

The Evolution of Artificial Intelligence Applications in Business and Economic Research: A Bibliometric and Science Mapping Approach

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ABSTRACT: In recent years, the application of Artificial Intelligence (AI) and Machine Learning (ML) has transformed how businesses and economies evolve, especially in response to the global digital transformation accelerated by the COVID-19 pandemic. This study applies a bibliometric and science mapping approach to systematically examine 2,428 peer-reviewed articles indexed in Scopus from 2013 to 2024, focusing on AI's role within the domains of economics and business. The methodology includes PRISMA-guided data screening and visualization using VOSviewer and Bibliometrix, highlighting publication trends, co-authorship networks, subject area distribution, and thematic clusters.

Findings reveal exponential growth in AI-related publications since 2018, with dominant themes centered on digital marketing, personalization, and business process optimization. Developed countries—particularly the United States, China, India, and the United Kingdom—account for the majority of contributions, while developing countries remain underrepresented. Moreover, limited attention has been given to ethical dimensions of AI in business contexts, suggesting a critical research gap. The study underscores the need for broader, more inclusive collaboration and exploration of under-researched areas such as ethical AI, logistics, and SMEs. Overall, this research offers strategic insights for scholars, policymakers, and industry leaders seeking to understand and shape the evolving AI landscape in business and economic research.

KEYWORDS: Artificial Intelligence, Machine Learning, Economic Research, Digital Transformation, Bibliometric Analysis

I. INTRODUCTION

In recent years, artificial intelligence (AI) has emerged as a transformative force, redefining how global economic and business systems operate. From reshaping customer engagement to optimizing strategic decision-making at the managerial level, AI has steadily moved from theoretical discourse to practical application across sectors. As technological capabilities evolve, so does AI's influence on innovation, entrepreneurship, and knowledge creation—pillars that are widely recognized as drivers of modern economic activity (Soni, 2020). In particular, industries such as financial technology (fintech) illustrate how AI integration enhances operational efficiency and service effectiveness, ultimately contributing to macroeconomic performance (Cao et al., 2021).

Despite its rapid advancement and the growing volume of AI-related research, the current academic landscape still lacks a comprehensive, structured map of scientific output within the business and economic domains. While numerous studies explore AI's technical, ethical, or sectoral dimensions, there is limited understanding of its research dynamics from a bibliometric standpoint. This gap becomes more pronounced when considering the fragmented nature of AI literature, which often lacks coherence in terms of methodological approaches and thematic convergence. Chen & Biswas, (2021) emphasize that during periods of disruption, such as the COVID-19 pandemic, organizations increasingly turned to AI to explore novel business opportunities—highlighting the urgent need for a systematic evaluation of scholarly trends.

The imperative for such an assessment aligns with broader scholarly calls for applying science mapping methodologies to evaluate publication patterns, co-authorship networks, and conceptual structures within emerging research fields. As suggested by (Ogrean, 2023), bibliometric techniques offer valuable insights into how themes such as AI and sustainability intersect in business research. Furthermore, (Xu, 2022)underscores the multifaceted relationship between AI and the economy, noting that beyond productivity gains, AI may significantly influence broader economic growth trajectories.

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Addressing this literature gap, the current study applies bibliometric and science mapping approaches to systematically review academic contributions in AI as applied to business and economics. Specifically, this study aims to: (1) analyze publication trends and thematic evolution, (2) identify the most prolific authors, institutions, and countries, and (3) formulate a forward-looking research agenda to guide future scholarly efforts. This approach is grounded in the methodological guidance provided by (Donthu et al., 2021) who outline best practices in conducting bibliometric analyses to capture scholarly impact and intellectual structure.

Moreover, this research seeks to understand the underlying patterns of scientific collaboration and thematic development over the last decade. As highlighted by (Kim et al., 2024; Law et al., 2023), such understanding is essential for advancing academic knowledge and fostering interdisciplinary and international cooperation.

To this end, the study is guided by the following research questions:

- How has AI-related research in business and economics evolved over the past ten years?
- What are the dominant themes, research clusters, and collaboration patterns emerging from this body of literature?

Through this inquiry, we aim to offer not only a descriptive account of past and present research but also strategic insights that can inform future investigations. (Kong et al., 2022) note the utility of science mapping in tracing research development phases and identifying emergent areas of collaboration, a perspective that underpins the relevance and timeliness of this study.

II. METHODS

This study uses a bibliometric approach and *science mapping* to analyze the evolution and contribution of research regarding the application of artificial intelligence (AI) and machine learning in the fields of economics and business over the past decade, from 2013 to 2024. This approach was chosen because it is able to reveal patterns of scientific publications, collaboration between researchers, dominant themes, and dynamic trends in knowledge production in a certain field of study quantitatively and visually (Donthu et al., 2021).

2.1 Database Selection

The main data source in the study is **Scopus**, which is widely recognized as the largest and most credible bibliographic database for the international scientific literature. The search strategy is carried out through a special query using boolean logic with the string: TITLE-ABS-KEY (("artificial intelligence" OR "machine learning")) AND ("business" OR "economic")) This query is further filtered with a number of specific parameters, such as the year of publication (2013–2024), the type of document (only final scientific articles, the type of "article"), language (English), the status of the publication (final stage), and open access. Subjects included include Computer Science, Social Sciences, Environmental Sciences, Business and Management, and Economics and Finance. In addition, restrictions are also carried out based on *the exact relevant keywords*, including "Artificial Intelligence", "Economic and Social Effects", "Big Data", "Innovation", "Digital Transformation", and other strategic keywords. After all the filters were applied, a total of **2,428 documents** were found that met the criteria for further analysis.

2.2 Data Collection Process

The data collection and screening process refers to the **PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses)** protocol which consists of four main stages: identification, screening, feasibility assessment, and inclusion as shown in Figure 1. At the identification stage, all articles obtained from the query are exported in CSV format from Scopus and then filtered to avoid duplication or incomplete entries. Documents that do not meet the eligibility criteria such as not being peer-reviewed articles, not in a designated subject category, or not available in English are excluded from the dataset. The final inclusion stage leaves documents that are ready to be analyzed bibliometrically and visually

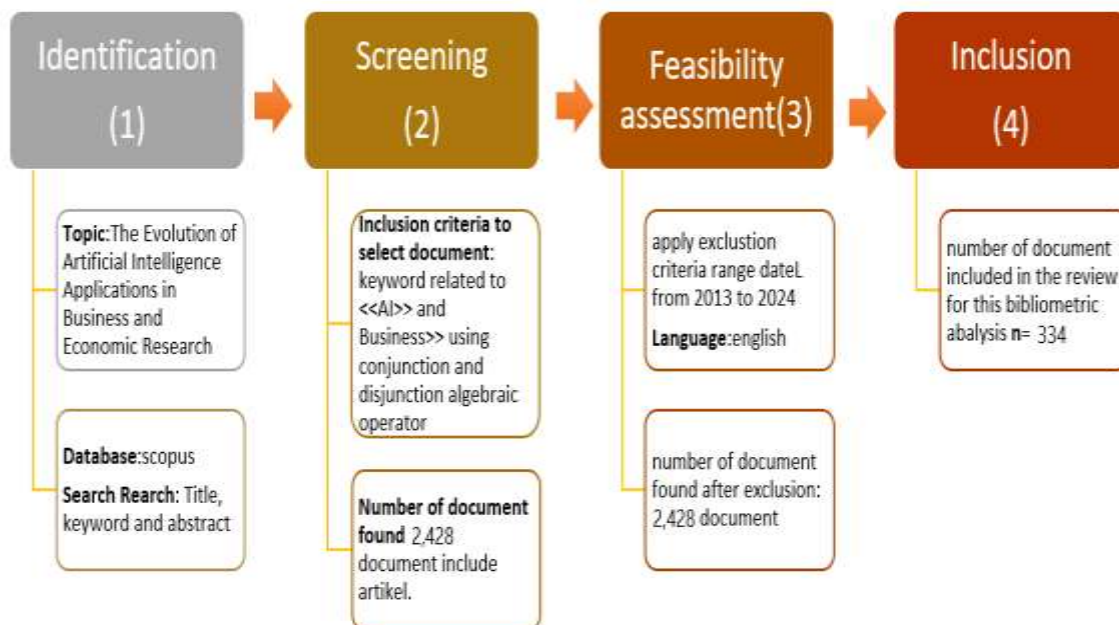


Figure. 1. PRISMA framework flow char

2.3 Techniques and Analytical Tools

For the purposes of bibliometric analysis and scientific mapping, two main software programs are used. First, **VOSviewer** is used to visualize collaboration networks (co-authorship), co-citation relationships, and keyword co-occurrence. Co-authorship analysis was conducted at the level of individual authors with a *full counting* calculation method to identify significant collaborative actors. Second, **Bibliometrix** run through the **RStudio platform** is used to conduct descriptive statistical analysis and publication trends, including annual calculation of the number of publications, the distribution of authors and productive institutions, as well as the analysis of the journals that publish the most articles related to this topic.

The visualization of the resulting science mapping includes several dimensions, including the distribution of dominant keywords, thematic clusters, collaboration networks between authors and institutions, and relationships between journals through citation analysis. The main indicators used in this study include: (1) the number of publications per year, (2) the most productive authors and institutions, (3) the most dominant journals and keywords, and (4) a map of global scientific collaboration in this field of research. All data and processing is done in a transparent and documented manner to maintain replication and validity of the analysis.

III. RESULTS AND DISCUSSION

3.1 Results

As a result of the bibliometric approach to the scientific literature indexed by Scopus during the period 2013 to 2024, an in-depth picture was obtained of the trends and distribution of publications related to the application of *artificial intelligence* (AI) and *machine learning* (ML) in the fields of economics and business. Based on the results of the visualization in Figure 2, it can be seen that the number of publications has not been concentrated to the extreme on one individual, but some names have emerged as quite productive researchers. Among them, Valaskova, K. is recorded as the most prolific writer with five publications, followed by several other researchers such as Durica, M., Govindan, K., Horák, J., Ionescu, C.A., and Nagy, M. who each produced three publications. Meanwhile, a number of other authors such as Bliumska-Danko, Coman, and Frnda, each contributed two scientific articles. These findings indicate that there is an active research community that is consistently developing this topic, although it has not yet demonstrated the dominance of a single actor.

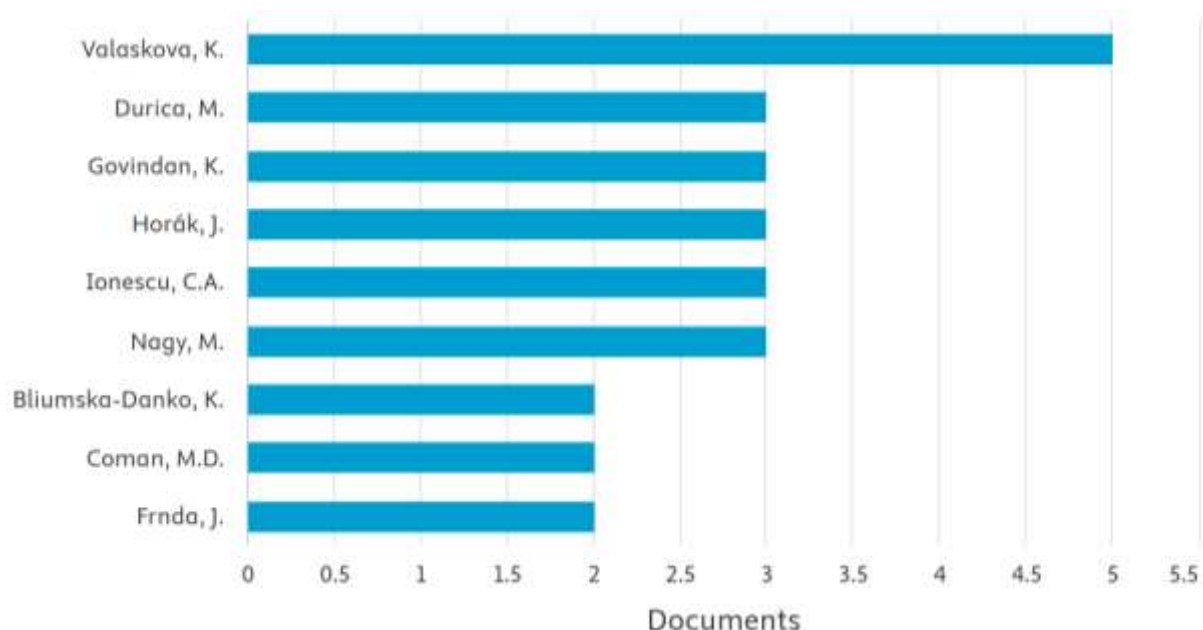


Figure 2.document by author

Figure 3 shows a very significant trend of increasing publications, especially since 2018. The surge in publications occurred progressively until it reached its peak in recent years, namely 2023 and 2024. This increase can be interpreted as a reflection of the increasing global attention to digital transformation, especially after the COVID-19 pandemic which accelerated the adoption of digital technology in various sectors of the economy. This phenomenon also shows that the topic of AI and ML in economic and business contexts has become an increasingly strategic and relevant area of research.

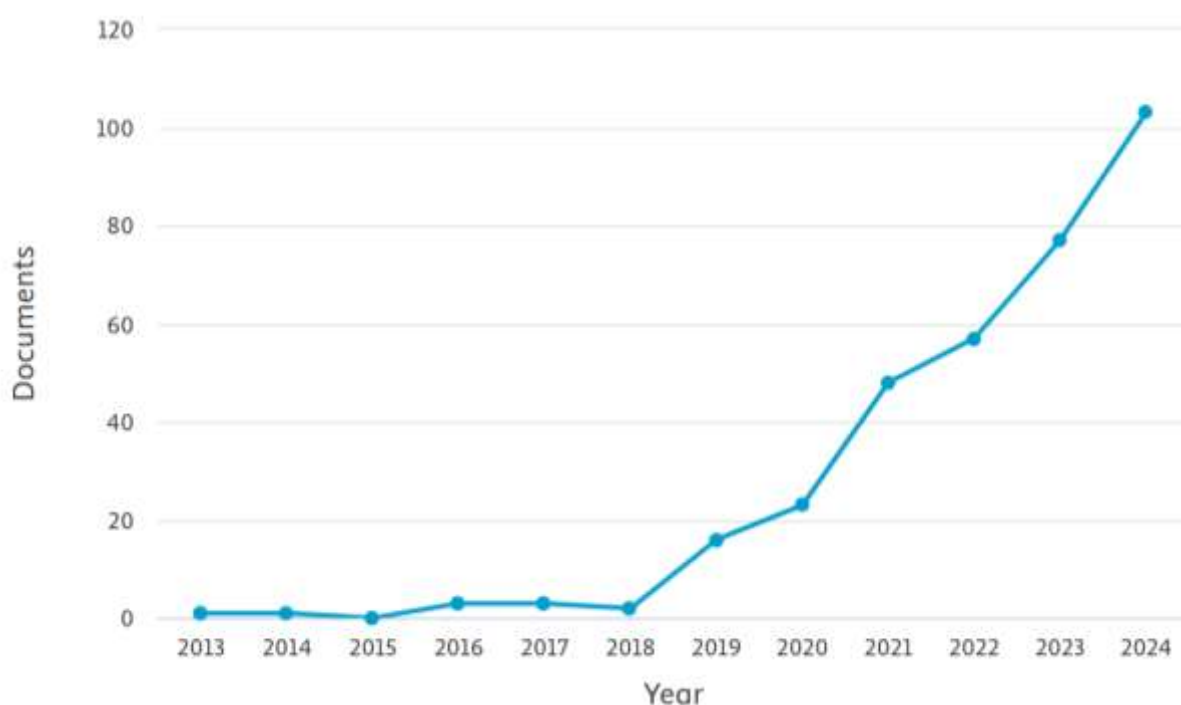


Figure 3. Document by year

Figure 4 illustrates the distribution of publications per year by source or journal. It can be seen that a number of reputable journals such as *Sustainability*, *Technological Forecasting and Social Change*, and *the Journal of Business Research* are media that consistently publish related articles. This reflects that this topic has been well received in various interdisciplinary and cross-disciplinary scientific forums, not just limited to the economic and technological domains.

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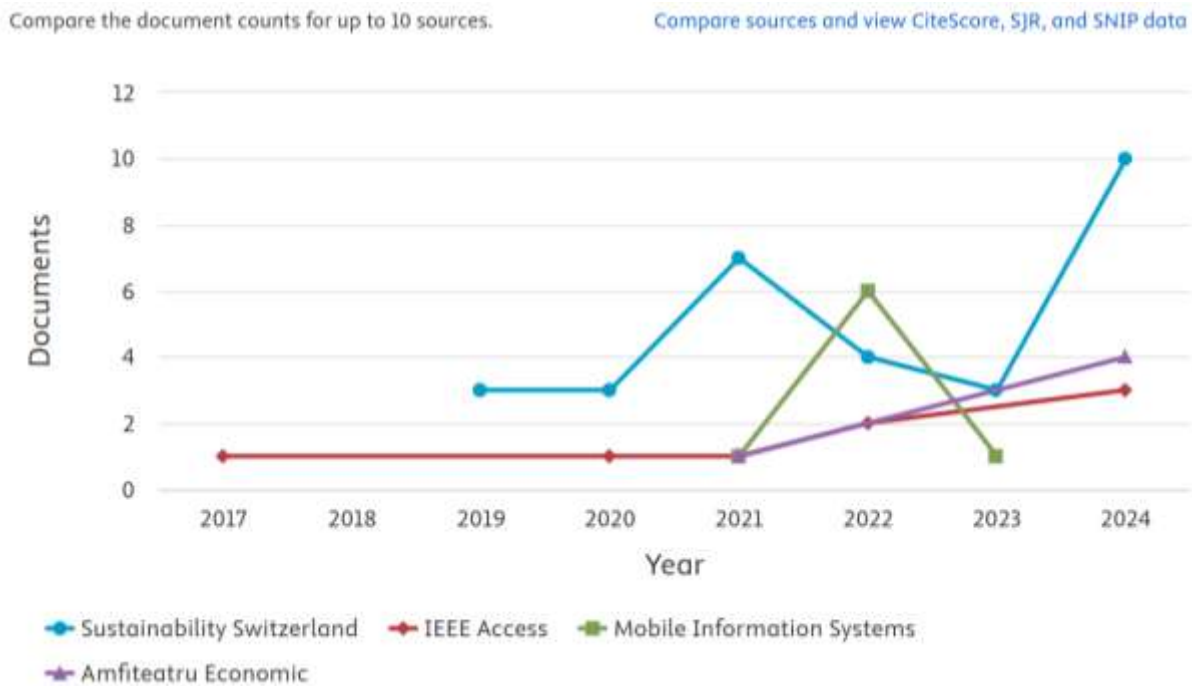


Figure 4. Document per year by source

In Figure 5, the visualization by country or region shows that the largest contribution comes from developed countries such as the United States, China, India, and the United Kingdom. These countries in general do have high research capacity, both in terms of human resources, funding, and innovation ecosystems. Unfortunately, contributions from developing countries, including Indonesia, are still relatively limited. These findings should serve as an alarm as well as a strategic opportunity for the academic community and policymakers in developing countries to invest more seriously in AI-based research, especially in the social and economic domains.

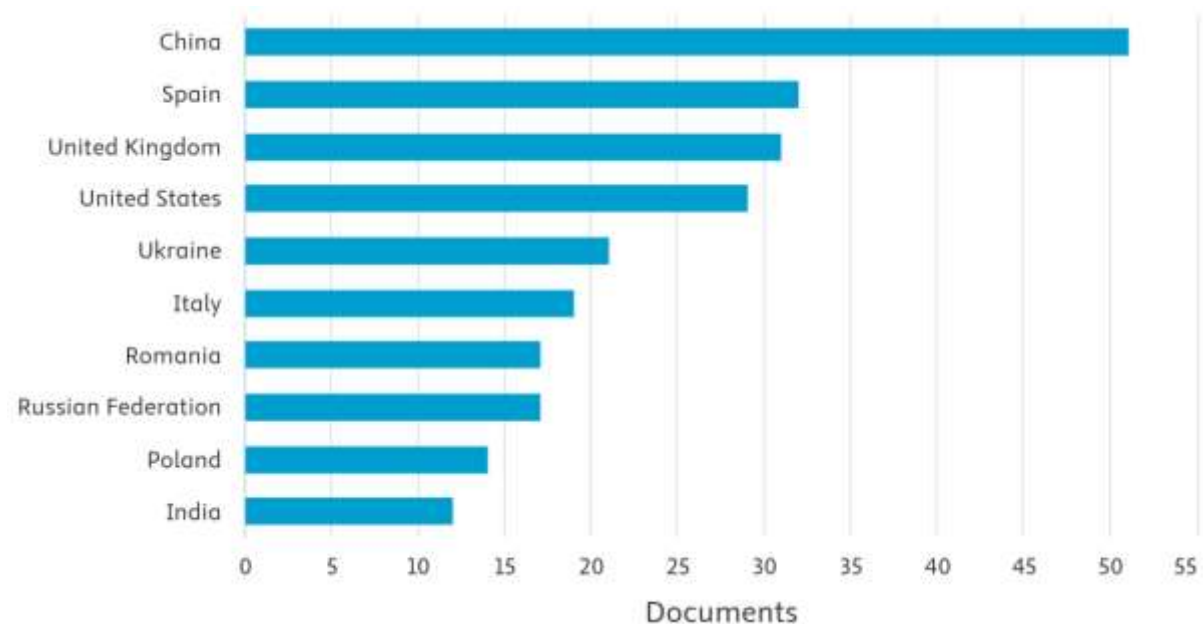


Figure 5. Document bu country or territory

Figure 6 reinforces the picture that AI and ML research in economics and business is multidisciplinary. The fields of science that contributed the most were computer science (21.0%), followed by social sciences (15.5%), management and business (13.9%), and economics and finance (9.5). In addition, the involvement of the fields of engineering, environment, energy, mathematics, and psychology shows that AI-based economic issues can no longer be limited to one discipline alone. Interestingly, a number of

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contributions also came from the fields of health, life sciences, and humanities, which shows the increasing application of AI in answering real societal challenges.

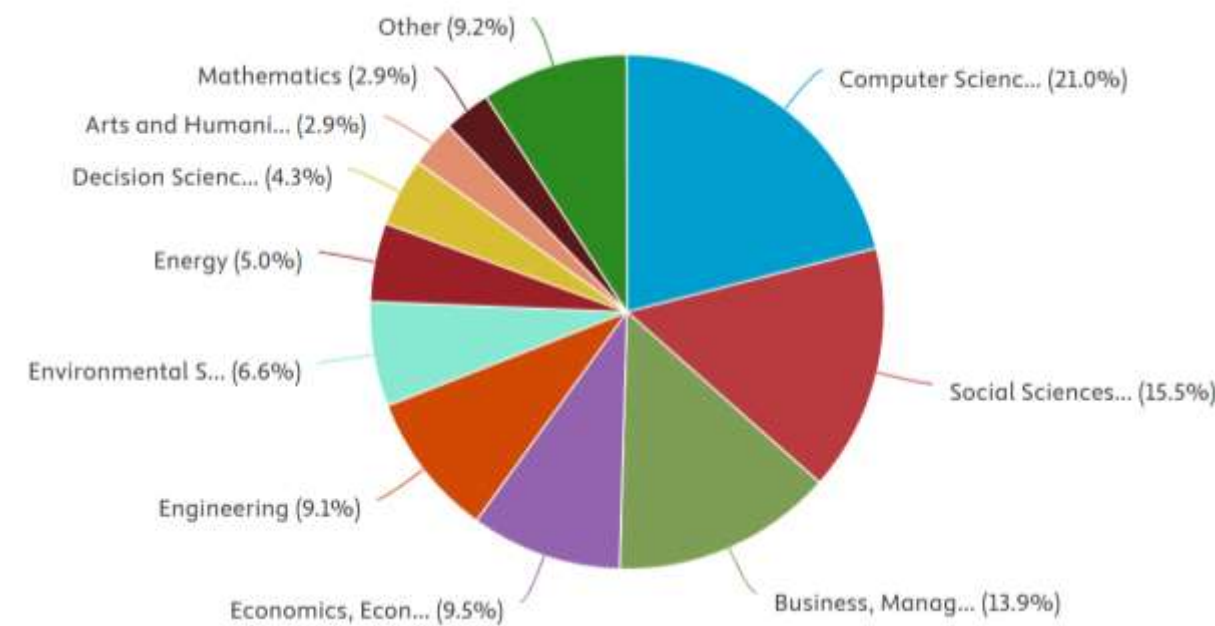


Figure 6. Document by subject area

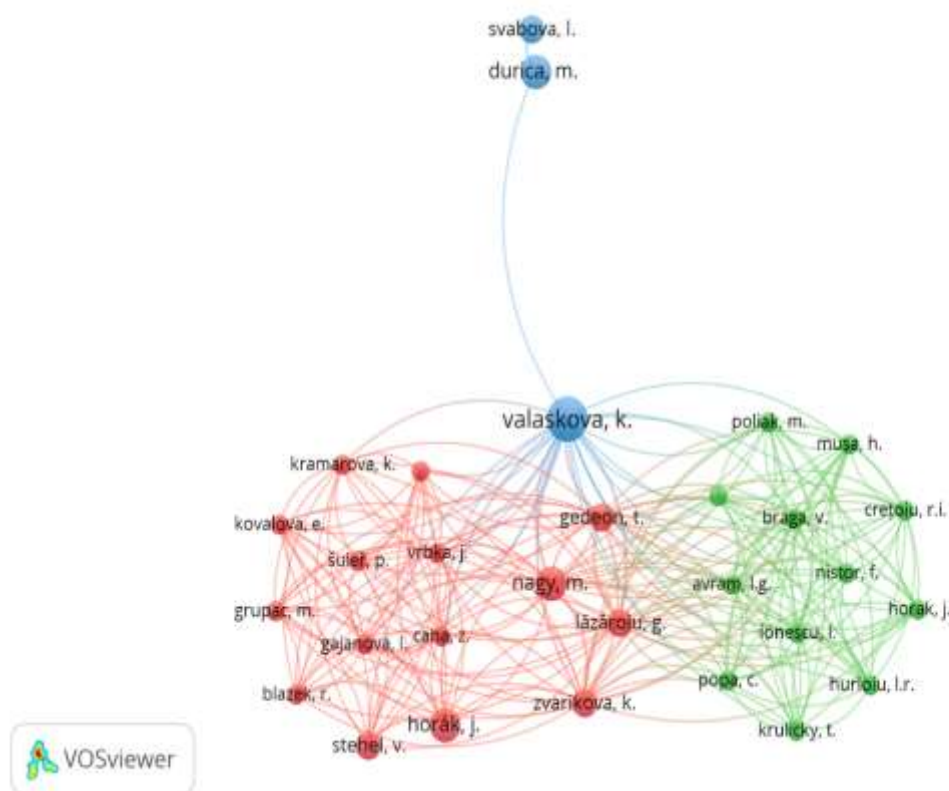


Figure 7. network visualization

Figure 7. The network visualization of the VOSviewer consists of Item:30, cluster:3, Link:248Total link Strength:262. This shows the map of the authors' collaborations in three main clusters: red, green, and blue. *Valaskova, K.* It becomes a center for cross-cluster collaboration, bridging relationships between groups of writers who are dense in their collaboration. Red and green clusters tend to be more internal, with intense relationships within the group, while blue clusters are smaller and concentrated.

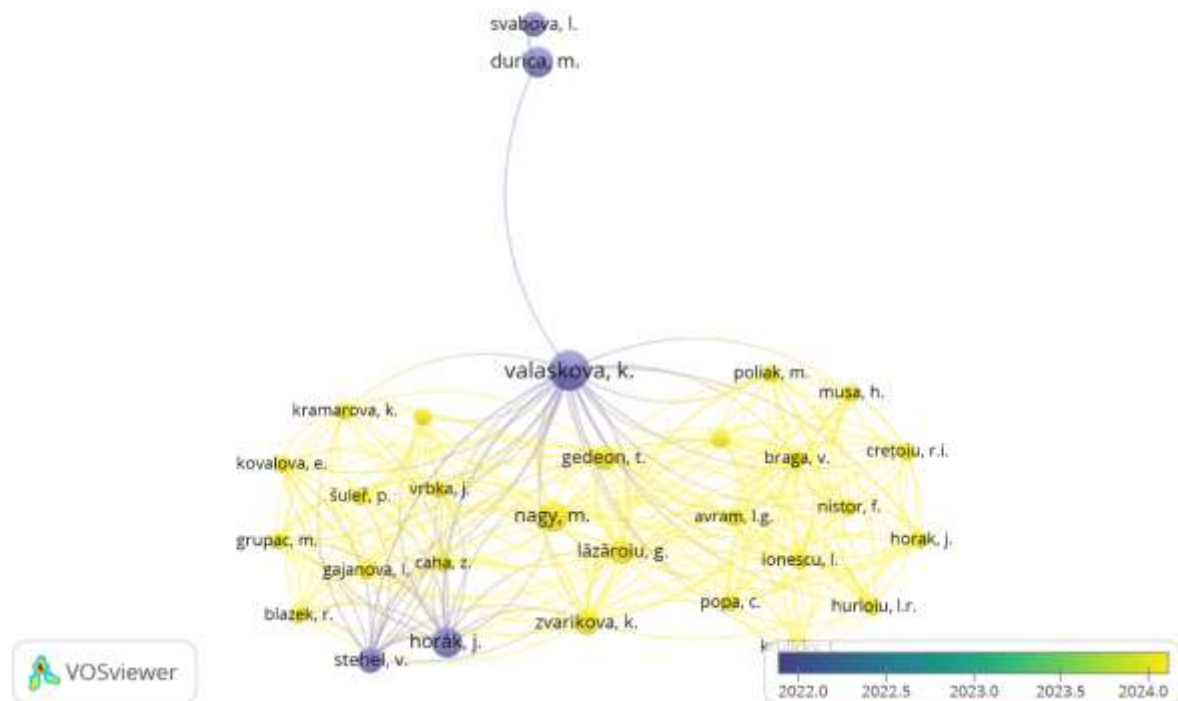


Figure 8. overlay visualization

Figure 8. This visualization overlay maps the temporal dynamics of scientific collaboration between authors. The color of the node indicates the average time trend of the publication, with a gradation from purple (2022) to yellow (2024). The analysis revealed that *Valaskova, K.* played the role of a central figure with a high intensity of collaboration at the beginning of the period (2022), while writers such as *Braga, V.*, *Ionescu, L.*, and *Popa, C.* Appearing dominant in more cutting-edge scientific collaborations (2023–2024). This phenomenon reflects the continuity and regeneration of scientific networks, where new groups of authors are beginning to take a more active role in collaborative research.

3.2 Discussion

The results of bibliometric analysis over the past decade (2013–2024) show an **exponential growth in scientific publications** examining the application of *Artificial Intelligence* (AI) and *Machine Learning* (ML) in the economic and business domains. Since 2018, there has been a significant surge in the number of articles published, with the peak of contributions in 2023 and 2024. This phenomenon shows that the topic of AI is no longer marginal in economic studies, but has become *mainstream* and strategic in response to global digital transformation (Donthu et al., 2021)

This trend is not only quantitative, but also reflects a **shift in epistemological focus** in economic research. The dominant research in the thematic cluster focuses on the application of AI in **digital marketing, consumer personalization, and business process optimization**, as shown in the distribution of dominant subjects and keywords. This indicates that researchers are more interested in front-end aspects of AI in business, such as sales strategy and customer interaction, than in back-end areas such as **logistics, supply chain, or AI-based production**, where the number of publications is still relatively limited. This inequality can be an important signal that the focus of research is unevenly distributed and opens up new spaces for exploration in areas that are still under-discussed.

In addition, spatial analysis of the author's country of origin shows a **gap in research contributions between developed and developing countries**. The United States, China, India, and the United Kingdom are major contributors to the publication, supported by an established research and innovation infrastructure. Meanwhile, developing countries, including Indonesia, have not yet occupied a significant position in the global scientific landscape regarding AI in economics (methods and hasil.pdf, p. 5). This is a reflection of structural challenges such as limited research resources, lack of funding, and weak international collaboration networks. In this context, strategic efforts are needed to strengthen local research capacity and establish more inclusive transnational partnerships.

No less important is the **lack of research on ethical aspects (ethical AI)** in the business context. Although AI offers high efficiency and scalability, potential negative impacts such as algorithmic bias, privacy violations, and technology access

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inequality have not been a major theme in the publications analyzed. In fact, ethical discourse is a crucial element in the development of sustainable and equitable AI systems (Floridi & Cowls, 2019). The lack of adequate attention to this issue is a serious gap that deserves to be addressed by the scientific community, especially in the era of an increasingly complex and automated digital economy.

Scientifically, these findings provide several **strategic implications**. First, the results of this analysis provide a new direction for researchers to explore areas that are still under-touched, such as AI in the logistics sector, public sector, MSMEs, or ethical and social issues in AI implementation. Second, the author's collaboration map (Figure 7) and temporal analysis of the network (Figure 8) show that collaboration across institutions and countries is the key to increasing scientific productivity. Thus, strengthening collaborative networks can expand the reach and quality of research in the future. Third, for policymakers and industry players, this information can be used as a basis for formulating data-based strategic policies and encouraging more accountable and inclusive innovation in the development of AI technology (Brynjolfsson & McAfee, 2017).

By paying attention to these developments critically and constructively, it can be concluded that AI research in the fields of economics and business has entered an early maturity phase. Nevertheless, there is still a wide space for theoretical deepening, interdisciplinary methodological development, and practical application that is socially and ethically responsible.

CONCLUSIONS

The present study confirms that the field of artificial intelligence in business and economics has experienced exponential scholarly growth, particularly following 2018. This trajectory reflects the increasing importance of AI in both academic and practical spheres of economic transformation. While dominant themes such as digital marketing and process optimization have received substantial attention, other areas—particularly those involving ethical concerns, supply chain applications, and use in small-to-medium enterprises—remain underexplored.

The concentration of scientific output in developed nations suggests disparities in research infrastructure and international participation. These findings highlight the importance of strengthening collaboration between institutions and fostering inclusion of researchers from underrepresented regions. Furthermore, the absence of substantial discourse around ethical AI reveals a critical gap that must be addressed to ensure responsible and sustainable AI development in business contexts.

In light of these findings, the study advocates for future research agendas that integrate interdisciplinary approaches, consider broader socio-economic impacts, and prioritize ethical frameworks. Such efforts will be vital in shaping a more inclusive, impactful, and balanced global discourse on AI in business and economic development.

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