

Artificial Intelligence for Product Innovation: A Bibliometric Analysis

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Abstract. Artificial intelligence is rapidly transforming business operations, attracting significant attention for its role in innovation. Even though artificial intelligence and product innovation have already been studied as separate fields, their intersection remains underexplored in the literature. As the adoption of artificial intelligence increases, it is becoming essential for both academia and industry to understand its impact on new product development and business model innovation. A bibliometric analysis was performed on 72 papers sourced from the Web of Science database, published between 2019 and 2024, analyzing publication trends, keyword co-occurrence, collaboration networks, and thematic clusters. This study aims to answer the following research questions: (1) What are the primary research trends in the academic literature at the intersection of artificial intelligence and product innovation? (2) Does the association of artificial intelligence and product innovation represent an area of research with high potential? The results show a significant increase in the number of studies, with a high annual growth rate of 65,28% and a high international co-authorship rate of 48,61%, confirming that this topic is relevant globally. The co-occurrence analysis shows a strong connection between artificial intelligence, innovation, product innovation, and new product development, demonstrating the growing academic interest on this field. The thematic map classifies the intersection of artificial intelligence and product innovation as a motor theme, suggesting strong opportunities for additional research and interdisciplinary studies. This research contributes to the literature by mapping existing research, identifying key gaps, and offering insights for future studies on the role of artificial intelligence for new product development.

Keywords: artificial intelligence, AI in business, product innovation, innovation management, new product development, business model innovation, human-AI collaboration.

Introduction

Artificial intelligence (AI) is evolving rapidly, and companies are increasingly adopting it to improve efficiency and create business value. In recent years, the potential applications of AI in business have been highly studied from different perspectives. At the same time, product innovation, business model innovation, and new product development have been important research areas, with a focus on how companies create new products, optimize business models, and support competitive advantage.

However, even though AI is increasingly applied within numerous business areas, its integration with product innovation remains underexplored in the academic literature. This paper aims to explore if the intersection of AI and product innovation, an interdisciplinary topic at the middle of business and technology, represents a research area with high potential, offering opportunities for additional studies. Given that AI adoption needs a multidisciplinary approach, researchers and practitioners can benefit from a comprehensive understanding of what has already been studied and applied within different business domains (Loureiro et al., 2021).

This study wants to fill this gap by conducting a bibliometric analysis of 72 papers, published between 2019 and 2024, that study the intersection of AI and product innovation. Using

Bibliometrix (Aria & Cuccurullo, 2017), the analysis will identify the main trends and new themes in the field. The study will focus on the following research questions:

RQ1. What are the primary research trends in the academic literature at the intersection of artificial intelligence and product innovation?

RQ2. Does the association of artificial intelligence and product innovation represent an area of research with high potential?

Literature review

Artificial intelligence and business model innovation

Artificial intelligence has developed as a strong force within industries, fundamentally impacting business operations worldwide by creating new opportunities, generating value, and making businesses to integrate it strategically while rethinking their established practices (Enholm et al., 2022; Loureiro et al., 2021; Perifanis & Kitsios, 2023). Organizations that use AI applications tend to achieve serious advantages through automation, including increased revenue, reduced costs, and better operational efficiency, helping workers to focus on processes with added value (Enholm et al., 2022; Kakatkar et al., 2020; Lee & Shin, 2020). In order to accomplish successful digital transformation, organizations need to adopt and implement these new technologies in an effective manner into their business processes, from decision-making based on AI in finance and sales to automating manual processes, improving human-AI collaboration, and increasing employee or customer emotional involvement (Davenport, 2018; Perifanis & Kitsios, 2023).

A systematic literature review by Loureiro et al. (2021) states that artificial intelligence is transforming the workplace by modelling organizational roles, decision-making processes, and employee engagement. Research shows the importance of redefining job functions and supporting employees in adapting to AI changes (Kakatkar et al., 2020; Loureiro et al., 2021). AI plays a growing role in strategic decision-making, project management, and business operations, while also influencing human-machine collaboration (Loureiro et al., 2021; Perifanis & Kitsios, 2023). While organizations adopt AI, there is a higher need to develop important competencies, such as: problem-solving, critical thinking, creativity, and emotional intelligence, also considering a smooth AI adoption and adaptability through employee training under the form of upskilling and reskilling initiatives (Bughin, 2024; Loureiro et al., 2021). Moreover, AI has the potential to improve internal communication, to help problem-solving, and to sustain knowledge creation, contributing to innovation within organizations (Loureiro et al., 2021).

The integration of artificial intelligence in business can support organizational processes by optimizing purchasing and supply chain models, adjusting pricing strategies, improving product development and scheduling, and developing B2B commerce, integrating intelligence into business operations (Sestino & De Mauro, 2022). The increasing value of AI in companies is closely linked to the rise of Big Data, which covers multiple collections of structured and unstructured information, characterized by volume, variety, and velocity, with more particular characteristics such as variability, veracity, and value (Sestino & De Mauro, 2022). As businesses recognize Big Data as a strategic resource, it has fundamentally changed managerial practices, promoting more data-driven decision-making and operational efficiencies (Sestino & De Mauro, 2022). Data-driven decision-making (DDDM) shows the practical impact of AI, improving accuracy, reliability, efficiency, and agility, encouraging more companies to adopt it and managers to explore the most effective business models (Jorzik et al., 2024; Oluwaseun Badmus et al., 2024).

In conclusion, the role of AI in business model innovation (BMI) is becoming more important, making companies rethink main structures and strategies to fully exploit the potential

of AI (Jorzik et al., 2024). Its combination with technologies like cloud computing, blockchain, 6G, and quantum computing extends its applications in diverse fields, while open innovation and data democratization intensifies adoption, making it accessible to non-experts as well (Jorzik et al., 2024). Moreover, collaboration within business ecosystems, such as engaging customers, suppliers, and universities helps transformation using AI, helping businesses to remain competitive and adaptable in an evolving digital environment (Jorzik et al., 2024). However, the successful adoption of digital technologies, including AI, does not automatically generate economic value, because their impact depends on how well they meet a firm's operations, strategy, and user capabilities (Climent et al., 2024). Research shows four main business model types: novelty, efficiency, complementarity, and lock-in, that determine how companies generate and build value through digital transformation (Climent et al., 2024). These configurations contribute to the firm's business model architecture, guiding interactions between internal and external stakeholders to create value exchange and competitive advantage (Climent et al., 2024).

Product innovation and new product development

Innovation is usually divided into four main categories: product innovation (which involves developing new products or improving existing ones), process innovation (which focuses on improving or changing operational processes), organizational innovation (which creates new methods in business practices), and marketing innovation (which adopts new strategies for promoting products and services) (Viveiros Lopes et al., 2016). Effective innovation management is essential for transforming new ideas into tangible outcomes, ensuring a rapid implementation through the optimization of resources to maximize value for consumers (Vătămănescu & Alexandru, 2018). Business success is linked to innovation management, because it supports value creation for stakeholders through the implementation of new or significantly improved products, processes, marketing methods, or organizational approaches adapted to business practices (Jerdea, 2023; Santos et al., 2019; Vătămănescu et al., 2022).

Product innovation is connected to research and development (R&D) activities, demanding long-term commitment, significant fixed costs, as well as a minimum innovation capacity to sustain investments (Hervas-Oliver et al., 2021). Product innovation is most effective when it is supported by customer insights and collaborations with scientific institutions, such as universities, strengthening its role in improving firm innovativeness and new product development (Hervas-Oliver et al., 2021). New product development (NPD) involves both the outcome of innovation and the process through which it is created (Marion & Fixson, 2021). While the outcome focuses on the final product, the process perspective analyzes the activities and interactions needed for successfully developing innovation, providing more details regarding how NPD occurs, with new knowledge being generated at every stage, from ideation to commercialization (Marion & Fixson, 2021).

Digital transformation generates fundamental changes within industries, improving innovation, business models, and value chains through smart and connected products (Appio et al., 2021). As a form of process innovation, emerging technologies transform how firms create and deliver products and services, leading to greater customization, integrated product-service offerings, and better solutions (Blichfeldt & Faullant, 2021). Research shows that strong digital capabilities are linked to value creation and long-term competitiveness (Blichfeldt & Faullant, 2021). Besides improving internal efficiency, adopting new technologies allows companies to develop entirely new products, services, or integrated innovations that strengthen their market position (Blichfeldt & Faullant, 2021). For instance, large language models (LLMs) are

opportunities for innovation augmented by AI, particularly in knowledge-intensive processes like NPD (Bouschery et al., 2023). These models, designed to process and generate natural language, support tasks such as machine translation, text summarization, insight extraction, and creative content generation (Bouschery et al., 2023). Their capabilities contradict traditional ideation practices, transforming the role of humans in NPD as AI assumes more cognitive tasks, with LLMs models improving knowledge access and connectivity, finally leading to more innovative and higher-quality outcomes (Bouschery et al., 2023).

Methodology

This study performs a bibliometric analysis to analyze the research landscape, trends, and gaps at the intersection of artificial intelligence and product innovation. Bibliometric analysis is a multi-contextual quantitative method used for assessing academic literature, allowing researchers to identify impactful studies, emerging themes, and collaboration patterns within a specific research field (Donthu et al., 2021; Ellegaard, 2018).

The data for this analysis was collected from the Web of Science (WoS) database in February 2025. To ensure deep understanding, the search query was designed to retrieve relevant articles mentioning both artificial intelligence and product innovation in their topic (meaning the title, abstract, author keywords, or Keywords Plus fields). This initial search generated 91 results.

To adjust the dataset, a multi-step filtering process was applied. First, editorials (2) and retracted publications (1) were removed, leaving a dataset of journal articles, proceeding papers, review articles, and early-access publications, which are summarized in Table 1. Additionally, two papers from 2025, the current and incomplete year, were excluded to maintain a stable dataset.

Table 1. Distribution of retrieved documents by type

Document type	Number of documents
Article	69
Proceeding paper	11
Review article	9
Early access	8

Source: Authors' own research.

Additional filtering was applied based on Web of Science categories, keeping in mind that while AI and product innovation are primarily studied within business disciplines, relevant interdisciplinary contributions also come from computer science and engineering. As shown in Table 2, the final selection included 72 publications, sorted across multiple fields. These categories reflect the interdisciplinary nature of AI and product innovation, including both business-focused and technical perspectives.

Table 2. Distribution of retrieved documents by WoS category

Web of Science category	Number of documents
Business	25
Management	15
Computer Science Information Systems	12
Computer Science Interdisciplinary Applications	8
Computer Science Artificial Intelligence	7
Computer Science Software Engineering	7
Economics	5

Web of Science category	Number of documents
Engineering Multidisciplinary	5
Operations Research Management Science	5
Computer Science Cybernetics	4
Computer Science Theory Models	4
Information Science Library Science	3
Multidisciplinary Sciences	3
Business Finance	2
Green Sustainable Science Technology	2
Mathematics Interdisciplinary Applications	2

Source: Authors' own research.

Since all retrieved documents were in English, no additional language filtering was necessary. There was also no date filtering needed, since the intersection of these topics emerged recently, as we will see in the results and discussion section.

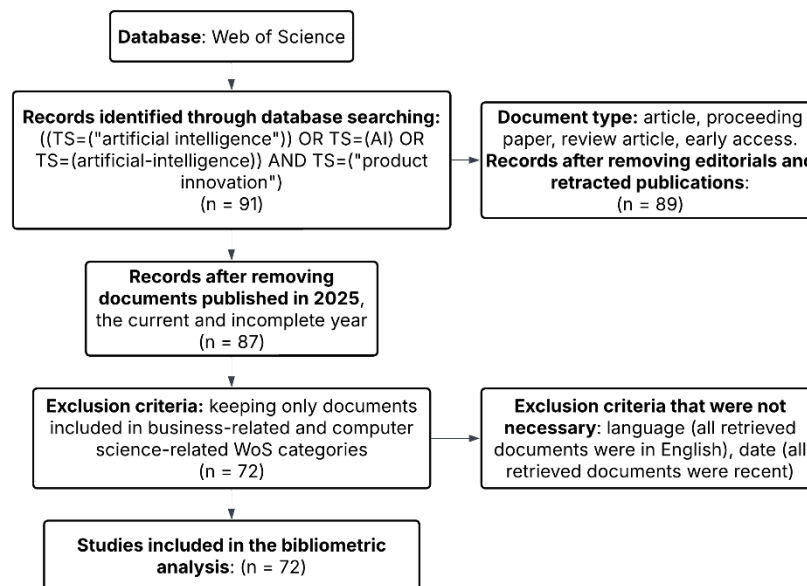


Figure 1. Stages of the data selection process

Source: Author's own processing using Lucidchart.

The bibliometric analysis was performed using Bibliometrix (Aria & Cuccurullo, 2017), a generally used R library for bibliometric studies, together with its no-code interface called Biblioshiny, to simplify visual and network-based analyses. The study analyzed publication trends (noticing how the research on AI and product innovation has evolved over time), co-occurrence network (identifying the relationships between keywords), co-citation trends (mapping the intellectual structure of the field by observing how frequently articles are cited together), keyword trend analysis (following the evolution of research topics), co-authorship networks (showing the collaboration patterns between researchers and institutions), and others.

By applying these techniques, this study provides a structured overview of the research environment, identifying the main contributions, dominant themes, and areas open to deeper exploration at the intersection of AI and product innovation.

Results and discussions

The research on AI and product innovation is recent and growing fast, with all the identified documents being published between 2019 and 2024, and a high annual growth rate of 65.28%, as shown in Table 3. Even though it's new, the field has already gained significant academic impact, as reflected in the average of 16.36 citations per document. Moreover, the dataset includes only academic papers, such as journal articles, conference proceedings, and reviews, indicating the novelty of the topics and that research in this field is mostly shared through fast research rather than books. Also, the high international co-authorship rate of 48.61% strengthens the global interest in this topic.

Table 3. General information about the retrieved records

Description	Results
MAIN INFORMATION ABOUT DATA	
Timespan	2019:2024
Sources (Journals, Books, etc.)	56
Documents	72
Annual Growth Rate %	65.28
Document Average Age	2.03
Average citations per doc	16.36
References	5387
DOCUMENT CONTENTS	
Keywords Plus (ID)	235
Author's Keywords (DE)	338
AUTHORS	
Authors	231
Authors of single-authored docs	14
AUTHORS COLLABORATION	
Single-authored docs	14
Co-Authors per Doc	3.29
International co-authorships %	48.61
DOCUMENT TYPES	
article	50
article; early access	6
proceedings paper	10
review	6

Source: Authors' own processing using Bibliometrix.

The annual scientific production on AI and product innovation has grown significantly in recent years, as shown in Figure 2. From 2019 to 2021, research activity was limited, with only 2 to 5 publications per year, but it began increasing in 2022 (11 articles), followed by steady growth in 2023 (14 articles) and a sharp rise in 2024 (37 articles). This sudden increase suggests a growing academic interest on the role of AI in product innovation, most probably caused by advancements in AI technologies, greater industry adoption, and recognition of its transformative potential in product development. The high rise in 2023 and 2024 also aligns with the high annual growth rate (65.28%) observed earlier, supporting that this is a rapidly expanding research field.

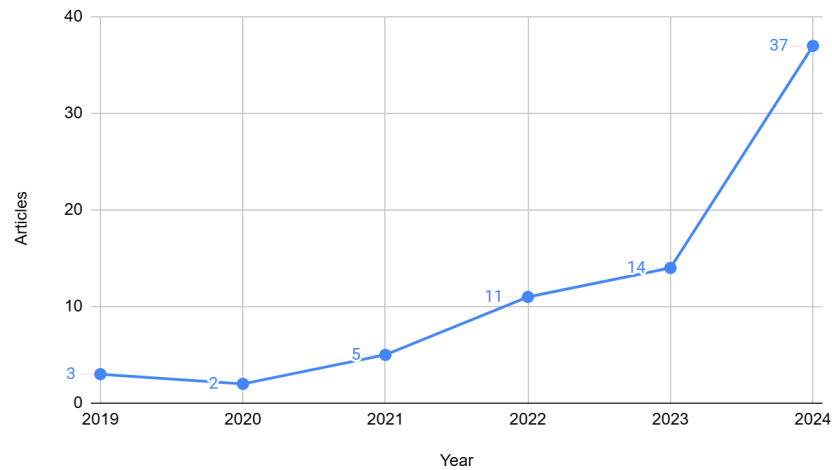


Figure 2. Annual scientific production

Source: Author's own processing using Bibliometrix and Google Sheets.

The average citations per year, as shown in Figure 3, show a stable impact among publications, with no significant fluctuations over time. While 2020 has the highest rate and 2019 the lowest, the values for 2021, 2022, 2023, and 2024 show constant academic interest. This suggests that even though AI and product innovation are well-established fields individually, their intersection is still emerging and developing rapidly. The stable citation impact strengthens the growing relevance of this research area, with recent publications having high potential for future studies as they gain more citations.

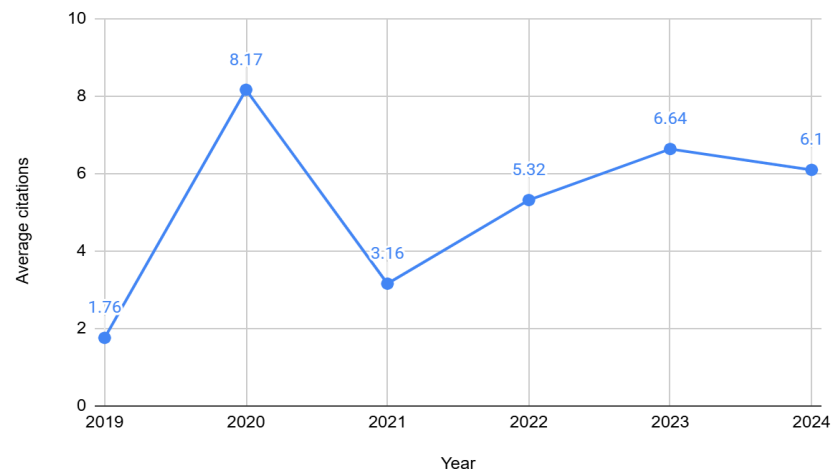


Figure 3. Average citations per year

Source: Author's own processing using Bibliometrix and Google Sheets.

The three-field plot attached as Figure 4 highlights the main authors, dominant research themes and geographic contributions in AI and product innovation. Keywords such as "artificial intelligence", "innovation", "product innovation", "product design", and "new product development" indicates the field's interdisciplinary nature and industry relevance, while terms like "process innovation", "big data", and "automation" suggest the wider role of AI in digital transformation. Research is led by China, the USA, and Germany, with contributions from India,

Italy, Canada, the UK, France, and others, proving it's a globally expanding field at the intersection of business and technology. The dominance of China, the USA, and European Union countries aligns with their stable roles in AI research and development.

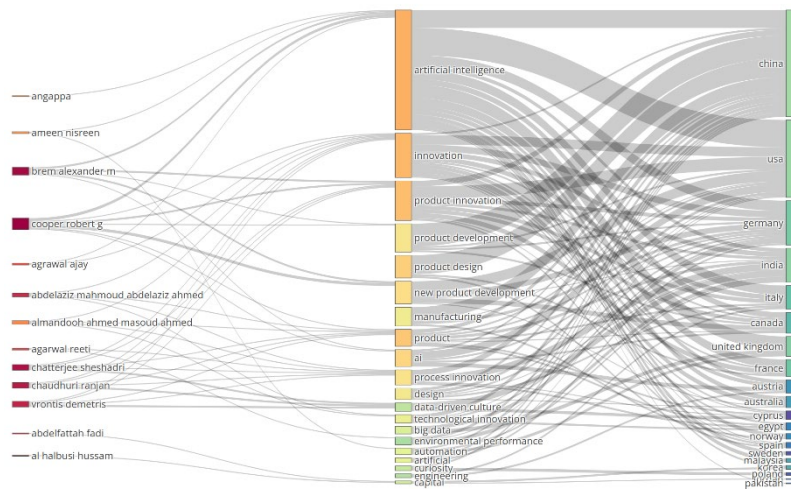


Figure 4. Three-field plot of authors, keywords, and countries

Source: Author's own processing using Bibliometrix.

The most relevant sources included in Table 4 show that research on AI and product innovation is found within multiple journals, with each contributing with a small number of documents. While the Journal of Business Research and Technological Forecasting and Social Change lead in publication volume, the differences between the top sources are minimal, showing that the field is still developing and not yet dominated by a few main journals. According to Bradford's Law, these top 10 journals form Zone 1, representing the most frequent publication sources.

Table 4. Most relevant sources of the retrieved records and Bradford's Law

Sources	Articles	Rank	Cumulative Frequency	Zone
Journal of Business Research	4	1	4	Zone 1
Technological Forecasting and Social Change	4	2	8	Zone 1
Annals of Operations Research	2	3	10	Zone 1
Cross-Cultural Design, PT I, CCD 2024	2	4	12	Zone 1
HELIYON	2	5	14	Zone 1
IEEE Access	2	6	16	Zone 1
IEEE Transactions on Engineering Management	2	7	18	Zone 1
Industrial Marketing Management	2	8	20	Zone 1
Psychology & Marketing	2	9	22	Zone 1
Research-Technology Management	2	10	24	Zone 1

Source: Authors' own processing using Bibliometrix.

The authorship distribution aligns with Lotka's Law, with 97.8% of authors contributing only on one paper, while a few researchers, such as Robert G. Cooper, Alexander M. Brem, Sheshadri Chatterjee, Ranjan Chaudhuri, and Demetris Vrontis have multiple contributions, indicating a widely dispersed research landscape. Institutionally, Zhejiang University (9 documents) and Pennsylvania State University (7 documents) lead, with contributions from

Figure 4. Scientific production by country

Source: Author's own processing using Bibliometrix.

The word cloud attached in Figure 5 and the treemap attached in Figure 6 highlight the key concepts in AI and product innovation. The term "artificial intelligence" appears most frequently, followed by "innovation", "product innovation", and "product design", underlining the central themes of the research.



Figure 5. Word cloud of the most frequent keywords

Source: Author's own processing using Bibliometrix.



Figure 6. Treemap of the most frequent keywords

Source: Author's own processing using Bibliometrix.

The co-occurrence network attached as Figure 7 visually represents the relationships between the most frequent keywords in the AI and product innovation research. Central to the network is "artificial intelligence", which is strongly connected to terms such as "innovation", "product innovation", and "product design". These connections show that AI is mainly studied in relation with product development and innovation processes in the analyzed documents. This network not only illustrates the core concepts in the field, but also reflects the interdisciplinary nature of product innovation based on AI, adding aspects from business and technology.

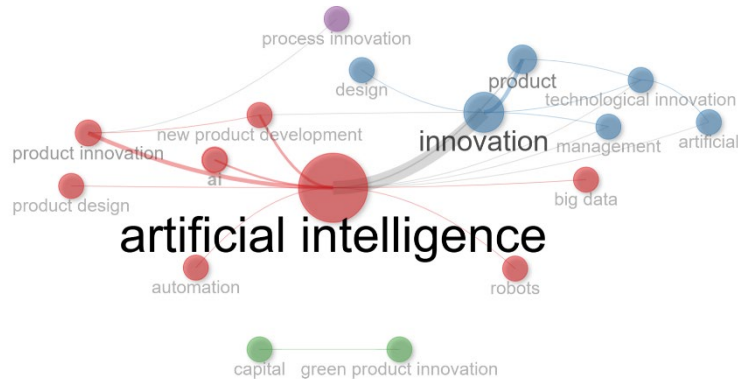


Figure 7. Co-occurrence network

Source: Author's own processing using Bibliometrix.

In the following paragraphs, we will go through the most relevant clusters observed in the thematic map attached as Figure 8, highlighting key keywords, research potential, and main contributions.

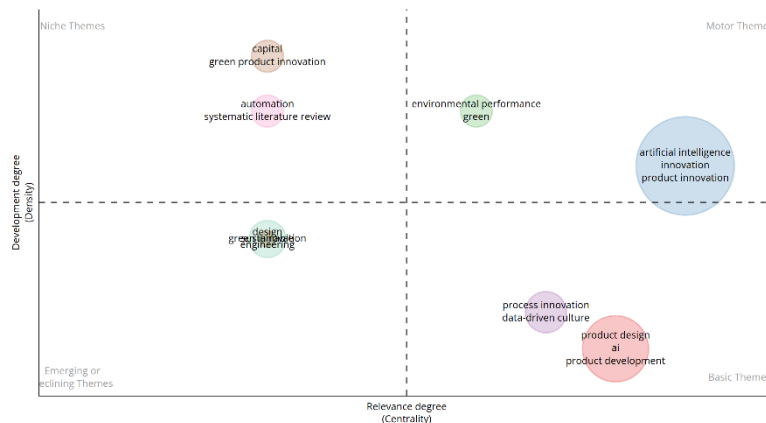


Figure 8. Thematic map

Source: Author's own processing using Bibliometrix.

The first cluster is Product Design. It includes the keywords “product design”, “AI”, “product development”, “manufacturing”, and “curiosity”. Part of the Basic Themes quadrant, this cluster includes highly researched and foundational topics in AI and product innovation. The centrality of terms such as “product design” and “product development” proves their established role in the field, while the inclusion of AI shows the growing integration of AI into traditional design and development processes. The most cited references are: Zhang et al. (2022), Li et al. (2021), Pisoni and Díaz-Rodríguez (2023).

The second and largest cluster is Artificial Intelligence, the one that is the most relevant to this bibliometric study. It includes the following keywords: “artificial intelligence”, “innovation”, “product innovation”, “product”, “new product development”, “technological innovation”, “artificial”, “big data”, “management”, and “robots”. Part of the Motor Themes quadrant, this cluster represents areas with high potential in AI and product innovation, showing that these topics are actively relevant and important to the research in the field. The frequency of terms like “artificial intelligence” and “product innovation”, together with high centrality values, indicates the growing importance of AI in advancing product development processes. As a Motor Theme, this cluster is expected to be highly relevant to future studies, with a strong focus on analyzing how AI can continue to transform and improve product innovation. The most cited references are: Babina et al. (2024), Rampersad (2020), Bahoo et al. (2023), Mariani et al. (2023), Del Giudice et al. (2022), Hutchinson (2021). Other relevant references published in 2024 are: Cooper (2024), Cooper and Brem (2024), Liu (2024).

The fourth cluster by size is Process Innovation. It includes the keywords “process innovation” and “data-driven culture”. Part of the Basic Themes quadrant, this cluster represents established and foundational topics within the context of AI and product innovation. It supports the role of improving internal processes and incorporating a data-driven culture in innovation practices. With moderate centrality values, this cluster plays a supporting role in the research environment, focusing on how process innovation interacts with AI to improve organizational efficiency. It is recognized as a well-researched and critical area, but it does not show the same potential as the Motor Themes clusters. The most cited references are: Chatterjee et al. (2024), Chaudhuri et al. (2024).

The seventh cluster is Automation, which belongs to the Niche Themes quadrant, and includes keywords such as “automation”. Even though automation is a specific area of interest within the field, it remains a research theme with limited scope in the context of AI and product innovation. The most cited reference is: Ameen et al. (2022).

Figures 9 and 10 show the collaborative and citation patterns in AI and product innovation research. The collaboration network indicates the main partnerships, with important authors forming central hubs. Meanwhile, the co-citation network shows influential works at the center, demonstrating a strong base in existing literature while recognizing the integration of newer contributions.

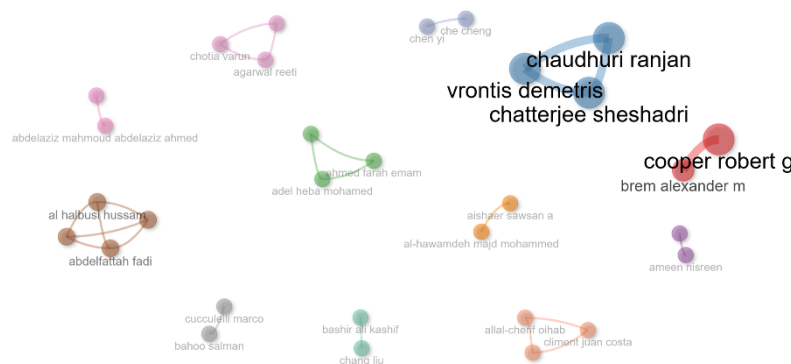


Figure 9. Collaboration network

Source: Author's own processing using Bibliometrix.

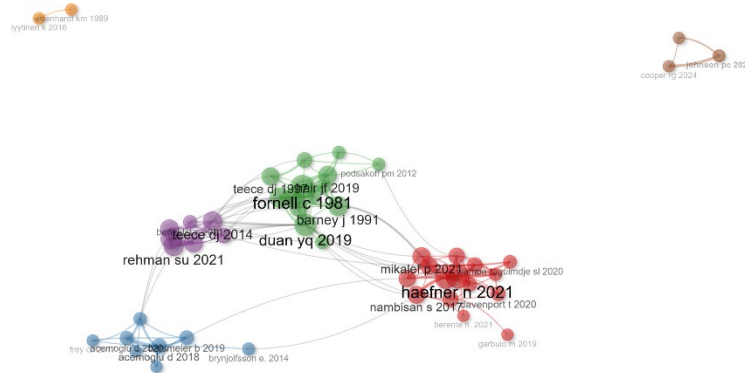


Figure 10. Co-citation network

Source: Author's own processing using Bibliometrix.

Conclusion

The findings show a clear increased trend in research on AI and product innovation, as reflected in the high annual growth rate of 65.28% in publications from 2019 to 2024. The international co-authorship rate of 48.61% proves the global relevance of this topic, with contributions from diverse countries and institutions. Additionally, the co-occurrence analysis indicates a strong connection between artificial intelligence, innovation, product innovation, and new product development, confirming that these concepts are closely connected in the analyzed literature. These trends suggest that the mix of AI and product innovation is gaining increasing academic attention and is positioned as a growing research topic.

The results confirm that the intersection of artificial intelligence and product innovation is an area of high research potential, as shown in the second cluster, the primary one connecting AI and product innovation, which is positioned as a motor theme. This classification indicates that the topic is very well connected to existing research and generates significant opportunities for additional interdisciplinary studies. While AI adoption continues to develop, future studies should comprise its specific contributions to new product development, the challenges of its implementation, and its long-term implications in various industries.

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