken School of Economics. This concentration of research in Northern Europe, particularly in Sweden and Finland, highlights the region's leadership in industrial innovation and sustainable business practices. The strong focus on digital servitization in these institutions reflects a regional emphasis on leveraging digital tools to enhance traditional manufacturing and service industries. Nordic institutions, known for their innovation ecosystems, are clearly at the forefront of advancing theoretical and practical knowledge in digital servitization,

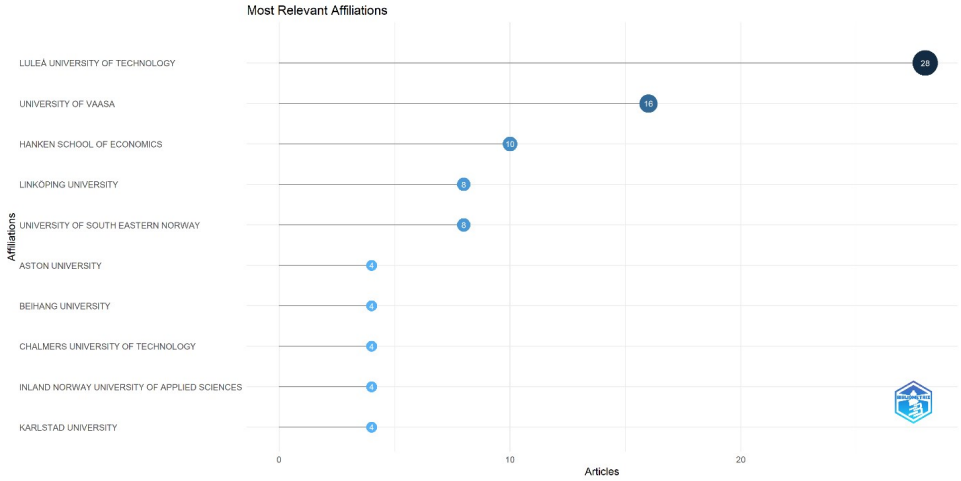

Figure 5: Analysis Of Institutional Contributions.

particularly in industries that are grappling with the challenges and opportunities posed by Industry 4.0.

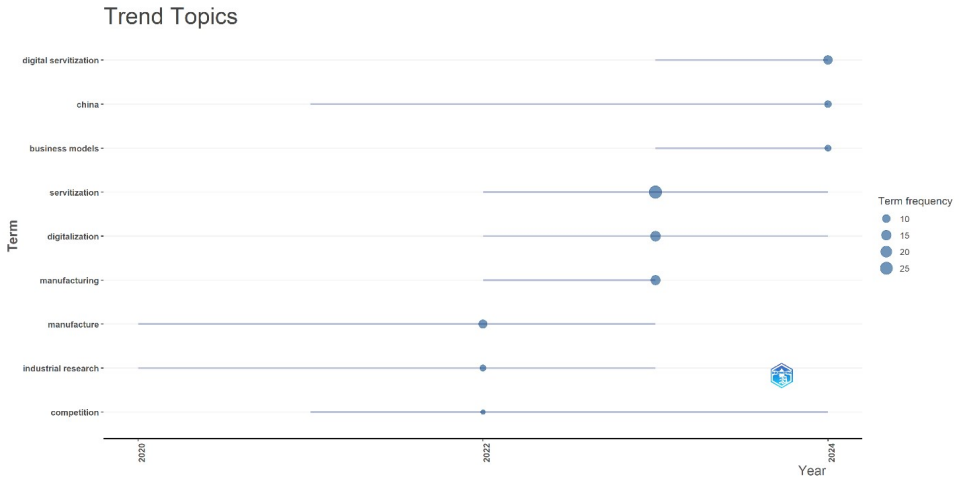

Figure 6: Trend Topics.

The trend topics (Figure 6) in digital servitization have evolved over time, with key terms such as “digital servitization,” “manufacturing,” “business models,” and “sustainability” dominating the discourse between 2020 and 2024. This reflects a continuing focus on how digital technologies can be integrated into traditional manufacturing processes to enhance service offerings and generate new revenue streams. The emergence of terms like “data analytics” and “decision making” points to a growing interest in the role of data-driven decision-making in optimizing servitization strategies. This shift aligns with the increasing importance of data as a strategic asset, as businesses seek to leverage big data and advanced analytics to tailor their services to customer needs and improve operational efficiencies. The term “COVID-19” also appears, suggesting

that the pandemic has influenced how companies adopt digital servitization as a means of building resilience in times of crisis.

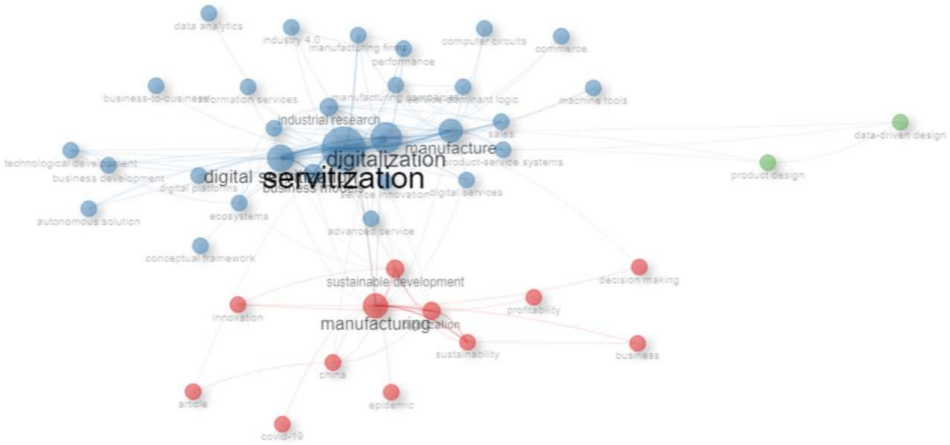

Figure 7: Keyword Co-occurrence Network.

Figure 8: Word Cloud.

The keyword co-occurrence network (Figure 7) and word cloud (Figure 8) further support these thematic insights, with “servitization,” “digitalization,” and “manufacturing” being the most frequently used terms. These keywords are closely associated with topics such as “business models,” “sustainable development,” and “innovation,” indicating that the research is not only concerned with technological adoption but also with its broader implications for business strategy and sustainability. The inclusion of terms like “ecosystems” and “platforms” suggests that researchers are increasingly exploring how digital servitization can be implemented through digital platforms and

service ecosystems, which enable firms to scale their service offerings and collaborate with other stakeholders in the value chain.

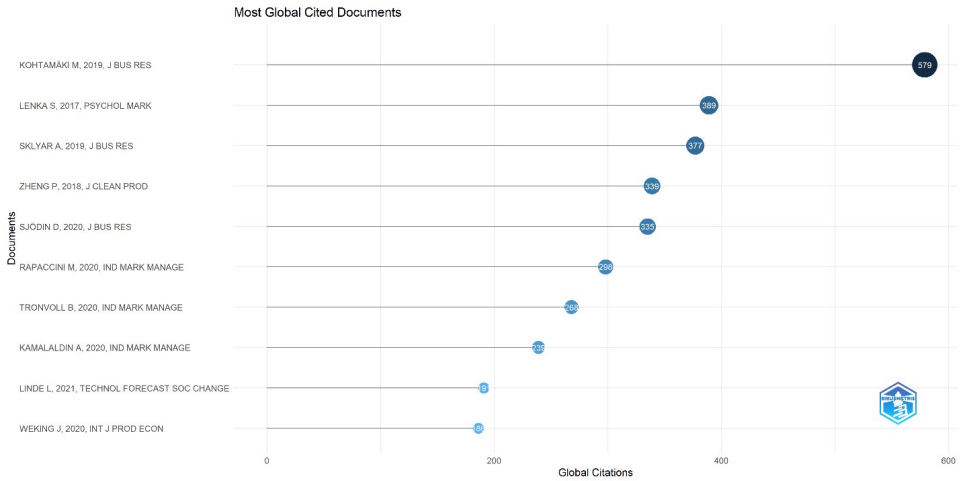

Figure 9: Most Globally Cited Documents.

The most globally cited documents (Figure 9) provide insight into the foundational works that have shaped the field. The paper by Kohtamäki et al. (2019) has been cited 579 times, underscoring its importance in establishing a theoretical framework for understanding digital servitization. Other highly cited works by Lenka et al. (2017) and Sklyar et al. (2019) have also made significant contributions, particularly in exploring the impact of servitization on business performance and customer satisfaction. These papers have laid the groundwork for ongoing research and continue to influence new studies that seek to explore more specific aspects of servitization, such as the role of digital tools and platforms in enhancing service offerings.

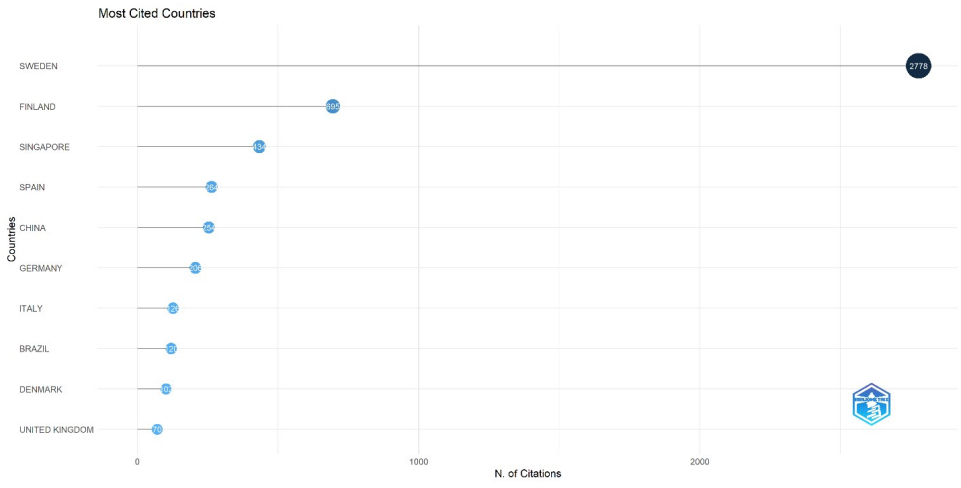

Figure 10: Most Cited Countries.

The most cited countries (Figure 10) further demonstrate the regional dominance of Sweden and Finland, with Sweden leading the field with 2,778 citations. This is consistent with the institutional analysis, which showed that Nordic universities are the most prolific in publishing on digital servitization. Other countries such as Singapore, China, and Germany are also significant contributors, particularly in the context of manufacturing and industrial research. The geographic distribution of research suggests that while Europe remains a hub for servitization research, other regions, especially Asia, are increasingly engaging with the topic, likely due to their industrial strength and rapid technological advancements.

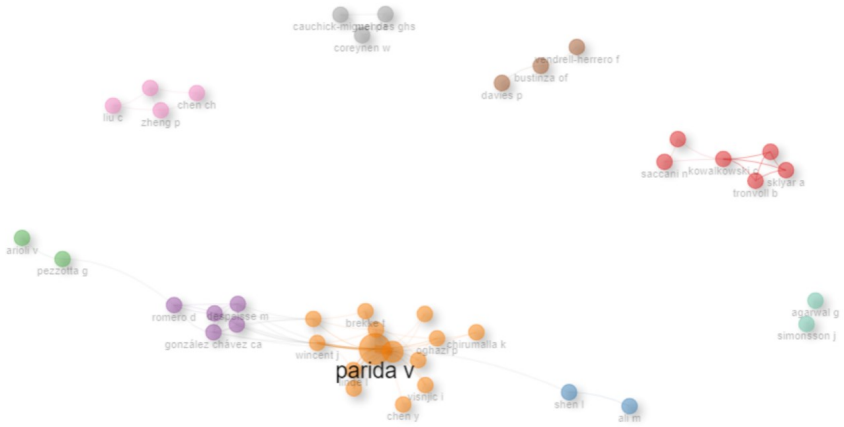

Figure 11: Co-authorship Network.

The co-authorship network (Figure 11) illustrates the collaborative nature of research in digital servitization, with Parida V. emerging as the central figure in the largest collaborative network. His connections with other prolific authors like Wincent J. and Oghazi P. highlight the strong collaborative efforts within this community, particularly among researchers based in Northern Europe. The presence of smaller, regionally clustered networks, such as those led by Zheng P. in China and Pezzotta G. in Europe, reflects a degree of fragmentation in the field. This suggests that while there is a core group of researchers driving the conversation, there is potential for greater international collaboration to enrich the research and integrate diverse perspectives from different industrial contexts.

The thematic tree map (Figure 12) provides a structured overview of the key topics and their relative importance in the digital servitization research landscape. Servitization occupies the largest segment, followed by digitalization and manufacturing,

Figure 12: Thematic Tree Map.

reinforcing the central themes identified throughout this analysis. Sub-themes such as business models, sustainability, and performance indicate that researchers are increasingly focused on how digital servitization can drive both economic and environmental benefits for firms. Emerging themes like data-driven design and epidemics reflect the responsiveness of the field to global challenges, such as the COVID-19 pandemic, and the increasing relevance of data analytics in optimizing service delivery and innovation.

5. Discussion

Digital servitization represents a critical shift in how manufacturing firms operate, moving from traditional product-based offerings to more service-oriented models facilitated by digital technologies. This transformation enables firms to enhance customer value by integrating services such as remote monitoring, predictive maintenance, and performance optimization into their product offerings [21]. The growing body of research on digital servitization reflects the strategic importance of this shift, as firms increasingly leverage digital tools to extend their value proposition beyond physical products [31].

The ability to integrate digitalization into servitization efforts aligns with broader global trends in Industry 4.0 and the digital economy, where connectivity, data, and digital platforms enable firms to deliver continuous value [25]. Digital servitization allows

firms to remain competitive by offering tailored, data-driven services, fostering stronger customer relationships, and generating new revenue streams [32]. The integration of digital technologies into business models is transforming manufacturing sectors by enabling a shift from transactional, product-focused relationships to more sustainable, service-oriented engagements that foster long-term partnerships.

A significant aspect of digital servitization is its potential to contribute to sustainability goals. By extending product lifecycles and minimizing resource use, firms can align their business models with the principles of sustainable development [33]. The transition from selling products to offering services such as maintenance or product upgrades reduces waste and promotes circular economy practices [34]. This has become especially relevant as firms world-wide face increasing pressure to meet environmental targets while remaining economically viable. The research highlights how sustainability has become a core theme within digital servitization, reflecting the broader commitment of firms to the Sustainable Development Goals (SDGs) [25].

The ability to harness data through advanced analytics and Internet of Things (IoT) technologies plays a crucial role in driving digital servitization. Data allows firms to offer more personalized and proactive services, ensuring products operate efficiently and customer needs are met in real time [35]. For instance, predictive maintenance enabled by IoT sensors allows firms to address potential failures before they occur, reducing downtime for customers and enhancing service value [32]. The increasing integration of AI and machine learning into servitization strategies allows businesses to optimize their service offerings further, enhancing operational efficiency and customer satisfaction [21].

The COVID-19 pandemic has also accelerated the adoption of digital servitization, as firms sought ways to maintain customer engagement without physical interaction [34]. Digital services such as remote monitoring, diagnostics, and support became critical for maintaining continuity during the crisis. The pandemic demonstrated the value of digital servitization as a resili-ence strategy, allowing firms to offer flexible and scalable services in times of uncertainty. As firms recover from the pandemic, the shift towards more integrated digital service models is expected to continue, driving long-term growth and competitiveness in a post-pandemic world [29].

Collaboration has emerged as a central element of digital servitization, with firms increasingly participating in service ecosystems that enable co-creation of value with

partners and customers [25]. The rise of digital platforms facilitates this collaboration, allowing firms to deliver integrated services that involve multiple stakeholders in the value chain [36]. These service ecosystems enable firms to scale their offerings more efficiently and provide customers with comprehensive, end-to-end solutions that enhance service delivery.

Despite its many benefits, digital servitization presents significant challenges for firms, particularly regarding organizational change. Transitioning from product-centric to service-centric models requires firms to rethink their business processes, invest in digital capabilities, and develop new skill sets [33]. This shift often involves substantial organizational restructuring and the adoption of a service-oriented mindset that prioritizes customer outcomes over product sales. Firms must align their digital transformation strategies with servitization goals to ensure they can deliver value through services while maintaining operational efficiency [29].

6. Conclusion

In conclusion, this bibliometric analysis provides a detailed picture of the current state of re-search in digital servitization. The field is characterized by a strong focus on the integration of digital technologies into manufacturing and service-oriented business models, with sustainability and innovation as key drivers. Nordic countries, particularly Sweden and Finland, lead the field in terms of both institutional contributions and geographic impact, though other regions, especially Asia, are gaining prominence.

The research is evolving, with new areas of focus emerging around data analytics, decision-making, and the role of digital platforms in scaling service ecosystems. Future research will likely delve deeper into these areas, exploring how advanced technologies like artificial intelligence, IoT, and blockchain can further enhance servitization strategies. Additionally, greater international collaboration could help integrate diverse industrial experiences and foster more comprehensive insights into the global application of digital servitization.

Conflict of Interest

The authors declare no conflict of interest.

References

[1] Lang V. Digitalization and Digital Transformation. Digital Fluency. Berkeley (CA): Apress; 2021. https://doi.org/10.1007/978-1-4842-6774-5_1.

[2] Volberda HW, Khanagha S, Baden-Fuller C, Mihalache OR, Birkinshaw J. Strategizing in a digital world: overcoming cognitive barriers, reconfiguring routines and introducing new organizational forms. Long Range Plann. 2021;54(5):102110.

[3] Chen L, Dai Y, Ren F, Dong X. Data-driven digital capabilities enable servitization strategy—from service supporting the product to service supporting the client. Technol Forecast Soc Change. 2023;197:122901.

[4] Vargo SL, Lusch RF. Service-dominant logic 2025. Int J Res Mark. 2017;34(1):46–67.

[5] Ghosh S, Hughes M, Hodgkinson I, Hughes P. Digital transformation of industrial businesses: A dynamic capability approach. Technovation. 2022;113:102414.

[6] Pustišek M, Chen M, Kos A, Kos A. Decentralized machine autonomy for manufacturing servitization. Sensors (Basel). 2022 Jan;22(1):338.

[7] Ritala P, Keränen J, Fishburn J, Ruokonen M. Selling and monetizing data in B2B markets: four data-driven value propositions. Technovation. 2024;130:102935.

[8] Gebauer H, Paiola M, Saccani N, Rapaccini M. Digital servitization: crossing the perspectives of digitization and servitization. Ind Mark Manage. 2021;93:382–8.

[9] Paschou T, Rapaccini M, Adrodegari F, Saccani N. Digital servitization in manufacturing: A systematic literature review and research agenda. Ind Mark Manage. 2020;89:278–92.

[10] Abou-Foul M, Ruiz-Alba JL, Soares A. The impact of digitalization and servitization on the financial performance of a firm: an empirical analysis. Prod Plann Contr. 2021;32(12):975–89.

[11] Bortoluzzi G, Chiarvesio M, Romanello R, Tabacco R, Veglio V. Servitisation and performance in the business-to-business context: the moderating role of Industry 4.0 technologies. J Manuf Tech Manag. 2022;33(9):108–28.

[12] Kohtamäki M, Parida V, Patel PC, Gebauer H. The relationship between digitalization and servitization: the role of servitization in capturing the financial potential of digitalization. Technol Forecast Soc Change. 2020;151:119804.

[13] Rakic S, Pero M, Sianesi A, Marjanovic U. Digital servitization and firm performance: technology intensity approach. Inzinerine Ekonomika. 2022;33(4):398–413.

[14] Martín-Pe na ML, Sánchez-López JM, Díaz-Garrido E. Servitization and digitalization in manufacturing: the influence on firm performance. J Bus Ind Mark. 2019;35(3):564–74.

[15] Miao Y, Shi Y, Jing H. Effect of servitization on performance in manufacturing firms: A mediating effect model of digitalisation moderated by ESG performance. Heliyon. 2023 Oct;9(10):e20831.

[16] Zhou D, Wu Q, Lee S, Li X, Sun K, Peng X. Unpacking the mechanism linking digital servitization and manufacturing firm performance: the role of the service networks and slack resources. J Bus Ind Mark. 2024;39(2):189–205.

[17] Bromiley P, Papenhausen C. Assumptions of rationality and equilibrium in strategy research: the limits of traditional economic analysis. Strateg Organ. 2003;1(4):413–37.

[18] Leiblein MJ. The choice of organizational governance form and performance: predictions from transaction cost, resource-based, and real options theories. J Manage. 2003;29(6):937–61.

[19] Barney J. Firm resources and sustained competitive advantage. J Manage. 1991;17(1):99–120.

[20] Penrose ET. The theory of the growth of the firm. Oxford: Oxford University Press; 1959.

[21] Kohtamäki M, Parida V, Oghazi P, Gebauer H, Baines T. Digital servitization business models in ecosystems: A theory of the firm. J Bus Res. 2019;104:380–92.

[22] Lund M, Nielsen C, Goldschmidt L, Brem A. Managing innovation across technological and business cycles – The case of the maritime industry. International Association for Management of Technology; 2013.

[23] Wernerfelt B. On the role of the RBV in marketing. J Acad Mark Sci. 2014;42(1):22–3.

[24] Huikkola T, Kohtamäki M. Solution providers' strategic capabilities. J Bus Ind Mark. 2017;32(5):752–70.

[25] Sklyar A, Kowalkowski C, Tronvoll B, Sörhammar D. Organizing for digital servitization: A service ecosystem perspective. J Bus Res. 2019;104:450–60.

[26] Chen Y, Visnjic I, Parida V, Zhang Z. On the road to digital servitization – The (dis)continuous interplay between business model and digital technology. Int J Oper Prod Manage. 2021;41(5):694–722.

[27] Hacioglu U. Handbook of research on strategic fit and design in business ecosystems. IGI Global; 2019.

[28] Parate V, Hiremath BV, Tailor RK. Digital servitization: an effective tool of attracting customers in modern business world. Journal of Management Research and Analysis. 2022;9(4):207–9.

[29] Tronvoll B, Sklyar A, Sörhammar D, Kowalkowski C. Transformational shifts through digital servitization. Ind Mark Manage. 2020;89:293–305.

[30] Lerch C, Gotsch M. Digitalized product-service systems in manufacturing firms: A case study analysis. Res Technol Manag. 2015;58(5):45–52.

[31] Parida V, Sjödin DR, Lenka S, Wincent J. Developing global service innovation capabilities: how global manufacturers address the challenges of market heterogeneity. Res Technol Manag. 2015;58(5):35–44.

[32] Lenka S, Parida V, Sjödin DR, Wincent J. Exploring the microfoundations of servitization: how individual actions overcome organizational resistance. J Bus Res. 2018;88:328–36.

[33] Baines TS, Lightfoot HW, Benedettini O, Kay JM. The servitization of manufacturing: A review of literature and reflection on future challenges. J Manuf Tech Manag. 2009;20(5):547–67.

[34] Rapaccini M, Saccani N, Kowalkowski C, Paiola M, Adrodegari F. Navigating disruptive crises through service-led growth: the impact of COVID-19 on Italian manufacturing firms. Ind Mark Manage. 2020;88:225–37.

[35] Zheng P, Lin TJ, Chen CH, Xu X. Smart, connected open architecture product: an IT-driven co-creation paradigm with lifecycle personalization concerns. Int J Prod Res. 2018;56(1-2):691–705.

[36] Vendrell-Herrero F, Bustinza OF, Parry G, Georgantzis N. Servitization, digitization and supply chain interdependency. Ind Mark Manage. 2017;60:69–81.