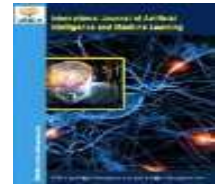




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Scientific Research Trends in Agribusiness And Furniture Industry Management - Digitalisation, Innovation And Value-Chain Transformation

Daniela Ventsislavova Georgieva¹, Teodora Marinova Georgieva²

¹ Economic Research Institute at the Bulgarian Academy of Sciences, Department "Economics of the Firm", Sofia, Bulgaria. E-mail: danielagr999@gmail.com, Orcid: <https://orcid.org/0000-0002-5752-0344>

² Faculty of Economics and Business Administration, Sofia University "St. Kliment Ohridski", Bulgaria.

E-mail: tmgeorgieva@feb.uni-sofia.bg, Orcid: <https://orcid.org/0000-0002-8031-6405>

*Corresponding Author: danielagr999@gmail.com

Abstract

This paper studies the evolution of scientific research on agribusiness management and the furniture industry, with a focus on the growing role of digitalisation, smart technologies, innovation, value chain and data-driven transformation. For that purpose, a bibliometric analysis of publications indexed in the Web of Science database for the period 2000–2026 is conducted using the VOS (visualisation of similarities) method. The results show an increasing scientific interest in digitalisation, sustainability, innovation and value-chain integration. At the same time, clear sector-specific differences occur. Research on agribusiness views management as part of larger agri-food and socio-ecological systems, highlighting problems like food security, natural resource management, and sustainable development. On the other hand, research on the furniture industry focuses primarily on production modernisation, Industry 4.0, sustainable design, circular economy practices and resource-efficient manufacturing. The co-occurrence of themes related to innovation, managerial capabilities, knowledge and networks suggests a growing research interest in understanding innovation as the outcome of interactions between internal organisational capabilities and external collaborative relationships. Additionally, the strong presence of value-chain concepts in both areas shows that current research is viewing involvement in value-added chains as essential for knowledge sharing, spreading technology, and maintaining long-term competitiveness. The paper's findings contribute to the literature on the research landscape in which AI- and ML-enabled management solutions can be developed and applied to support innovation, sustainability, and competitiveness in agribusiness and furniture manufacturing industries.

Keywords- agribusiness, co-occurrence mapping, digital transformation, furniture industry, management, thematic clusters.

I. INTRODUCTION

Digital transformation, sustainability, and knowledge-intensive technologies are reshaping enterprises' management practices and competitiveness. Artificial intelligence (AI), machine learning (ML), the Internet of Things (IoT), automation and data-driven decision-support systems are impacting production and managerial processes. As a result, competitiveness depends not only on tangible resources and operational efficiency but also on firms' ability to acquire knowledge, adopt technologies, develop organizational capabilities and collaborate with external partners. As globalization, technological change and sustainability grow, companies should constantly adapt their business models, processes and management practices. Traditional competitiveness based on resources, capacity and cost efficiency is shifting toward knowledge, innovation, digital technology and AI. This impacts low-tech, mature sectors like agribusiness and furniture, which rely heavily on resources and markets (Branzova & Dimitrova, 2023; Weiss, 2011; Hansen et al., 2021). The European furniture market is forecasted to hit USD 118.83 billion by 2031 at a 3.4% CAGR. Sustainable manufacturing, digitalisation, Industry 4.0 and supply chain efficiency drive the sector's growth. Future competitiveness depends on design, sustainable sourcing, AI and investments in innovation. Main advantages include flexible, sustainable production and market agility (Furniture Market Forecast 2025–2032). The global agricultural market is also expected to grow steadily, fuelled by technology, rising food demand and modernization. The OECD-FAO Outlook (2025) predicts a 14% rise in production by 2034, driven by productivity gains in the middle-income countries. Both sectors face challenges like boosting productivity, reducing environmental impact, adopting digital and smart technologies, human resource shortages and building sustainable supply chains. This however requires different management and strategic approaches.

Although these two sectors vary in their production methods, resource reliance and technological adaptation, both faces pressures related to digitalization, sustainability, innovation and integrating their value chains into the global markets. In agribusiness, these pressures are reflected in the development of precision agriculture, smart farming, application of IoT-based systems in automation, real-time monitoring, resource efficiency and agricultural decision-making (Subeesh and Mehta, 2021). Recent studies further identify the convergence of AI, blockchain and data analytics in the development of interconnected and data-driven agricultural systems (Rustemi and Dalipi, 2025), as well as the integration of AI-ML systems, automation and real-time decision support in digital agri-food systems (Afrifa et al, 20026). However, technological adoption is not determined only by the technology itself. Organizational readiness, skills, infrastructure, data availability and innovation capabilities influence firms' ability to adapt AI and other digital solutions into their business models. Evidence from European SMEs confirms that digital and innovation capabilities are important factors of AI adoption and implementation (Arroyabe et al, 2024). This highlights the managerial aspect of digital transformation and indicates that technological opportunities create value only when complemented by suitable organizational and knowledge capabilities. The furniture industry follows a similar transformation. Digitalization primarily relates to Industry 4.0, automation, digital passportization, marketing features, process improvements and integrated digital production (Popova and Georgieva, 2019). At the same time, sustainability requirements have increased the importance of eco-design, resource efficiency, material reuse and circular business models. Recent research shows that digital technologies can support circular strategies in the furniture industry by facilitating interaction among manufacturers, service providers and consumers, although a gap remains between their technological and practical implementation (Wulf et al, 2024).

However, these research areas are often studied in isolation or within specific sectoral contexts and regions. Less attention is placed on whether structurally different sectors demonstrate comparable changes in the intellectual and thematic structure of management research and on how emerging AI- and data-related topics are positioned within these broader transformations. Bibliometric analysis could provide an appropriate approach for addressing this gap. In this respect, this study explores management research in agribusiness and the furniture industry using bibliometric methods and keyword co-occurrence analysis. This approach uncovers research themes and conceptual structures, as shown in Bukar et al. (2023, p. 2). It can also offer an opportunity not only to identify dominant themes in both sectors but to differentiate between shared trends and those unique to each sector. Scientific publications from the Web of Science Core Collection were retrieved with the search terms "management" AND "agribusiness" and "management" AND "furniture industry." The search returned 1,675 publications on agribusiness and 754 on furniture. VOSviewer was used for bibliometric analysis, enabling network visualization and identification of thematic clusters based on keyword frequency and co-occurrence.

II. THEMATIC CLUSTER ANALYSIS OF MANAGEMENT RESEARCH IN AGRIBUSINESS

Based on the frequency and relationships of the keywords "management" and "agribusiness" in the analyzed publications, 11 main clusters have been identified (see Figure 1). Keywords that are positioned nearer within a cluster tend to appear together more frequently in the analyzed publications, suggesting common thematic areas. The identified clusters are as follows:

Cluster 1 (Red): "Digital transformation and smart agri-food systems". This research cluster covers areas such as digitalisation, smart agriculture and tech transformation, focusing on digital agriculture, AI, big data, blockchain, IoT, smart farming, precision agriculture and supply chains. These interconnected keywords show digital tech as an important field for achieving efficiency and competitiveness in agriculture. Advances in AI, big data and blockchain gives new opportunities for traceability, automation, and process optimisation in agri-food supply chains. Digital transformation is changing agribusiness through data-driven decisions, predictive analytics, and big-data-based models. Since 2022, the rise in publications indicates this is an emerging and rapidly expanding research field.

Cluster 2 (Green): "Performance, productivity, and sustainable farm management". Performance remains a main theme in the cluster, but understanding of organisational performance is shifting. Earlier research concentrated on productivity and financial metrics, whereas more recent studies also incorporate green innovation, environmental concerns and technological factors. This reflects a move from a narrow economic view to a broader, multidimensional concept of sustainable performance, considering economic, social and environmental outcomes as interconnected.

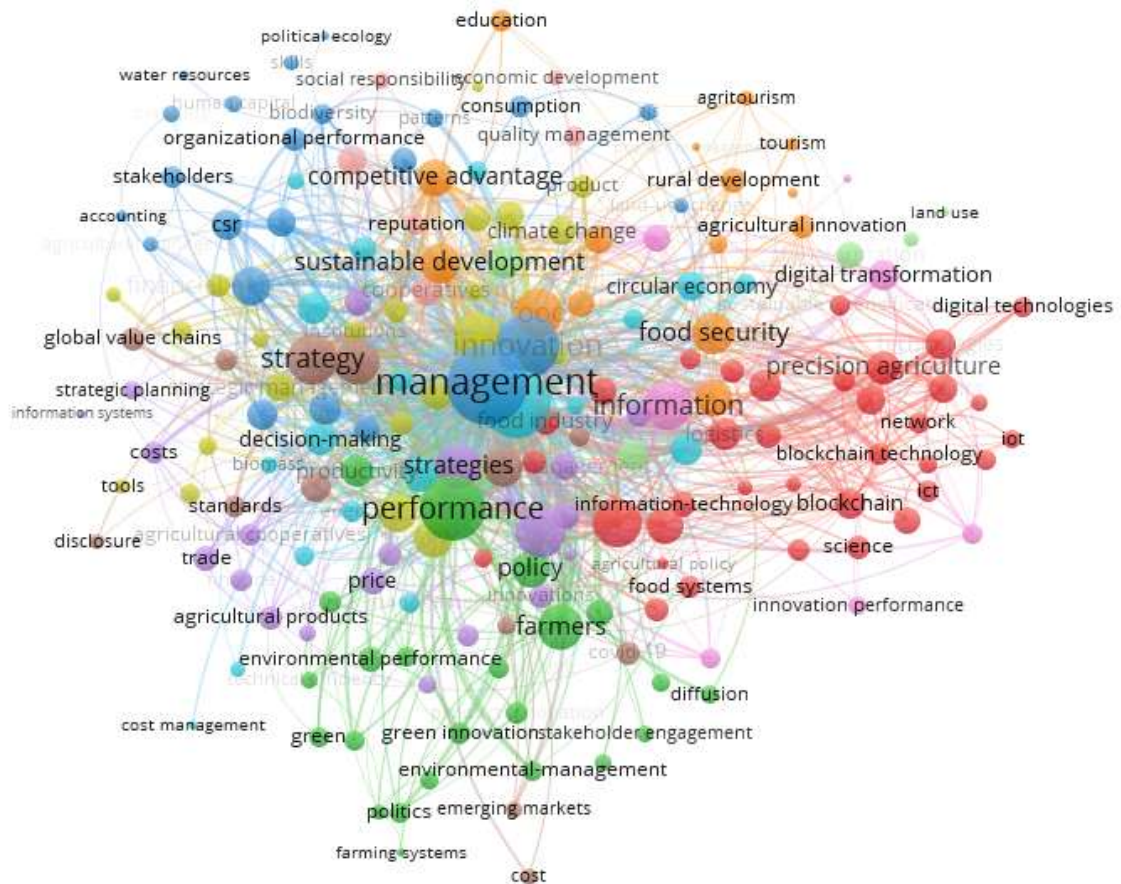


Fig. 1 Cluster map of keywords in publications on “management” and “agribusiness”

Source: Based on data from the Web of Science, processed using VOSviewer, N = 1675

Cluster 3 (Blue): “Management, innovation and organisational resilience”. Management is the main theme in the blue cluster, connecting other areas and highlighting that managerial skills are essential for innovation. Innovation is seen as part of broader organisational capabilities, including adaptability, knowledge management, stakeholder engagement and sustainable practices.

Cluster 4 (Yellow): “Value Chains, networks and competitiveness”, highlights a shift from firm-centred to network-oriented approaches. The competitiveness of agricultural enterprises relies on their internal resources and their position within networks. In this respect, participation in global and regional value chains transfers technologies, knowledge and practices. Value chains are seen as systems for production and distribution as well as tools for boosting innovation capacity.

Cluster 5 (Purple): “Knowledge management, markets and strategic positioning” emphasizes the intangible resources as competitive advantages. Knowledge, organizational learning, marketing capabilities, and cooperative structures are essential for enterprise development, especially for small and medium-sized enterprises with limited innovation resources.

Cluster 6 (Light Blue): “Sustainability, circular economy and resource efficiency” addresses the environmental core of the research, encompassing sustainability, circular economy, resource efficiency and environmental management. The rise of circular economy ideas after 2022 shows a shift from focusing on reducing environmental harm to models emphasizing resource recovery, recycling and reuse of materials.

Cluster 7 (Orange): “Food security and sustainable rural development” broadens the view of agribusiness as part of a wider socio-economic system, linking innovation to economic performance and resilient, sustainable food systems.

Cluster 8 (Brown): “Risk management, globalisation and institutional resilience”. Its significance has grown since 2020 due to global disruptions, especially COVID-19, highlighting resilience, adaptability, and uncertainty in scientific research papers.

Cluster 9 (Pink): "Information systems, Industry 4.0 and innovation performance" explores the links between digital transformation, information systems and how organizations innovate. It focuses on

companies' potential to generate value through improved innovation, streamlined processes and organizational change. The research area also explores how digitalisation leads to measurable economic and managerial results.

Cluster 10 (Coral): "Quality, trust and social responsibility" covers research on the social and institutional aspects of agri-food systems. Main themes include quality management, certification, reputation and social responsibility, emphasizing trust, transparency and stakeholder expectations. It reflects a shift in which competitiveness relies not only on cost and efficiency, but also on an organisation's ability to meet social and environmental standards and expectations. Quality, CSR, ESG, sustainability policies and reputation are seen as strategic resources that build trust, improve market position and boost long-term competitiveness in response to sustainability demands.

Cluster 11 (Light Green): "Natural resource management and transformational processes" focuses on the resource base of agribusiness and strategies for management to adapt to shifting environmental and economic conditions. Main themes include resources, land use, water quality, transformation, and management, emphasizing the significance of effectively managing land, water, and natural capital to achieve sustainable development. The research explores natural resource transformation, sustainable practices, ecosystem conservation and enhancing agribusiness's adaptive capacity to environmental challenges. It shifts from broad sustainability concepts to specific managerial methods that balance economic efficiency, resource security and ecosystem preservation.

The cluster analysis shows a shift in agribusiness management scientific research from production and efficiency to broader themes like digitalisation, innovation, sustainability, and value creation. Currently scholars are viewing agribusiness as a dynamic innovation ecosystem where competitiveness relies on technological, managerial and sustainable resource management and participation in value chains. Literature links agricultural enterprises' innovation potential to integrating new technologies, knowledge and organizational solutions in response to economic and environmental changes. Since 2022, themes like AI, smart agriculture, blockchain, circular economy, green innovation and performance measurement point to a new paradigm in which digital integration, environmental responsibility, and strategic knowledge are essential for decision-making, adaptability, and long-term value across agri-food chains.

III. CLUSTER ANALYSIS OF TRENDS IN MANAGEMENT RESEARCH IN THE FURNITURE INDUSTRY

Eight main clusters have been identified based on the frequency and relationships of the keywords "management" and "furniture industry" in the extracted and analyzed WoS publications (see Figure 2):

Cluster 1 (Red): "Market development, technology and strategic management" examines how furniture companies adapt in response to technological advancements, international competition and changing markets. Main themes in the cluster include technology, strategies, product development, logistics, e-commerce, growth, knowledge, investment and a resource-based view, emphasizing the connection between technological innovation, strategic management and sustained competitive advantage. The rise of e-commerce, digital customer channels, and new logistics models is changing traditional production, distribution and international market approaches. According to the resource-based view, competitiveness depends on developing and leveraging intangible resources like organizational knowledge, technological capabilities, managerial skills and innovation. Technology now serves as a strategic factor of positioning, value creation and long-term industry growth.

Cluster 2 (Green): "Innovation, management and enterprise competitiveness". Researches on innovation in the cluster goes beyond new technologies including new products, process improvements, organizational change and new business models. Networking and knowledge exchange with external partners, like suppliers, clients, research institutes and global value chain participants, are seen as essential for boosting innovation. Competitiveness increasingly relies on combining internal resources with external knowledge and partnerships.

Cluster 3 (Blue): "Industry 4.0, digitalization and efficient manufacturing" focuses on the technological transformation of the furniture industry through intelligent manufacturing. The increase in AI and Industry 4.0 research after 2022 indicates a growing interest in the field. These technologies support automation, data-based decision-making, quality enhancements and resource optimization, assisting furniture companies in minimizing losses, personalizing products and responding to market shifts and clients' demands.

Cluster 4 (Yellow): "Sustainability, circular economy and supply chain management" examines how the furniture industry is transforming toward sustainable, resource-efficient models. This transformation moves from linear to circular practices, focusing on material reuse, product longevity, waste reduction and resource efficiency. Design plays a significant and strategic role, not just in functionality and aesthetics but also in sustainability. Supply chain management includes environmental criteria, traceability and partnership collaboration. The competitiveness of furniture firms is seen as depending on optimizing processes and building sustainable relationships with suppliers, customers and business partners from abroad.

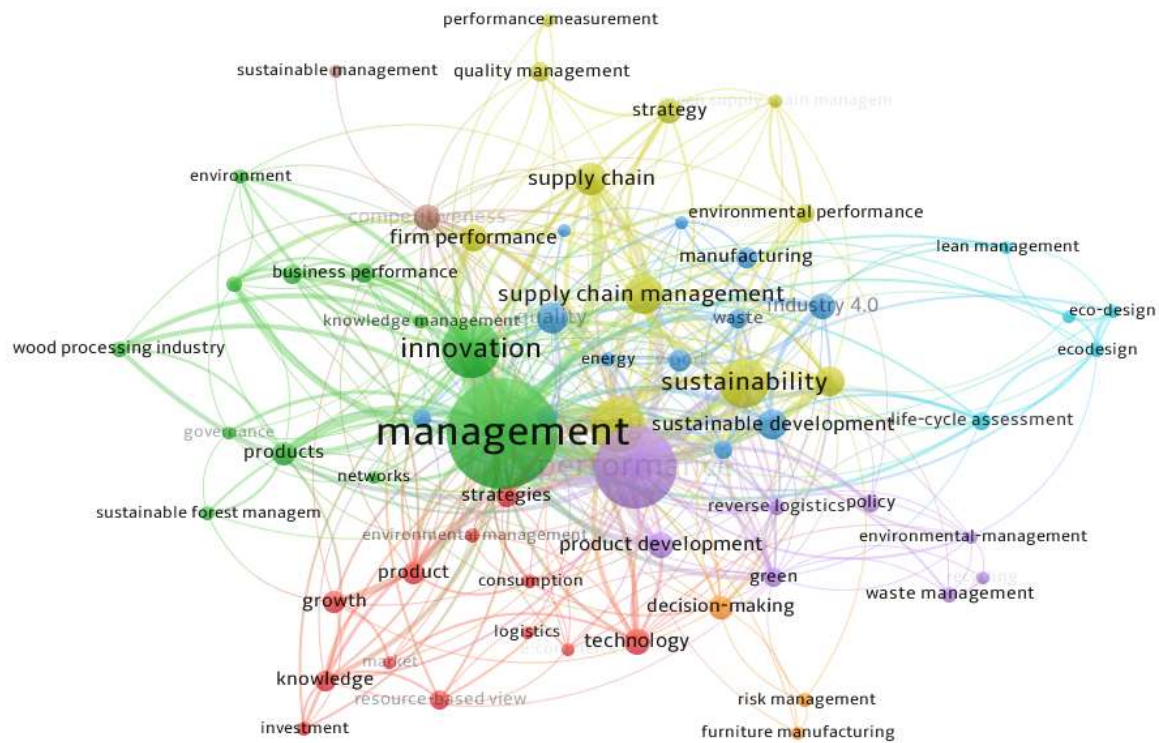


Fig. 2 Cluster map of keywords in publications on “management” and “furniture industry”

Source: Based on data from the Web of Science, processed using VOSviewer, N = 754

Cluster 5 (Purple): “Green management, environmental performance and reverse logistics” focuses on the environmental transformation of furniture companies and sustainable production. The studies in the cluster indicates a change in how organizational performance is assessed including environmental impact, waste reduction and resource management alongside traditional efficiency metrics. Green innovation is seen as both regulatory compliance and a strategic tool to boost competitiveness. Environmentally friendly solutions help companies optimize processes, cut resource dependency and create higher-value-added products. As a result, environmental management is seen as essential for transitioning to circular business models and sustainable development in the furniture industry.

Cluster 6 (Light Blue): “Eco-design and product life cycle management”. Main terms in the cluster include eco-design, product design, life-cycle assessment and lean management, emphasizing product innovation, resource efficiency and reducing environmental impacts. This scholars' research in the field reflects a shift in how design is viewed, from merely improving aesthetics and function of furniture to being a strategic tool for sustainability and innovation. Innovation starts at the design stage, influencing product features, material choices, and extending product lifespans. Eco-design plays a significant role in transitioning to circular production models and enhancing industry sustainability.

Cluster 7 (Orange): "Production management, risk and decision-making" covers studies on managerial strategies that enhance the resilience, adaptability and efficiency of furniture companies in an evolving and uncertain environment. It highlights the need for flexible production and management systems to address global challenges like market instability, supply chain issues, consumer demand shifts and economic uncertainty. Risk management is seen as a strategic process that involves identifying threats, assessing their impact, and developing appropriate responses. Effective planning, resource management and timely decision-making are considered important factors for sustainable growth in furniture businesses.

Cluster 8 (Brown): “Competitiveness and sustainable management”. In a global market, furniture companies now compete not only on reducing cost and prices but also on innovation, adaptability and responsible resource use. Here, sustainable management is seen as a strategic method that integrates economic, environmental and organizational resilience. Companies that incorporate these elements into their models improve innovation and growth in response to fast-moving market and technological shifts. The cluster analysis shows that the furniture industry is shifting from a traditional model focused on resources, costs and capacity to a new one based on knowledge, digitalization and global integration in the value chain creation. Technology solutions now serve as main drivers for adaptation, innovation and growth. The future furniture industry success depends not only on improving production but also on

engaging with knowledge networks and collaborating on technology. This transition indicates a new competitiveness model focused on innovation, sustainability and strategic flexibility.

IV. DISCUSSION OF THE RESULTS

The analysis shows a generally similar evolution of management research in both agribusiness and the furniture industry. In both fields, the literature has moved beyond traditional issues regarding efficiency, productivity and resource management toward a broader understanding of competitiveness based on innovation, knowledge, digital technologies, sustainability and value-chain integration. This shift suggests that competitive performance is becoming more linked to an enterprise's ability to acquire knowledge, adopt new technologies, collaborate with external partners and respond to evolving technological and market conditions.

The concept of innovation is changing and becoming more multidimensional. It extends beyond R&D and technological development including organizational change, new business models, knowledge sharing and inter-organizational collaboration. The co-occurrence of innovation with knowledge, managerial skills, networks and technology suggests that innovation is a process integrating internal organizational capabilities with external knowledge sources. These findings align with the OECD's analysis of how global value chains and innovation networks are interconnected, which highlights the interdependence between the cross-border organisation of production and the international flows of intangible and knowledge-based assets (OECD, 2017). This relationship is especially important for digital transformation, where successful technology adoption depends not only on access to technological solutions but also on a firm's capability to integrate them into existing processes and managerial practices. The current study results show that in agribusiness scholars' research digital technologies are viewed within a broader agri-food system in which production, environmental conditions, supply chains and market information are connected. This result is in line with the conclusions of Shaikh, Rasool, and Lone (2022), who support the idea that AI, machine learning, IoT, sensors, and related technologies are important components of the transition from traditional agriculture toward precision agriculture and smart farming. In the furniture industry, digitalization is closely linked to optimizing production, sustainable design, circular economy practices and resource efficiency manufacturing. This could indicate that digital transformation progresses along sector-specific pathways even when aiming for similar strategic goals.

The growing role of artificial intelligence and data-driven technologies is becoming more important in the analyzed sectors. AI and ML helps digitalization to shift from collecting information and automating processes to supporting predictive analytics and decision-making. In agribusiness, their potential is related to forecasting, resource allocation, production monitoring and supply-chain management. In the furniture industry, main applications include demand forecasting, production planning, predictive maintenance, quality control, material optimization and data-driven product development. Therefore, the common factor between the two sectors isn't necessarily the use of the same technologies but the increasing significance of data as a strategic asset for managerial decisions. Lada et al. (2023) found a relationship between organizational readiness and AI adoption, as well as between top-management commitment and AI adoption. This can indicate that the AI and ML implementation relies on factors like digital maturity, technological infrastructure, data quality, employee skills, managerial capabilities, organizational readiness and access to external knowledge. This distinction is important because enterprises may have access to similar technologies but differ substantially in their capacity to transform them into innovation and competitive value.

The results of the current study also highlight the role of value chains in the agribusiness and furniture sectors' transformation. Innovation and digitalization are no longer limited to generation and implementation by individual companies. Instead, value chains are seen as ways for transferring knowledge, technology and data among suppliers, producers, customers, research institutions and other stakeholders. This finding supports Glachant (2013), who highlights the role of global value chains in spreading technologies and the importance of technological absorptive capacity to benefit from these flows. In agribusiness, such integration can support traceability, food security, forecasting and supply-chain resilience, whereas in the furniture industry it can improve coordination in sourcing, production, design and distribution.

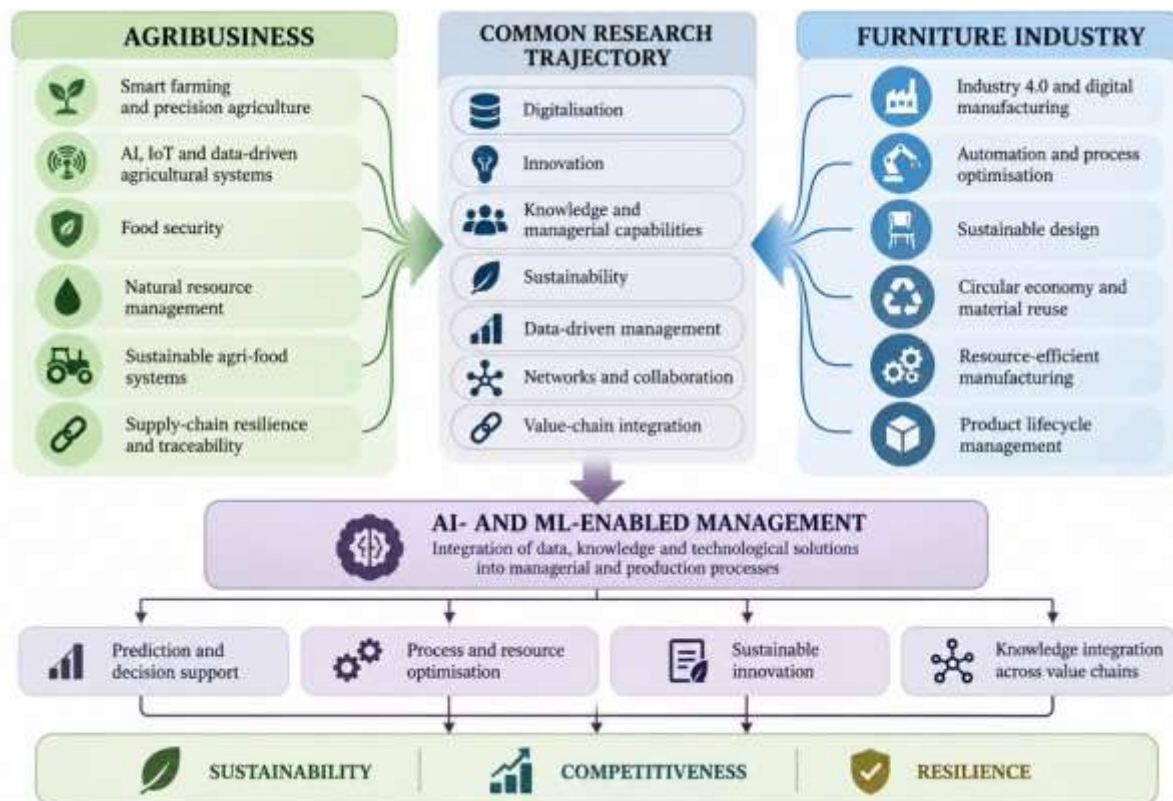


Fig. 3 Conceptual Framework of Digital, Sustainable, and AI-Enabled Management Transformation
 Source: Gemini Notebook based on the author's findings and bibliometric analyzes

The evolution of the literature suggests a shift toward a research agenda in which AI and ML should be examined not as isolated technological solutions, but as factors for organizational and value-chain transformation. And from this perspective - as part of a broader institutional, economic and innovation ecosystem. This perspective is particularly relevant in the European context. Although the European Union looks for establishing a common regulatory and economic framework, significant differences can be found across Member States in terms of administrative procedures, institutional capacity, digital maturity, innovation performance, access to finance and the conditions under which new technologies are developed and adopted. These differences can influence the speed of AI research progress and how research results are translated into real-world applications. This issue can be of importance when EU is analyzed alongside other major economies, such as the United States, China and India. The existence of a common European regulatory framework does not necessarily refer to an uniform conditions for AI development and implementation across countries, sectors and firms. From this point of a view, future research could more in deep discuss AI adoption primarily at the level of individual technologies or firms and investigate the extent to which institutional and economic fragmentation influences the emergence of AI-based innovation ecosystems. It could be useful to consider whether increasing interoperability of data, research infrastructures, regulatory practices and innovation-support mechanisms can enable smoother cross-border knowledge exchange and help turn AI research into real-world applications. This question could be relevant for sectors such as agribusiness and the furniture industry, where value chains frequently extend across national borders and where technological transformation depends not only on firm-level capabilities but also on networks of suppliers, research organisations, public institutions and others.

V. CONCLUSIONS

This study offers a comparative bibliometric analyzes of the development of management research in agribusiness and the furniture industry over the period 2000–2026. The findings indicate that, despite their different production and market characteristics, both research fields are undergoing a shift toward management approaches in which innovation, digital transformation, sustainability and value-chain relationships are strongly interconnected. The identified thematic structure also reflects a broader shift in how competitiveness is understood, emphasizing knowledge, technological skills, organizational flexibility and collaboration between organizations.

While the two sectors share a common shift toward technology-enabled and sustainability-oriented management, the application of these trends reflect their specific technological, environmental and organizational characteristics. This suggests that the effects of digital transformation cannot be fully

understood through a universal management framework but should be examined in relation to regions and sector-specific conditions as well as countries' regulations.

The results further suggest that the growing intersection between digitalization, innovation, knowledge and value-chain integration offers an important research context for applying artificial intelligence and machine learning. Instead of viewing AI and ML as standalone technological advances, they should be seen as components of a larger shift toward data-driven and intelligent management systems. Their effectiveness relies on enterprises' ability to convert data and technology into practical knowledge and efficient managerial decisions.

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CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest in relation to the publication of this article.

AUTHOR CONTRIBUTIONS

Daniela V. Georgieva was responsible for the overall conceptualization and methodological design of the study. Her contribution included literature collection and review, secondary data collection, identification of the methodology for data analysis, data preparation and analysis using VOSviewer, identification and interpretation of the thematic clusters and preparation of the manuscript. She also developed the introduction, cluster analyses, discussions and formulated the main conclusions, contributing to the overall interpretation of the research findings. Teodora Georgieva contributed by providing comments and suggestions to the Discussion and Conclusion sections of the manuscript.

ETHICAL APPROVAL

This study relied exclusively on secondary sources and did not involve human participants or animals. Therefore, ethical approval was not required.

INFORMED CONSENT

Not applicable.

DATA AVAILABILITY STATEMENT

This study did not produce or analyze new empirical data. All materials and sources are publicly accessible and properly cited in the reference list.

STATEMENT ON THE USE OF GENERATIVE AI

Generative artificial intelligence (AI) tools were limited to tasks such as grammar correction, language translation, editing, stylistic refinement, and manuscript formatting. Gemini Notebook was used only for visualization of figure 3 based on the authors discussions and bibliometric review findings.

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