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AI-BASED INNOVATION MANAGEMENT: A BIBLIOMETRIC ANALYSIS

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Abstract
Innovation management is widely recognized as a critical driver of organizational performance, competitiveness, and long-term growth. The advent of advanced digital technologies, particularly artificial intelligence (AI), has transformed how organizations approach innovation, positioning AI not merely as a supportive tool but as a strategic enabler of knowledge creation, product development, and business model innovation. Despite the increasing relevance of AI in innovation management, current research remains fragmented, focusing largely on specific applications such as machine learning for product design, predictive analytics for strategic planning, or natural language processing in knowledge management. Consequently, there is a lack of comprehensive understanding that integrates technological, managerial, and societal dimensions, limiting both theoretical advancement and practical guidance for organizations aiming to leverage AI for innovation.
This study addresses this gap through a systematic bibliometric analysis of the AI-based innovation management literature. Using Scopus as the primary data source, publications up to August 31, 2025, were analyzed to map the field's evolution, thematic clusters, key contributors, and emerging trends. The analysis employed performance indicators including publication counts, citation patterns, h-index metrics, and science mapping methods such as keyword co-occurrence and co-authorship networks. Visualization was performed using VOSviewer to identify thematic clusters and interrelationships.
Results indicate that the field has undergone two distinct phases. The formative phase (1993–2015) was characterized by sporadic publications and limited academic visibility, while the growth phase (post-2018) exhibits exponential increases in both publications and citations, reaching a peak of 86 publications and 2,175 citations in 2025. The bibliometric mapping identified eight major thematic clusters: (1) Generative AI, NLP, and innovation practices; (2) Industrial innovation, risk, and strategic management; (3) Artificial intelligence, technology management, and foresight; (4) Research methods, organizational change, and knowledge work; (5) Decision-making, design, and innovation processes; (6) Sustainability, risk, and societal impacts of technology; (7) Open innovation, SMEs, and technology-driven entrepreneurship; and (8) Digital transformation, global competitiveness, and management practices. These clusters illustrate the field's interdisciplinary nature, bridging technical, managerial, and societal perspectives. Key topics such as generative AI, digital transformation, and sustainability reflect emerging priorities for both research and practice.
The study underscores ongoing gaps and opportunities in the literature, including the need for integrative frameworks that combine technological capabilities, managerial practices, and societal considerations. Furthermore, context-specific research in emerging economies and empirical studies assessing AI adoption across sectors are limited but necessary for advancing both theory and practice. Overall, AI-based innovation management has evolved into a rapidly expanding, influential research field that functions as a transformative force, shaping organizational knowledge creation, strategic foresight, and sustainable competitiveness in the digital economy.
Keywords: Artificial Intelligence, Innovation Management, Digital Transformation, Generative AI, Sustainability, Open Innovation.
JEL classification: O31, O32, L86

Introduction

Innovation management has long been acknowledged as a key driver of organizational performance, competitiveness, and long-term growth (Tidd & Bessant, 2020). The emergence of advanced digital technologies, particularly artificial intelligence (AI), is profoundly transforming how organizations manage innovation. AI can enhance decision-making, accelerate research and development processes, facilitate knowledge recombination, and enable the creation of novel products, services, and business models, positioning it not only as a tool but as a strategic enabler of innovation (Cockburn, Henderson, & Stern, 2018).

Despite the growing scholarly and managerial interest in AI-driven innovation, existing literature remains fragmented. Most studies focus on specific applications, such as machine learning in product design, natural language processing in knowledge management, or predictive analytics in strategic planning, with limited attention to integrative perspectives that capture the intellectual structure, thematic interconnections, and global dynamics of the field (Donthu et al., 2021). This fragmentation highlights the problem addressed in this study: the absence of a comprehensive understanding of AI-based innovation management that links technical, managerial, and societal dimensions. The resulting knowledge gap limits both theoretical advancement and practical guidance for organizations seeking to leverage AI for innovation.

The aim of this study is to systematically map the scientific landscape of AI-based innovation management using bibliometric analysis, thereby providing a comprehensive overview of the field's evolution, thematic clusters, influential contributors, and emerging trends. To achieve this objective, the study addresses the following research questions: (1) How has AI-based innovation management evolved over time in terms of publication output, citation patterns, and intellectual influence? (2) What are the dominant thematic clusters, and how do they reflect the interdisciplinary nature of the field? (3) Which countries, institutions, and international collaborations have played the most significant roles in shaping this research domain? (4) How do emerging topics such as generative AI, digital transformation, and sustainability influence the trajectory of AI-based innovation research? (5) What gaps and opportunities exist in the current literature that can inform future research and managerial practice?

By addressing these questions, the study contributes to both scholarly knowledge and practical application, offering insights into how AI reshapes innovation management and highlighting areas for future research that integrate technological, managerial, and ethical considerations.

Literature Review

Innovation is often described as a process through which an initial invention or creative idea progresses from research and development to market introduction (Jensen et al., 2012). This process typically involves stages such as idea generation, evaluation, and implementation (Schultz, 2019) and is characterized by its capacity to induce changes in operational processes, making it a form of dynamic capability. Innovation processes encompass creative activities that result in new and purposeful business processes, as well as diverse tasks requiring multiple skills and approaches (Voigt, 2013). A major challenge in these processes is ensuring reproducible manufacturing, particularly when there is limited experience with new procedures, materials, and tooling. Developing methods to acquire sufficient process knowledge is therefore essential for the success of innovative endeavors (Großmann & Wiemer, 2010).

Effective management of innovation processes requires a structured approach, incorporating functional, process, and administrative subsystems (Grynko & Gviniashvili, 2017). Evaluating the efficiency of innovation management must consider multiple impacts, including scientific and technological, resource-related, economic, financial, and social effects (Rybin et al., 2020; Junior et al., 2012). Innovation management integrates disciplines such as technology management, research and development, and process management to optimize the creation and implementation of innovative products and services (Zabala-Iturriagagoitia, 2014).

A variety of tools and techniques, including design thinking, business model canvas, and technology watch, are used to systematically observe, analyze, and leverage technological information, enabling firms to align their technological base and internal competencies with external signals (Hurni & Grösser, 2017). Organizations must also develop flexible and sustainable structures and cultures to adapt effectively to environmental changes and emerging challenges as they grow (Yu, 2017).

Recent literature emphasizes that AI does not merely optimize existing processes but can fundamentally transform the nature of innovation processes and research and development organizations. AI supports human competencies across different stages of the innovation process, including opportunity identification, solution development, and testing (Haefner, 2021). The development of advanced deep learning methods positions AI as a "discovery tool", capable of accelerating innovation through improved prediction, data exploration, and automation of routine experiments. At the same time, concentration of data and algorithms in the hands of a few firms may constrain overall innovation unless appropriate data-sharing mechanisms are in place (Cockburn, Henderson & Stern, 2018).

From a managerial perspective, the concept of *prediction machines* illustrates how decreasing prediction costs shift strategic decision-making value toward judgment, creativity, and implementation as key areas for innovation. Consequently, firms must reconfigure resources, processes, and business models to capitalize on lower prediction costs (Agrawal, Gans & Goldfarb, 2018).

AI also enhances *innovation capabilities*. Literature proposes a taxonomy of AI applications in innovation, such as "replace" (substituting human functions), "reinforce" (strengthening human competencies), and "reveal" (identifying new opportunities), and identifies critical organizational capabilities for effective AI deployment, including data management, resource integration, and adaptive culture. At the same time, a gap persists between managerial expectations and actual AI adoption: managers often view AI as a strategic technology, but transformation requires changes in competencies, decision-making processes, and data governance. Competitive advantage stems not from possessing AI technology alone, but from the ability to integrate it with organizational capabilities (Brynjolfsson & McAfee, 2017).

Overall, literature highlights that (1) AI has the potential to radically transform knowledge production and innovation processes, but outcomes depend on data access and management practices, and (2) transformation requires new organizational capabilities, including data governance, interdisciplinary integration, and adaptive innovation routines. There is also a pressing need for empirical studies comparing AI effects across sectors, as well as research on public policies promoting data sharing and transparency to prevent innovation concentration in the hands of a few actors (Gama & Magistretti, 2023; Haefner et al., 2021).

Methodology

This study employs a bibliometric approach to systematically examine the development and intellectual structure of the research domain on AI-based innovation management. Bibliometric analysis has gained wide acceptance as a rigorous method for mapping scientific fields and evaluating their conceptual foundations (Donthu et al., 2021). Following the framework proposed by Zupic and Čater (2015), the methodological process was structured into five stages: design, compilation, analysis, visualization, and interpretation.

In the first stage, the study design and research questions were defined to capture the scope, structure, and emerging themes in AI-based innovation management. The second stage involved data compilation. Bibliometric data were retrieved from the Scopus database, which is widely recognized for its comprehensive coverage of peer-reviewed publications. The search was conducted between 5 and 10 September 2025, considering publications available up to 31 August 2025. To ensure relevance and focus, the following search query was applied: *(TITLE-ABS-KEY ("AI") OR TITLE-ABS-KEY ("artificial intelligence") AND TITLE-ABS-KEY ("innovation management")) AND (LIMIT-TO (LANGUAGE, "English"))*

The third stage encompassed performance analysis and science mapping. Performance analysis was conducted using publication-related indicators (e.g., number of publications per year, most productive authors, journals, and institutions) and citation-related indicators (e.g., total and average citations per article). Science mapping was applied to explore the conceptual and intellectual structure of the field. In particular, keyword co-occurrence analysis was performed to identify clusters of research themes, uncover dominant topics, and trace their evolution over time.

The fourth stage, visualization, was carried out using VOSviewer (Nees Jan van Eck and Ludo Waltman, Leiden University, version 1.6.17), a widely used tool for bibliometric mapping. Co-occurrence analysis was based on the full counting method, with a threshold of at least five keyword occurrences for inclusion in the mapping process. This enabled the identification of distinct research clusters and their interrelationships.

Finally, in the interpretation stage, the findings were synthesized to address the research questions and provide insights into the evolution, current state, and future directions of AI-based innovation management. This systematic process ensured transparency, reproducibility, and alignment with best practices in bibliometric research.

Results

The article that can be considered the first Scopus-indexed publication in the domain of AI-based innovation management is: *Toward a knowledge-based framework to foster innovation in networked organizations*. In *Proceedings of the Seventh International Conference on CSCW in Design (CSCWD 2002)* (Spinosa et al. 2002). This pioneering work introduces theoretical and technological foundations for innovation management in networked organizations, such as virtual, extended, and distributed enterprises. The authors emphasize that, in a competitive environment, managers should deliberately adopt information technology solutions to support knowledge and intellectual capital management. The paper particularly addresses the fundamental research question: how can information technology be leveraged to capture individual knowledge and intellectual capital and transform it into innovative products and services exploitable by the organization? In response, the authors propose an IT-based framework designed to support the full knowledge life cycle in networked organizations. As such, this publication marks the starting point for research linking knowledge management, information technology, and innovation, laying the groundwork for what is today referred to as *AI-based innovation management*.

Since this initial contribution, research on *AI-based innovation management* has evolved gradually, showing a clear trajectory from isolated publications to a rapidly expanding research stream. The first Scopus-indexed publication appeared in 1993, followed by a long period of minimal activity, with the next paper published only in 2002. Between 2003 and 2010, contributions were sporadic, rarely exceeding one study per year, which illustrates the limited academic attention given to this field at that time. A modest increase occurred between 2011 and 2014, when three to four papers appeared in certain years, though the area remained relatively niche. From 2015 onwards, publications began to emerge more regularly, and by 2018, a new phase of development was evident. The year 2019 marked a turning point, with 16 publications indicating a surge of scholarly interest. This momentum continued into 2020 with 20 contributions, highlighting that the field was gaining recognition as a relevant area of study.

The trend accelerated significantly from 2021 onwards, with 27 publications in 2021 and 29 in 2022, demonstrating consistent growth. In 2023, the number of studies nearly doubled to 36, reflecting the increasing importance of AI-driven innovation in both academic and practical contexts. By 2024, the field had expanded even more rapidly, with 64 publications, more than doubling the output of just two years earlier. The peak so far has been recorded in 2025, with 86 publications, marking the highest level of activity in the history of the discipline. This rapid rise underscores how *AI-based innovation management* has moved from being a marginal research interest to a central theme in management and technology studies. The growing body of literature reflects a shared recognition among scholars and practitioners that artificial intelligence is becoming a critical enabler of innovation, as enterprises increasingly adopt AI-based solutions to secure and sustain competitive advantage in the near future.

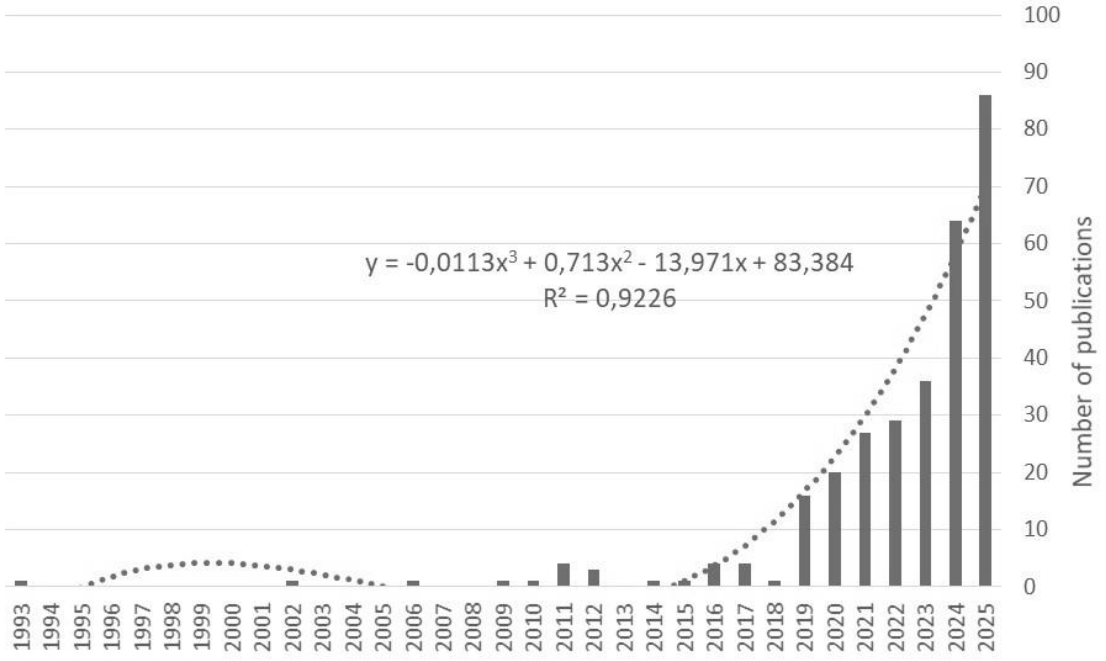

Fig. 1. Number of publications related to AI-based innovation management
Source: Scopus data, 31.08.2025

The scientific landscape of *AI-based innovation management* demonstrates both a significant growth in research output and an accelerating accumulation of scholarly influence. In total, the field has generated 6,490 citations with an h-index of 31, which reflects both productivity and impact at a relatively mature level of development (Figure 2). The temporal distribution of publications and citations reveals a two-phase evolution: an early formative stage with sporadic contributions and limited visibility, followed by a phase of exponential growth beginning after 2018.

During the initial stage (2002–2015), annual publication counts were low, typically between zero and one paper per year, and citation volumes remained modest, rarely exceeding 25 per year. This pattern indicates a marginal research area with limited academic attention. A gradual increase is observable from 2016 onward, when small but consistent publication activity (three to four papers annually) began attracting a growing number of citations, reaching 22 in 2016 and 25 in 2017. The first notable breakthrough occurred in 2019, when 16 publications generated 39 citations, followed by 20 publications and 121 citations in 2020, which signaled the field's entry into a phase of broader academic recognition.

The second phase is characterized by accelerated expansion and heightened citation impact. In 2021, publications accumulated 305 citations, while in 2022, publications nearly doubled the citation count to 560. The growth intensified in 2023, when 36 publications were cited 1,050 times, reflecting a marked increase in knowledge diffusion and scholarly engagement. The trend continued sharply upward in 2024, with 64 publications generating 2,053 citations, and culminated in 2025, when 86 publications attracted 2,175 citations.

The concentration of citations in recent years demonstrates not only the rising output but also the increasing intellectual relevance of *AI-based innovation management*. The data suggests that the field has transitioned from a peripheral niche to a mainstream research domain at the intersection of artificial intelligence, knowledge management, and innovation studies. The steep upward trajectory of both publication volume and citation counts underscores its growing role as a driver of theoretical advancement and practical applications in the context of enterprise competitiveness and digital transformation.

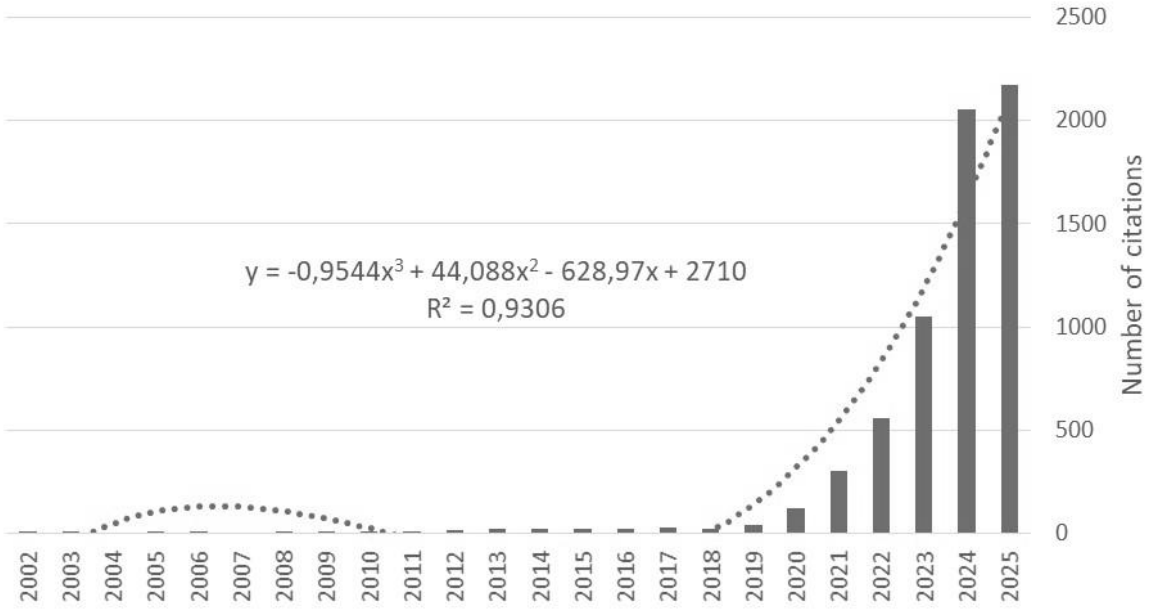

Fig. 2. Number of citations of publications related to AI-based innovation management
Source: Scopus data, 31.08.2025

In the bibliometric analysis, 2,127 keywords were identified. The keyword of *Innovation Management* (161 occurrences) is at the center of current discussions on how organizations can create, manage, and scale new ideas. Closely related to it is *Artificial Intelligence* (147 occurrences), which increasingly serves as both a tool and a driver for innovation. The broader theme of *Innovation* (55 occurrences) shows that the topic is studied not only as a managerial process but also as a fundamental force shaping modern organizations.

Digital Transformation (22 occurrences) and *Generative Artificial Intelligence* (21 occurrences) reflect how organizations are reshaping their operations through advanced technologies. AI-related subfields such as *Decision Making* (19 occurrences), *Machine Learning* (15 occurrences), and *Generative AI* (8 occurrences) indicate the growing importance of algorithmic tools in guiding innovation strategies. The competitive aspect of innovation is highlighted by *Competition* (18 occurrences), showing that technological innovation is strongly linked to gaining and sustaining competitive advantage.

Strategic approaches remain important: Open Innovation (14 occurrences) emphasizes collaboration beyond organizational boundaries, while *Knowledge Management* (12 occurrences) and *Information Management* (11 occurrences) highlight the role of capturing and structuring organizational knowledge. Similarly, *Decision Support Systems* (10 occurrences) and *Big Data* (10 occurrences) demonstrate the reliance on data-driven tools for supporting innovation decisions.

Sustainability also plays an important role: *Sustainable Development* (13 occurrences), *Sustainability* (9 occurrences), and *Life Cycle* (9 occurrences) show that innovation is increasingly evaluated not just by profitability but also by its environmental and social impact. In parallel, *Technology Adoption* (11 occurrences), *Technology Management* (8 occurrences), and *Technological Innovation* (11 occurrences) reflect the managerial need to integrate and govern emerging tools effectively.

From an operational perspective, innovation involves *Innovation Process* (11 occurrences), *Innovations Process* (10 occurrences), *Product Development* (8 occurrences), *Product Design* (8 occurrences), and *Project Management* (8 occurrences). These terms highlight the structured and systematic side of bringing new ideas to life. Supporting this, *Industrial Management* (8 occurrences) and *Strategic Management* (8 occurrences) indicate that innovation must be embedded in broader management systems.

Finally, the forward-looking nature of the field is captured by *Emerging Technologies* (8 occurrences) and *Technological Development* (8 occurrences), supported by *Investments* (11 occurrences) that enable organizations to experiment and scale. The presence of *Human* (8 occurrences) emphasizes that, despite technological advances, people remain central to the innovation process as users, creators, and decision-makers.

The analysis of keyword co-occurrence made it possible to identify eight clusters (Figure 3). The full counting method was applied, with the minimum number of keyword co-occurrences set at three.

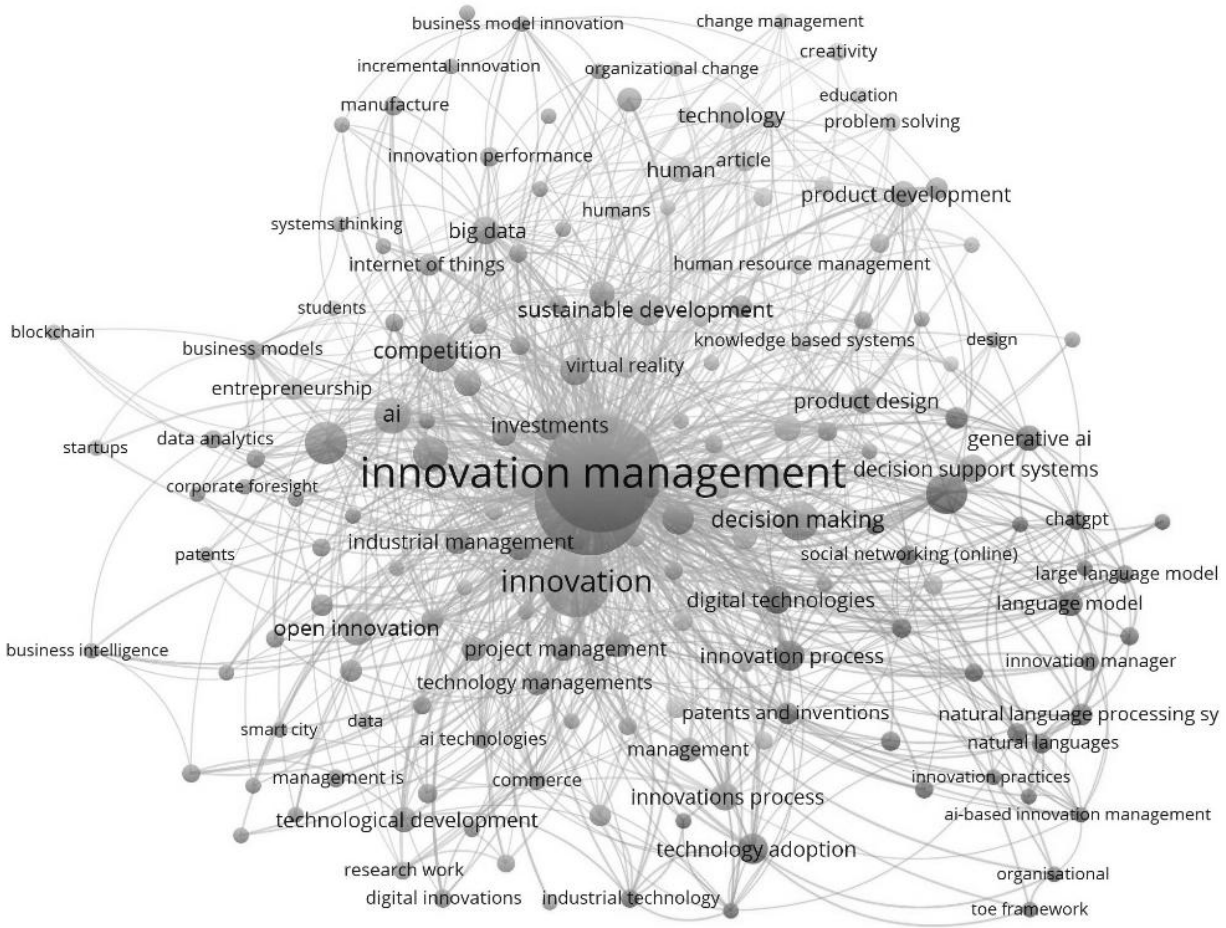

Fig. 3. Co-occurrence of keywords related to AI-based innovation management
Source: VOSviewer, based on Scopus data, 31.08.2025

Cluster 1 is called *„Generative AI, NLP, and Innovation Practices"*. This cluster is strongly focused on the rise of generative artificial intelligence and its applications in organizations. It includes concepts such as ChatGPT, large language models, and natural language processing systems, which represent the cutting edge of AI-driven innovation. Alongside the technical aspects, the cluster contains themes like design thinking, TRIZ, and innovation frameworks, which connect AI technologies to structured methods of creativity and problem-solving. This combination highlights how generative AI is not only a tool for automation but also a driver of new ways of thinking about innovation. The inclusion of terms such as "social networking" and "organizational" shows that these technologies are embedded in wider social and business contexts. They influence knowledge sharing, communication, and collaboration across organizations. Moreover, *innovation management* and *innovativeness* suggest that firms must adopt new managerial approaches to fully exploit these technologies. In practice, this cluster is about linking advanced AI capabilities with the managerial and human dimensions of innovation. It demonstrates that generative AI is shaping both the technical side of language processing and the cultural/organizational side of creativity. Overall, this cluster emphasizes the integration of cutting-edge AI with practical innovation practices.

Cluster 2 is named „*Industrial Innovation, Risk, and Strategic Management*". This cluster highlights the application of innovation management in industrial and manufacturing settings. Concepts such as automation, Industry 4.0, and big data indicate a strong focus on how digital technologies transform industrial operations. The presence of terms like *competitiveness*, *competitive advantage,* and *radical innovation* shows that this cluster addresses how companies use innovation to remain competitive in global markets. At the same time, it includes *risk assessment, risk management, and health care*, reflecting that technological change comes with uncertainty and sector-specific challenges. Manufacturing enterprises and supply chain management are central topics, pointing to the operational and logistical dimensions of innovation adoption. New product development, incremental innovation, and business model innovation illustrate the need to balance radical and incremental changes in industrial environments. Strategic management and strategic decision-making highlight the managerial tools needed to guide these innovations effectively. This cluster therefore represents the intersection between technological innovation, risk, and strategy in industrial contexts. It shows that successful

industrial innovation requires not only new technologies but also robust strategic frameworks. In essence, this cluster captures the challenge of integrating innovation into industrial operations while safeguarding efficiency and competitiveness.

Cluster 3 is labeled *„Artificial Intelligence, Technology Management, and Foresight".* This cluster emphasizes the role of artificial intelligence and emerging technologies in organizational management. It includes central terms such as artificial intelligence, data analytics, and business intelligence, which represent the core of data-driven decision-making. At the same time, it contains themes like corporate foresight, strategic foresight, and technological forecasting, which suggest a strong orientation toward long-term planning and anticipating technological change. The inclusion of *science and technology, technological development,* and *machine learning* highlights the research and technical dimensions of AI integration. Information systems, information management, and digitalization connect this cluster to the digital transformation of organizations. Management research and industrial management indicate that this cluster has both an academic and practical dimension. It explores how companies adopt and manage AI-driven technologies to stay competitive and innovative. The educational aspect, such as *engineering education*, shows that developing the necessary human capital is also a concern. This cluster demonstrates how AI is embedded in management processes, from data analysis to foresight and planning. Overall, it underlines that AI is not just a tool but a strategic enabler for organizations in an era of rapid technological change.

Cluster 4 is called *„Research Methods, Organizational Change, and Knowledge Work"*. This cluster combines methodological approaches, organizational dynamics, and human factors. On the research side, it contains *bibliometric analysis, content analysis, systematic literature review,* and *entrepreneurship,* indicating a focus on academic approaches to understanding innovation and management. On the organizational side, keywords such as *organizational change, human resource management, students, and creativity* suggest a strong link with human capital, leadership, and innovation culture. It emphasizes how research and data analysis can inform practical approaches to organizational transformation. The inclusion of *trust, technological innovation, and knowledge-based systems* suggests that this cluster also considers the social and cultural dimensions of adopting new technologies. Human factors like creativity, problem-solving, and education are seen as essential for successful innovation processes. This cluster also addresses how organizations adapt to change, combining structured methods of analysis with soft skills and leadership. It demonstrates the importance of research-driven insights for guiding change in organizations. Moreover, it connects academic research practices with real-world management challenges. In short, this cluster underlines that innovation is not only technological but also deeply human and organizational.

Cluster 5 is designated as „*Decision-Making, Design, and Innovation Processes".* This cluster revolves around decision-making and innovation design within organizations. It includes concepts such as decision support systems, decision-making processes, and strategic approaches, which highlight the role of structured tools in improving organizational performance. The inclusion of *design and innovations, product design,* and *product development* connects decision-making directly to tangible outcomes in products and services. Research and development management is another key theme, pointing to the systematic nature of innovation activities. The presence of *problem solving, strategic planning,* and *managing innovation* suggests that this cluster is about balancing creativity with structured management approaches. Sales and innovation performance show that commercial outcomes are a key measure of success in these processes. This cluster also emphasizes incremental innovation and practical approaches to product innovation. It shows that organizations must carefully manage the innovation pipeline from ideation to market implementation. Decision support systems and management practices play a central role in ensuring effectiveness. Overall, this cluster represents the operational and managerial side of decision-making for innovation, bridging strategic planning with product and process design.

Cluster 6 is named *„Sustainability, Risk, and Societal Impacts of Technology"*. This cluster focuses on the ethical, environmental, and societal dimensions of technology and innovation. It brings together sustainability-related terms such as *sustainable development, environmental management, and supply chain management,* which indicate the importance of integrating ecological and social concerns into innovation processes. The inclusion of *economic and social effects, life cycle, and learning systems* highlights a systemic perspective on innovation impacts. Risk management, ethical technology, and machine learning show that emerging technologies must be assessed not only for efficiency but also for ethical and social consequences. Agroindustry and industrial sustainability are also mentioned, which suggests that this cluster has a strong relevance for applied industrial sectors and their environmental responsibilities. The presence of *current and literature review* shows that this cluster is anchored in contemporary debates. It emphasizes the need to consider long-term risks, resource efficiency, and ethical responsibility. Companies and policymakers must adopt sustainability-oriented approaches to innovation management. This cluster is therefore about responsible innovation that takes into account risks, ethics, and global challenges. It demonstrates the growing importance of balancing technological progress with sustainability.

Cluster 7 is referred to as „*Open Innovation, SMEs, and Technology-Driven Entrepreneurship".* This cluster captures the ecosystem of entrepreneurship, small and medium-sized enterprises (SMEs), and technology-driven innovation. Keywords like *open innovation, startups, SMEs,* and *patents* reflect the role of intellectual property and collaboration in shaping new business models. The presence of blockchain and intelligent systems highlights how digital technologies enable novel entrepreneurial opportunities. This cluster also emphasizes efficiency, competitiveness, and innovation performance, pointing to

the economic drivers of technology adoption in smaller firms. The role of data, information processing, and innovation is central to enabling flexible, agile, and collaborative forms of business innovation. It shows how startups and SMEs adopt cutting-edge technologies to overcome resource limitations and gain a competitive edge. Patents and inventions highlight the importance of protecting intellectual property in these contexts. Open innovation practices demonstrate the collaborative and networked nature of modern innovation ecosystems. This cluster is highly future-oriented, reflecting how entrepreneurship adapts to emerging technologies and new market opportunities. Overall, it underscores the interplay between technological innovation, small business dynamics, and entrepreneurial strategy.

Cluster 8 is called *„Digital Transformation, Global Competitiveness, and Management Practices".* This cluster emphasizes digital transformation as a strategic and managerial challenge for organizations and economies. It contains central terms such as *digital innovations, digital transformation, technological change, and innovation management.* The presence of "developing countries" highlights the global dimension of digitalization, showing that both advanced and emerging economies face challenges in adopting these technologies. Competitiveness and commerce indicate that digital transformation is linked to economic performance and market adaptation. Project management, management practice, and management process reflect the organizational side of implementing digital strategies. This cluster also connects AI technologies and digitalization with broader management frameworks. It emphasizes how firms integrate technological change into strategic and operational processes. The focus on competitiveness suggests that digital transformation is essential for maintaining or achieving a strong position in global markets. It also underlines the role of managers and innovation leaders in shaping these transformations. Overall, this cluster shows that digital transformation is not only about adopting technologies but also about restructuring business models and organizational practices. It highlights the global, managerial, and competitive aspects of innovation in the digital era.

The geographical distribution of authors contributing to the field of AI-based innovation management demonstrates a strong international scope, with significant concentrations in Europe, Asia, and North America. The leading contributor is Germany with 48 publications, followed by China with 41 and the United States with 32. In Europe, Italy with 30 publications and the United Kingdom with 17 also occupy prominent positions, while in Asia, India with 23 has emerged as a major contributor alongside China. Several other European countries show notable activity, including Sweden with 15 publications, Spain and Australia with 13 each, Austria with 12, Switzerland and France with 10 each, and the Netherlands and Denmark with 9 each. This reflects a strong European research presence in this domain, often associated with innovation policy initiatives and collaborative projects. The Russian Federation with 12 and Ukraine with 7 also demonstrate active involvement, indicating that Eastern Europe contributes meaningfully to the field.

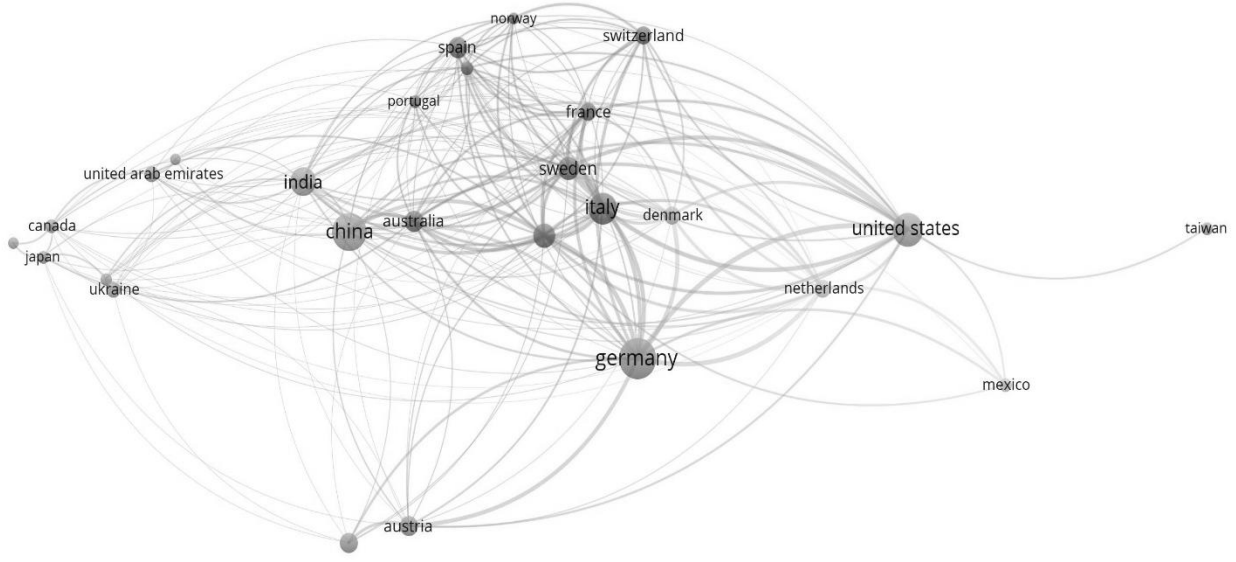

Fig. 4. Bibliometric mapping of countries of publications related to AI-based innovation management
Source: VOSviewer, based on Scopus data, 31.08.2025

Outside Europe, Australia with 13 and Canada with 7 suggest that English-speaking countries with advanced digital economies play a supporting but relevant role. Emerging economies are also represented, with Mexico contributing 6 publications, Brazil and Chile 3 each, and Malaysia 4, pointing to a gradual diffusion of research activity into Latin America and Southeast Asia. In Asia, contributions are further diversified across Taiwan, Japan, and Poland with 5 publications each, South Korea and Norway with 4 each, and the United Arab Emirates with 7, suggesting that innovation management in the context of AI is increasingly addressed by both developed

and rapidly developing economies. Smaller but still relevant contributions also come from countries such as Portugal, Jordan, Greece, and Hungary, each with three to five publications, reflecting the breadth of participation across different research systems. At the global periphery, isolated contributions are recorded from countries such as Zimbabwe, Vietnam, Uzbekistan, Tanzania, Costa Rica, and Bahrain, each with a single publication. Although numerically minor, these cases highlight the global diffusion of interest in AI-based approaches to innovation.

The network of international collaboration within this research field can be further understood through the analysis of clusters of co-authorship. The data reveal distinct groupings of countries that tend to cooperate more closely. For instance, cluster 1 includes Australia, Finland, France, Italy, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom, representing a predominantly European-Western alliance with strong academic traditions in innovation and management studies. Cluster 2 brings together China, Canada, India, Japan, Malaysia, Poland, South Korea, the United Arab Emirates, and Ukraine, reflecting a strong Asia–Pacific orientation with links to North America and Eastern Europe, indicating the global diffusion of knowledge production. Cluster 3, which consists of Austria, Germany, and the Russian Federation, highlights the central role of Central and Eastern Europe in this domain. Cluster 4 links Mexico and the Netherlands, showing emerging cooperation between Latin America and Western Europe. Finally, cluster 5 includes the United States and Taiwan, underlining strong transpacific collaboration.

Overall, the analysis shows that while research on AI-based innovation management is geographically diverse, it is structured around several collaboration hubs that reflect both regional strengths and transnational partnerships. These clusters not only reinforce the role of leading economies in shaping the field but also demonstrate the increasing integration of emerging economies into global research networks.

Discussion

The discussion of the results addresses the research questions by linking bibliometric evidence with the evolution, thematic structure, and global patterns of AI-based innovation management. The first research question concerns the evolution of the field over time. The bibliometric data reveal a clear two-phase development: from 1993 to 2015, publication activity was sporadic, reflecting limited scholarly attention, whereas after 2018, publications and citations grew exponentially, peaking in 2025 with 86 publications and 2,175 citations (Brynjolfsson & McAfee, 2017; Davenport & Ronanki, 2018). This trajectory indicates that AI-based innovation management has moved from a peripheral niche to a mainstream research area, confirming its growing relevance for theory and practice.

The second research question examines dominant thematic clusters. Keyword co-occurrence analysis identified eight major clusters, illustrating the interdisciplinary nature of the field. For example, the cluster combining generative AI with structured innovation practices highlights how AI technologies enable creative problem-solving in organizational contexts (Amabile, 1998; Vial, 2019). Another cluster emphasizing sustainability demonstrates the integration of environmental and societal concerns into innovation management, reflecting the increasing importance of ethical and sustainable innovation frameworks (Geissdoerfer et al., 2017; Schiederig et al., 2012). These findings suggest that AI-based innovation management is simultaneously technical, managerial, and socially embedded.

Regarding the third research question on countries, institutions, and international collaborations, the results show that Germany, China, and the United States are the leading contributors, with strong European, Asian, and emerging economy participation. Co-authorship patterns reveal regional and transnational networks that facilitate knowledge exchange (Hu, et al., 2020; OECD, 2021). This suggests that research productivity is concentrated in regions with strong technological infrastructures and innovation policies, while emerging economies are gradually becoming integrated into global research networks.

The fourth research question concerns emerging topics, including generative AI, digital transformation, and sustainability. The results show that generative AI is not only a tool for automation but also a driver of novel innovation practices, enhancing creativity and accelerating product and service development (Davenport & Ronanki, 2018; Vial, 2019). Digital transformation is closely linked to organizational restructuring and competitive advantage, suggesting that AI adoption reshapes business models and managerial processes. Sustainability, which appears prominently in one cluster, indicates that organizations increasingly evaluate innovation impacts in ethical, environmental, and social terms (Geissdoerfer et al., 2017). These insights show a dual focus on short-term managerial efficiency and long-term strategic orientation in AI-based innovation management.

Finally, the fifth research question focuses on gaps and future opportunities. Despite rapid growth, the field remains fragmented, with limited integration across technological, managerial, and societal dimensions. While human factors such as creativity, leadership, and skill development are acknowledged, their interaction with AI-driven processes requires further exploration (Amabile, 1998; Brynjolfsson & McAfee, 2017). Moreover, the underrepresentation of emerging economies highlights a need for context-specific research. Sustainability-oriented innovation also remains an area that requires deeper theoretical and empirical investigation (Schiederig et al., 2012; Geissdoerfer et al., 2017). Overall, these gaps suggest avenues for developing integrative frameworks that combine technological advancement, managerial practice, and societal impact.

In summary, the discussion demonstrates that AI-based innovation management is a dynamically evolving, interdisciplinary field. The bibliometric evidence confirms its growth, identifies thematic and geographical patterns, and highlights critical areas for future research.

By systematically linking the empirical findings to the research questions, it becomes evident that AI functions both as a practical tool and a strategic enabler, shaping organizational innovation, guiding policy, and supporting global competitiveness.

Conclusions

AI-based innovation management has developed into a rapidly expanding and influential research field, moving from marginal attention in the early 2000s to a mainstream domain after 2018. The field integrates technological, managerial, and societal perspectives, with themes ranging from generative AI and decision support to sustainability, open innovation, and organizational change. Research confirms that AI functions both as a practical tool for improving processes and as a transformative force redefining knowledge creation and foresight.

The analysis highlights strong international engagement, led by Germany, China, and the United States, alongside contributions from Europe, Asia, and emerging economies, with clear patterns of regional clusters and transnational collaborations. Human factors such as creativity, trust, and leadership remain central, while education and skills development are recognized as key enablers of innovation.

The results also point to challenges of knowledge fragmentation, underscoring the need for integrative frameworks that connect technical, strategic, and ethical dimensions. Overall, AI-based innovation management has matured into a cornerstone of digital transformation, offering both theoretical advances and practical tools for organizations seeking sustainable competitiveness in the knowledge economy.

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