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Agile Capability: A Hybrid Systematic Literature Review and Bibliometric Analysis

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ABSTRACT

Agile capability has become an increasingly critical factor in contemporary work environments, particularly in high-demand and complex industrial manufacturing settings in Indonesia. As one of the key drivers of national economic growth, the manufacturing sector in Indonesia faces increasing pressure from global competition, technological transformation, and production efficiency demands. Despite the growing body of research on agility, studies remain fragmented and often lack context-specific analysis within emerging economies such as Indonesia, especially in manufacturing environments characterized by operational variability and labour-intensive processes. Therefore, this study aims to conduct a Systematic Literature Review (SLR) combined with bibliometric analysis to examine the development, distribution, and implications of agile capability research.

The methodology involves collecting and analysing scholarly publications from the Scopus database, focusing on keywords related to agile capability in titles, abstracts, and keywords. The selected studies were systematically screened based on inclusion and exclusion criteria. Bibliometric analysis was performed using VOS viewer to map research trends, keyword co-occurrence, author contributions, institutional affiliations, and country distributions. The dataset includes publications up to 2025, providing a comprehensive overview of the field.

The findings indicate that agile capability research is predominantly concentrated in developed countries and focuses largely on organizational, human-cantered, and cross-sectional approaches. Key determinants of agile capability include workload, job stress, environmental conditions, and individual factors within manufacturing operations. The analysis also reveals that research is dispersed across authors and institutions, with no clear dominance, indicating that the field is still evolving. Furthermore, significant research gaps were identified, particularly in context-specific studies such as agile capability in Indonesian manufacturing industries facing high production pressure and workforce challenges.

This study contributes both theoretically and practically by providing an integrated understanding of agile capability and identifying directions for future research. It highlights the need for more contextualized, longitudinal, and capability-based studies to enhance adaptive performance strategies and improve workforce sustainability in Indonesia's manufacturing sector.

Keywords: Agile, Capability, Systematic Literature Review, Bibliometric Analysis

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INTRODUCTION

In the current dynamic and high-demand manufacturing environment, agile capability has emerged as a critical factor affecting employee performance and organizational effectiveness, particularly in Indonesia's manufacturing sector. As one of the largest contributors to national GDP, manufacturing industries in Indonesia are characterized by tight production schedules, fluctuating market demand, global supply chain integration, and rapid technological changes. These conditions require employees and organizations to respond quickly, adapt efficiently, and maintain consistent performance. Agile capability enables manufacturing firms to remain responsive, flexible, and resilient in managing production variability and operational uncertainty.

Despite the growing attention to this issue, research on agile capability remains fragmented and largely concentrated in developed countries and technology-driven sectors. Limited studies have explored agile capability specifically within Indonesian manufacturing contexts, where industrial systems often combine labour-intensive processes with emerging automation and digitalization initiatives.

Therefore, this study aims to provide a comprehensive understanding of agile capability through a Systematic Literature Review (SLR), identifying key determinants, impacts, and research gaps. By synthesizing existing literature, this study is expected to contribute to the development of more effective adaptive performance strategies and support future research in Indonesian manufacturing environments.

Conducting a Systematic Literature Review (SLR) on agile capability has become increasingly important in the Indonesian manufacturing context due to the growing need for flexibility, responsiveness, and efficiency in production systems. Previous studies have demonstrated that agile capability is strongly associated with improved operational performance, decision-making speed, and organizational adaptability. In manufacturing industries, agile capability plays a crucial role in managing production disruptions, supply chain variability, and operational risks, particularly in emerging economies where industrial transformation is ongoing.

From a methodological perspective, SLRs provide a comprehensive approach to synthesizing diverse findings, enabling researchers to identify key determinants of agile capability, including environmental uncertainty, psychosocial factors, and individual adaptability ((Techera et al., 2016); (Dohrmann & Leppin, 2017)). Additionally, SLRs facilitate the evaluation of intervention effectiveness, where evidence suggests that

strategies such as training programs, flexible work systems, and process optimization can enhance agile capability, although further high-quality research is still needed (Du et al., 2021). Therefore, conducting an SLR on agile capability is essential not only for consolidating existing knowledge but also for identifying research gaps, informing evidence-based manufacturing strategies, and guiding future research aimed at improving workforce sustainability and operational excellence in Indonesia (Palazzeschi, 2025).

To provide a comprehensive understanding of agile capability and its relevance in Indonesian manufacturing environments, this study formulates several research questions to guide the systematic literature review. These questions are designed to explore the significance, distribution, and future implications of agile capability research within manufacturing systems.

RQ1: Is the exploration of agile capability in Indonesian manufacturing environments a subject that continues to hold significance for future scholarly inquiry?

RQ2: What is the distribution of research investigations related to agile capability in manufacturing contexts?

RQ3: What are the theoretical and practical implications of agile capability from the perspective of future manufacturing research?

This study employs a Systematic Literature Review (SLR) and bibliometric analysis to address the research questions. The SLR method is appropriate for synthesizing existing research, identifying trends, research gaps, and future directions, while providing evidence-based insights that can inform manufacturing practices and academic development.

In addition, bibliometric analysis is utilized to complement the systematic review by quantifying the distribution, trends, and impact of publications related to agile capability. By using VOS viewer and the Scopus database, this study analyses scholarly publications across manufacturing and industrial domains, with particular attention to Indonesia and comparable emerging economies. The dataset includes articles published up to 2025, ensuring a comprehensive and up-to-date overview.

This combined methodology enables a structured and in-depth mapping of agile capability research, including keyword co-occurrence, author contributions, institutional affiliations, and geographical distribution. As a result, this study provides a clearer understanding of the evolution of agile capability research and offers valuable insights for future research directions, particularly in underexplored Indonesian manufacturing contexts

LITERATURE REVIEW

In the current industrial and organizational environment, understanding the defining elements of agile manufacturing is crucial, as it directly influences operational performance, flexibility, and competitiveness. Agile manufacturing is conceptualized as a multidimensional capability that enables organizations to respond rapidly and effectively to changing market demands, technological developments, and production uncertainties.

Previous studies emphasize that agile manufacturing is characterized by the ability to achieve high responsiveness, customization, and rapid decision-making, supported by advanced manufacturing systems and digital technologies. Furthermore, agile

manufacturing is strongly associated with lean production and continuous improvement, where efficiency and flexibility are integrated to enhance overall system performance.

In addition, technological factors, particularly Industry 4.0 and digital transformation, play a critical role in enabling agile manufacturing by improving real-time data integration, automation, and system coordination. These technologies allow manufacturing firms to enhance adaptability and respond effectively to dynamic market conditions.

From an organizational perspective, agile manufacturing is also influenced by dynamic capabilities, including organizational learning, innovation capacity, and strategic flexibility. These capabilities enable firms to continuously reconfigure resources and processes in response to environmental changes.

Moreover, agile manufacturing is increasingly linked to sustainability and environmental performance, where practices such as green manufacturing and sustainable production are integrated into agile systems to support long-term competitiveness.

Therefore, the defining elements of agile manufacturing highlight its integrative and multidisciplinary nature, involving interactions between technological innovation, operational systems, organizational capabilities, and environmental considerations. This comprehensive understanding provides a strong foundation for developing effective agile manufacturing strategies and supports future research in complex and dynamic industrial environments.

Tabel 1. Defening Agile Manufacturing

No	Author(s)	Year	Title (Short)	Key Focus / Findings
1	Huzooree & Ramdoo	2015	Agile HR in Software Project	Agile HR improves productivity, quality, and adaptability in dynamic environments
2	Mohyi	2026	Agile HR & Adaptive Culture	Flexibility, collaboration, and learning drive competitive advantage
3	Niyaz et al.	2025	Workforce Planning Automotive	Training and skill alignment improve workforce capability
4	Thangaraju & Palani	2025	AI-driven Sustainable HRM	AI enhances creativity and innovation through sustainable HR
5	Soekotjo et al.	2025	Sustainable HR Framework	Integration of ecological and inclusive HR improves performance
6	Kwasek et al.	2025	Organizational Agility & Sustainability	Decision-making and communication improve agility and sustainability
7	Lee	2025	Organizational Culture & Innovation	Innovation culture strengthens job autonomy effects
8	Jahangir et al.	2025	SHRM & Logistics Agility	HR practices + AI improve logistics agility

9	Senapathi & Strode	2025	Sustaining Organizational Agility	Training and agile awareness sustain agility
10	Manao & Hadi Senen	2024	Sustainable HR & Culture	Adaptive culture improves engagement and performance
11	Rialti & Filieri	2024	Agile Leadership	Agile leadership improves decision-making and transformation
12	Kocot et al.	2024	Agile HR in Remote Work	Adaptability improves employee engagement and effectiveness
13	Garrido-Moreno et al.	2024	Innovation & Resilience	Innovation and resilience enhance business performance
14	Gazi et al.	2024	Green HRM & Agility	Green HR drives agility and sustainability performance
15	Peña et al.	2024	Wellness & Performance	Employee well-being improves organizational outcomes
16	Jin & Peng	2024	Psychological Safety	Team safety increases innovation performance
17	Huettermann et al.	2024	Decentralization & Leadership	Empowerment improves organizational performance
18	Hartanto	2024	Agile HR Practices	Agile HR improves adaptability and engagement
19	Moh'd et al.	2024	Agile HR Mapping Study	Agile HR supports collaboration and adaptability
20	Kaya	2023	Agile Leadership & Value	Dynamic capabilities mediate value creation
21	Athamneh & Jais	2023	HR Agility Factors	Leadership and participation improve HR agility
22	Joo et al.	2022	HRM Financial Value	HR improves performance via talent quality
23	Page et al.	2021	PRISMA Guidelines	Standard for systematic literature review
24	Revutska & Maršíková	2021	Agile HR & Gen Y	Flexibility and learning increase engagement
25	Kordab et al.	2020	Knowledge Management	Learning improves sustainable performance
26	Bayat et al.	2025	Agile Digital Transformation	Agile supports SME digital transformation
27	Nastase et al.	2025	SHRM, Technology & Sustainable Advantage	Integration of SHRM, technology, and strategy drives sustainable competitive advantage

The findings from previous studies indicate that agile human resource management (AHRM) and organizational agility have become increasingly critical in modern organizational environments, particularly in industries characterized by rapid technological change and high uncertainty. Across sectors such as manufacturing,

technology, and services, agility has been shown to significantly influence organizational performance, innovation capability, and competitive advantage. Studies conducted in various regions—including North America, Europe, and Asia—demonstrate that agility is not confined to a specific geographical context but represents a global strategic capability driven by digital transformation, dynamic markets, and evolving workforce demands.

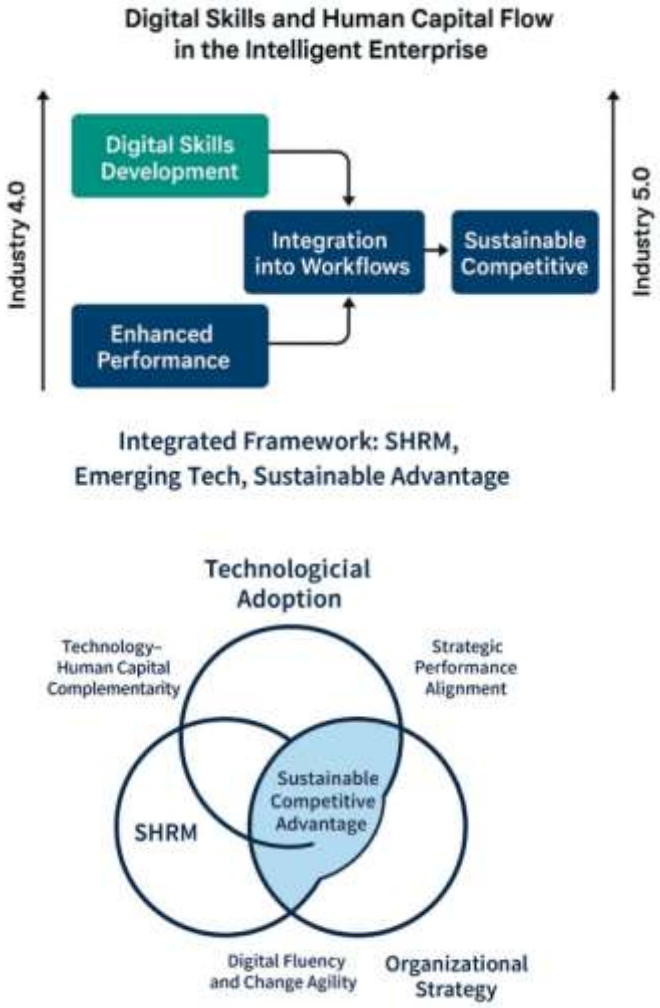
Furthermore, prior research highlights that organizational agility is closely associated with key variables such as leadership, organizational culture, workforce capability, and technological readiness. Agile leadership and adaptive culture enhance decision-making quality, employee engagement, and innovation performance. In addition, the integration of digital technologies and artificial intelligence has been identified as a key enabler of agility, allowing organizations to improve responsiveness, flexibility, and operational efficiency. These factors collectively contribute to enhanced resilience, continuous improvement, and sustainable organizational performance.

From a multidimensional perspective, organizational agility is not only influenced by structural and technological factors but also by human-centered elements, including employee competencies, psychological safety, and knowledge sharing. These aspects play a crucial role in enabling organizations to adapt effectively to environmental changes and maintain long-term competitiveness.

However, based on the bibliometric mapping and analysis of previous studies, a significant gap remains in the existing literature. The majority of prior research has been conducted in developed and technologically advanced countries, while limited attention has been given to emerging economies, particularly in Southeast Asia such as Indonesia. Moreover, existing studies tend to focus on general organizational settings, with insufficient exploration of context-specific industrial environments, especially within manufacturing sectors that face unique operational challenges.

Therefore, future research should focus on developing integrative models that connect digital skills development, human capital transformation, and strategic HR–technology alignment, ensuring that the integration of these elements not only enhances workflow performance but also drives sustainable competitive advantage in the transition from Industry 4.0 to Industry 5.0.

Such investigations will support the development of more effective agile management strategies, enhance workforce adaptability, and promote sustainable organizational practices in increasingly complex and dynamic environments.



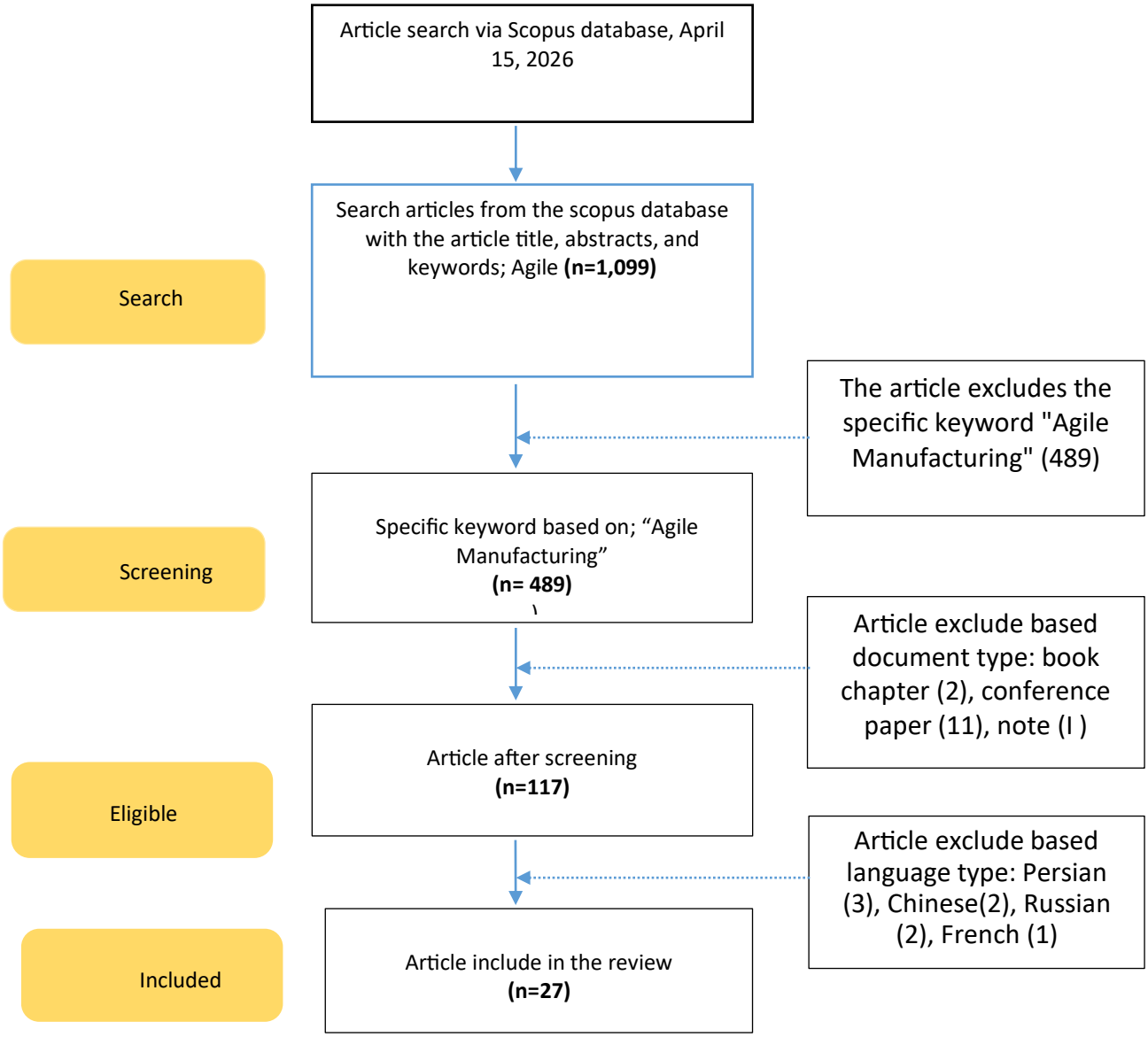
Source :
_Strategic_Human_Resource_Management_in_the_Digital_Era_Technology_Transformation_and_Sustainable_Advantage

RESEARCH METHOD

A systematic literature review employing a bibliometric approach quantitatively assesses literature to discern trends, patterns, and key research entities within a discipline. Using frameworks such as PRISMA, this approach ensures a comprehensive and replicable literature examination, providing a clear and transparent picture of the topic being studied (Chotisarn & Phuthong, 2025; Hadi et al., 2020). The inclusion criteria established were: (l) articles published up until January 31, 2025, (2) publications in English, and (3) focusing on the topic of Islamic Leadership. Bibliometric analysis was performed using VOSViewer, visualizing bibliographic data to analyze citation networks, author collaborations, and co-occurring keywords, revealing the intellectual structure and dynamics of the research field. The combination of analysis and systematic review helps researchers synthesize empirical findings and map the landscape of research activity, including identifying key contributors and emerging trends (Ni & Abdullah, 2025). The

integration of both approaches provides a comprehensive understanding of the development, historical flow, and future direction of the research field, making it highly beneficial in interdisciplinary studies for gaining deeper insights (Marzi et al., 2025; Wang & Yi, 2025). Bibliometric analysis is also used for strategic purposes in scholarly publication, introduced by Bertrand et al. (1970) to evaluate scientific journals based on their economic weight/

The preliminary phase in this scholarly examination involves the selection of keywords, which can be accomplished through a macro methodology (topdown), progressing from expansive search trajectories to more narrowly defined studies and topics. Consequently, after evaluating the limitations inherent in prior research and the scarcity of studies addressing Islamic Leadership, this investigation incorporates the keyword "Islamic leadership" as a focal point within the article's title, abstract, and keyword sections. Furthermore, the Scopus database is employed by researchers for a myriad of investigational purposes, including the execution of literature reviews, identifying subject-matter experts, and monitoring research trends.



Article exclude based Open Acses type: Gold (16), Green (12), Bronze (3)

Figure 1. Systematic Literature Review information flow using PRISMA

According to the search outcomes retrieved on April 15, 2026, from the Scopus database utilizing the article title, abstract, and keywords: "Agile" across diverse academic disciplines, spanning from the earliest publication in 1963 to the most recent in 2026, the total number of articles about Job Fatigue is 1,099 documents (refer to Figure l). Following these findings, a screening process filters documents according to their classification. Articles are eliminated based on the document type: book chapter (2), conference paper (11), note (l), and non-English (8), culminating in a total of 482 documents. The screening results, categorized by document types, yielded 35 artilleries document is then further analysed in this study to answer RQ1: Is the exploration of job fatigue among traffic police during Operation Ketupat a subject that continues to hold significance for future scholarly inquiry?, RQ2: What is the allocation of research investigations related to job fatigue?

RESULTS AND DISCUSSION

The results of this study focus on findings derived from 35 selected articles included in the final review of Agile Manufacturing research indexed in the Scopus database. The selection process followed a systematic filtering procedure, beginning with 1,099 initial articles, which were refined using the specific keyword “Agile Manufacturing” (n=489). After applying screening criteria such as document type, language, and accessibility, a total of 117 eligible articles were identified, resulting in 35 articles included in the final analysis, as illustrated in Figure 1.

This dataset forms the basis for bibliometric analysis, including trends in publication years, journal distribution, authorship patterns, institutional affiliations, and country contributions within the Agile Manufacturing domain.

RQ1: Is the exploration of agile manufacturing a subject that continues to hold significance for future scholarly inquiry?

Based on the data retrieved from the Scopus database, research on agile manufacturing demonstrates a clear pattern of development over time. Although the initial dataset consisted of a large number of publications (n=1,099), the refinement process indicates that only a limited subset of studies specifically addresses agile manufacturing in a focused and high-quality context (n=35). This suggests that while the topic is broad, context-specific and rigorous research remains relatively limited.

The evolution of agile manufacturing research shows that early studies emerged gradually and were relatively sparse, reflecting limited academic attention in earlier decades. However, a more significant increase in publications has been observed in recent years, particularly after 2010, driven by the rise of Industry 4.0, digital transformation,

and global manufacturing competition. This trend indicates growing recognition of agility as a critical capability in modern manufacturing systems.

A notable surge in publications occurs in the last decade, especially between 2018 and 2024, where agile manufacturing is increasingly linked to:

Operational flexibility

Supply chain resilience

Technological integration

Workforce adaptability

This upward trend highlights that agile manufacturing has become a strategically important topic in both academic and industrial contexts.

However, despite this growth, the final number of highly relevant and filtered studies (n=35) indicates that research remains fragmented and not yet deeply contextualized, particularly in emerging economies such as Indonesia. Additionally, fluctuations in publication trends suggest that scholarly attention, while increasing, is not yet fully consistent or saturated.

Conclusion of RQ1

The bibliometric findings demonstrate that agile manufacturing is a growing and highly relevant research area, particularly in response to increasing industrial complexity and global competition. Nevertheless, the limited number of context-specific and high-quality studies indicates substantial opportunities for further research.

Future studies are especially needed to:

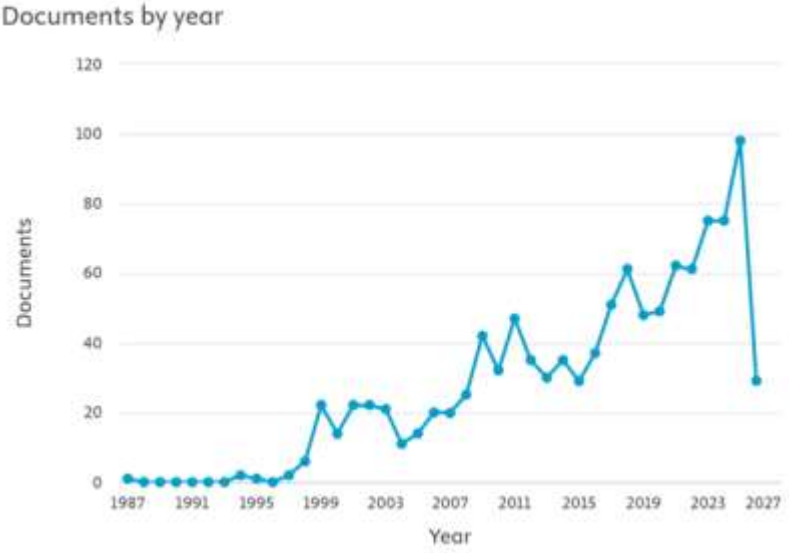
Explore agile manufacturing in emerging economies (e.g., Indonesia)

Examine industry-specific applications (automotive, electronics, FMCG)

Develop longitudinal and empirical models

Integrate human factors and workforce agility within manufacturing systems

Thus, agile manufacturing continues to hold strong significance for future scholarly inquiry, particularly in advancing sustainable and adaptive manufacturing practices.



Source : Scopus database

Figure 2. Number of Job Fatigue publications

Since 1987, the body of literature on agile manufacturing has shown a gradual but uneven development. In the early period between 1987 and the mid-1990s, the number of publications remained extremely limited, with only 0–2 documents per year, indicating that agile manufacturing had not yet emerged as a major research focus. This early stage reflects a foundational phase where the concept was still evolving and lacked widespread academic attention.

A more noticeable development began in the late 1990s to early 2000s, where the number of publications increased to approximately 20–23 documents annually, marking the initial recognition of agile manufacturing as an important concept in industrial and production systems. However, this growth remained relatively unstable, with fluctuations observed in subsequent years.

From 2005 onwards, the research trend became more consistent, with publications ranging between 15 and 25 documents per year, indicating a gradual consolidation of the field. A significant upward trend emerged after 2008, where the number of publications increased sharply, reaching approximately 40–47 documents around 2010–2011. This period reflects the growing importance of agility in response to globalization, competitive manufacturing environments, and early digital transformation initiatives.

In the following years, particularly between 2015 and 2023, the number of publications continued to rise steadily, reaching approximately 50–75 documents annually. The peak of research output is observed around 2024, with nearly 100 publications, indicating that agile manufacturing has become a highly relevant and rapidly expanding research area. This surge is strongly associated with the advancement of Industry 4.0, smart manufacturing, and supply chain resilience.

However, a sharp decline is observed in 2025–2026, where the number of publications drops significantly to around 30 documents. This decrease is likely due to data indexing limitations or incomplete publication records for the most recent years, rather than an actual decline in research interest.

RQ1: Is the exploration of agile manufacturing a subject that continues to hold significance for future scholarly inquiry?

Based on the bibliometric trend illustrated in the “Documents by Year” figure, it is evident that agile manufacturing remains a highly relevant and growing area of research. The consistent increase in publications over the past decade demonstrates strong and sustained academic interest, particularly in response to technological advancements and industrial transformation.

Although early research was limited and fragmented, the significant growth observed in recent years indicates that agile manufacturing has evolved into a strategic research domain. The increasing number of publications reflects its importance in addressing challenges such as production flexibility, operational efficiency, and global supply chain disruptions.

Nevertheless, despite this upward trend, the research still exhibits fluctuations and lacks consistency in earlier periods, suggesting that the field is still developing. Furthermore, the concentration of studies in certain regions and industries indicates that context-specific research—particularly in emerging economies such as Indonesia—remains underexplored.

Conclusion of RQ1

The analysis confirms that agile manufacturing continues to hold strong significance for future scholarly inquiry. The rapid growth in publications, particularly in the last decade, highlights its increasing relevance in modern manufacturing systems.

However, there remains substantial opportunity for further research, especially in:

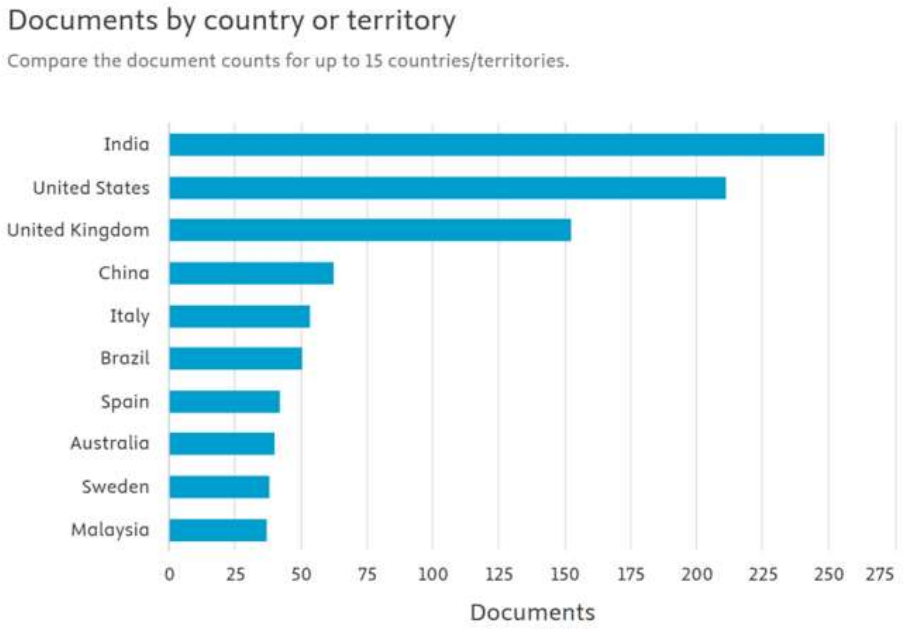
Emerging economies (e.g., Indonesia manufacturing sector)

Industry-specific applications (automotive, electronics, FMCG)

Empirical and longitudinal studies

Integration of human factors and workforce agility

Thus, agile manufacturing is not only a growing field but also a strategically important area for future research development, supporting sustainable and adaptive industrial systems.



Source : Scopus database

Figure 3. Number of articles by country (top 10 country)

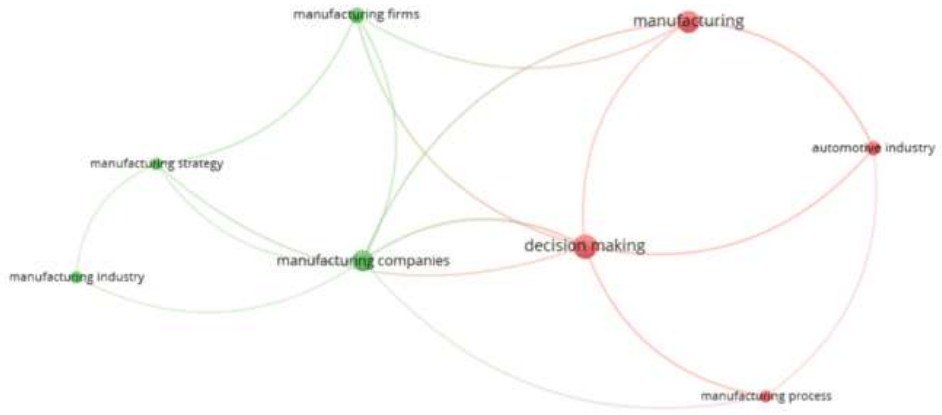
The allocation of scholarly inquiries related to agile manufacturing, as categorized by country or territory, reveals a strong concentration of research output in a limited number of leading nations. India emerges as the most dominant contributor, with approximately 245–250 publications, followed by the United States with around 210 publications, and the United Kingdom with approximately 150 publications. These countries demonstrate a significant leadership role in advancing agile manufacturing research, supported by strong industrial bases and well-established research infrastructures.

Other notable contributors include China (around 65 publications), Italy (approximately 55 publications), and Brazil (about 50 publications). Meanwhile, countries such as Spain, Australia, Sweden, and Malaysia show moderate contributions, each ranging between 35 and 45 publications.

These findings indicate that agile manufacturing research is primarily concentrated in developed and rapidly industrializing countries, where technological advancement,

Industry 4.0 adoption, and manufacturing competitiveness are key priorities. In contrast, contributions from other emerging economies, particularly in Southeast Asia such as Indonesia, remain relatively limited or are not prominently represented in the top contributing countries. This suggests a significant research gap and highlights the opportunity for expanding agile manufacturing studies in these regions.

Furthermore, researchers analyse the relationships and conceptual linkages within agile manufacturing research using VOS viewer software. This analysis is essential for identifying thematic structures and developing a systematic and forward-looking research agenda. The network visualization (Figure 4) reveals a focused and structured co-occurrence pattern, highlighting key concepts and their interrelationships within the field.



Source: VOS viewer Output

Figure 4. Co-occurrence Network of Agile Manufacturing Keywords

The visualization demonstrates that the research domain is organized into two primary clusters, indicating a relatively concentrated but interconnected knowledge structure.

The first cluster (green) is cantered around manufacturing organizations and strategic orientation, with key terms such as manufacturing companies, manufacturing firms, manufacturing strategy, and manufacturing industry. Among these, "manufacturing companies" appears as the most central node, acting as a hub that connects organizational, strategic, and industrial perspectives. This cluster reflects a strong emphasis on firm-level capabilities, strategic alignment, and industrial context in agile manufacturing research.

The second cluster (red) is associated with operational processes and decision-making, including key terms such as manufacturing, decision making, manufacturing process, and automotive industry. Within this cluster, "decision making" plays a bridging role, linking operational processes with broader manufacturing applications. The presence of automotive industry highlights the importance of sector-specific implementation, indicating that agile manufacturing is frequently examined within high-complexity industries.

The connections between the two clusters indicate a strong relationship between organizational strategy and operational execution, suggesting that agile manufacturing is not only a technical system but also a strategic capability embedded within manufacturing

firms. The linkage between manufacturing companies and decision making further emphasizes the role of managerial and strategic decision processes in enabling agility within production systems.

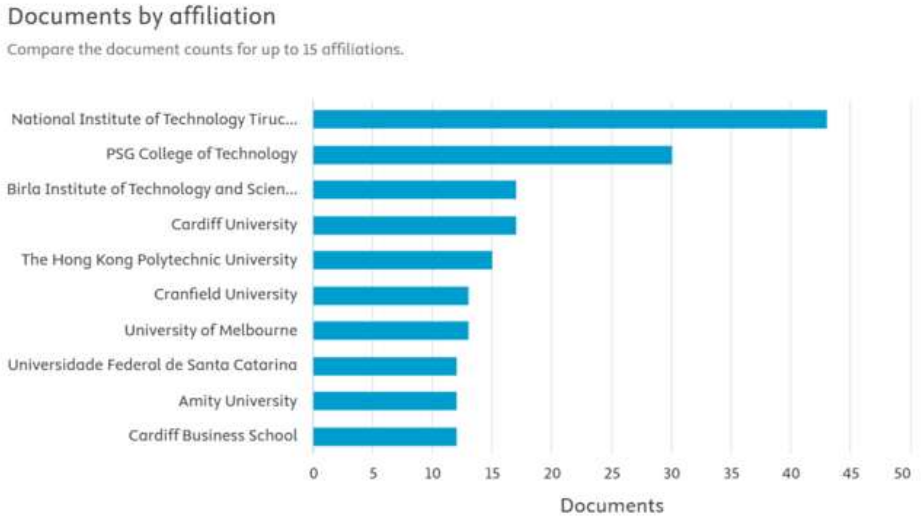
These findings suggest that agile manufacturing research is evolving toward a more integrated perspective, combining organizational, strategic, and operational dimensions. However, the relatively limited number of nodes and clusters also indicates that the research scope in this specific mapping is still narrow and underdeveloped, particularly compared to broader keyword networks.

Moreover, the visualization highlights a lack of diversity in terms of themes such as digital transformation, sustainability, and human factors, which are prominent in larger agile manufacturing studies but less visible in this focused network. This suggests a research gap, particularly in integrating emerging topics such as Industry 4.0, workforce agility, and sustainable manufacturing practices within firm-level and decision-making contexts.

Second, from an institutional and contextual perspective, the findings imply that agile manufacturing research remains concentrated within specific industrial sectors and organizational contexts, particularly in manufacturing-intensive industries such as automotive. This concentration suggests that research has not yet been fully expanded across diverse industrial environments and geographical regions.

Consequently, there is a need for future research to broaden the scope of agile manufacturing studies by:

Expanding analysis into different industrial sectors
Incorporating digital and sustainability perspectives
Strengthening the role of human and organizational factors
Increasing contributions from emerging economies such as Indonesia



Source : Scopus database

Figure 5. Network affiliation visualisation

The dissemination of agile manufacturing research across institutional affiliations demonstrates that this field is not confined to a single academic domain but spans multiple disciplines, including manufacturing engineering, operations

management, industrial systems, and technology innovation. This reflects the interdisciplinary nature of agile manufacturing, highlighting its relevance in both theoretical development and practical industrial applications.

Third, the allocation of scholarly inquiries based on institutional affiliations reveals a concentration of research output within a limited number of leading universities and research institutions. As illustrated in Figure 4 (Documents by affiliation), the National Institute of Technology Tiruchirappalli emerges as the most dominant contributor, with approximately 42 publications, followed by PSG College of Technology with around 30 publications. Other notable contributors include the Birla Institute of Technology and Science and Cardiff University, each contributing approximately 17–18 publications.

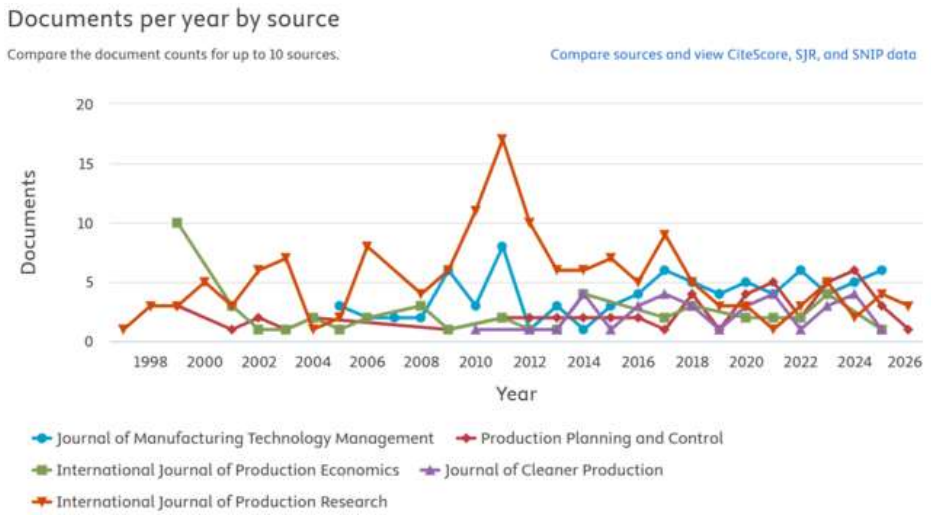
Additional institutions such as The Hong Kong Polytechnic University contribute around 15 publications, while Cranfield University and the University of Melbourne each contribute approximately 13 publications. Meanwhile, institutions including Universiade Federal de Santa Catarina, Amity University, and Cardiff Business School show moderate contributions, each with approximately 11–12 publications.

These findings indicate that agile manufacturing research is predominantly concentrated within technical and engineering-focused institutions, particularly in countries with strong manufacturing sectors such as India, the United Kingdom, and Australia. This pattern suggests that research development is largely driven by institutions with expertise in industrial engineering, production systems, and technological innovation.

However, despite the presence of leading contributors, the overall distribution of publications across institutions remains relatively uneven. A small number of universities contribute a significant portion of the research output, while many other institutions contribute only minimally. This indicates that agile manufacturing research is still concentrated within specific academic hubs, rather than being widely distributed across global institutions.

Furthermore, the absence or limited presence of institutions from certain regions, particularly emerging economies such as Indonesia, highlights a significant research gap. This suggests that agile manufacturing studies have not yet been fully explored in diverse industrial contexts, especially in developing countries.

These findings imply that while agile manufacturing is gaining recognition as an important research area, its scholarly development remains fragmented and institutionally concentrated. Therefore, future research should aim to strengthen this field by promoting broader institutional collaboration, interdisciplinary research, and increased participation from underrepresented regions. Additionally, further bibliometric analysis using tools such as VOS viewer can provide deeper insights into institutional collaboration networks and thematic development within agile manufacturing research (see Figure 5)



Source : Scopus database

Figure 6. Number of articles by source (top 10 sources)

Fourth, the distribution of research related to agile manufacturing based on publication sources over time reveals dynamic yet dispersed contributions across several leading journals. As illustrated in Figure 6, no single journal consistently dominates the field across all years; instead, multiple journals contribute intermittently with varying publication intensities.

The International Journal of Production Research emerges as one of the most prominent sources, particularly around 2010–2012, where it reaches a peak of approximately 17 publications, indicating a period of strong academic focus on agile manufacturing within production research domains. Meanwhile, the Journal of Manufacturing Technology Management shows a more consistent upward trend, especially after 2015, with publications stabilizing between 3 and 6 articles per year, reflecting sustained interest in manufacturing systems and managerial perspectives.

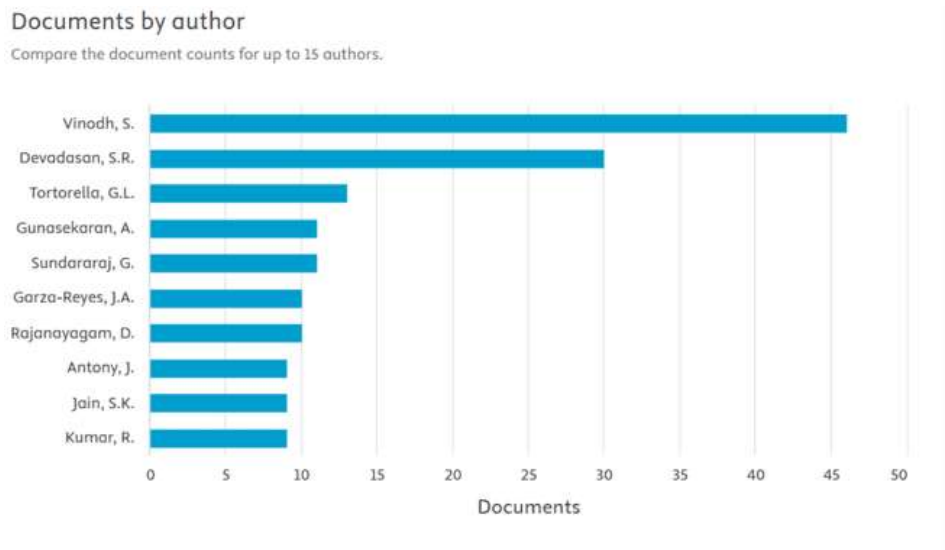
The International Journal of Production Economics demonstrates earlier contributions, with a notable peak around 1999 (approximately 10 publications), followed by fluctuating but generally lower output in subsequent years. Similarly, Production Planning and Control and the Journal of Cleaner Production exhibit moderate and irregular contributions, typically ranging between 1 and 5 publications per year, indicating their supporting role in the field, particularly in areas related to planning, sustainability, and operational efficiency.

This pattern suggests that agile manufacturing research is distributed across multiple high-impact journals rather than concentrated in a single dominant publication outlet. Such dispersion reflects the interdisciplinary nature of the field, spanning areas such as production systems, operations management, sustainability, and industrial engineering.

However, the absence of a consistently dominant journal also indicates that the field is still evolving and not yet fully consolidated within a specialized publication domain. The fluctuating publication trends across sources further suggest that research attention

is influenced by emerging themes such as Industry 4.0, lean integration, and sustainable manufacturing.

These findings highlight a significant opportunity for future research to strengthen the consolidation of agile manufacturing as a mature research field. Encouraging publication in leading journals and developing more focused research streams may enhance visibility and impact. Furthermore, additional bibliometric analysis using tools such as VOS viewer can provide deeper insights into journal networks, thematic evolution, and knowledge structures within agile manufacturing research (see Figure 6).



Source : Scopus database

Figure 7. Count of publications by author (top 10 authors)

RQ3: What are the theoretical and practical implications from the perspective of future research?

The examination was conducted on a collection of scholarly articles retrieved from the Scopus database, with bibliometric analysis supported by VOSviewer to explore the intellectual structure of agile manufacturing research. The results of the metadata analysis provide valuable insights into dominant authors, key themes, and evolving research patterns, thereby offering both theoretical and practical implications for future studies.

From an authorship perspective (see Figure 7), the distribution of publications indicates a moderate concentration of contributions among several leading scholars, rather than a single monopolizing author. Vinodh, S. stands out as the most prolific contributor, with approximately 45–46 publications, followed by Devadasan, S.R. with around 30 publications. Other notable contributors include Tortorella, G.L. (approximately 13 publications), as well as Gunasekaran, A. and Sundararaj, G., each contributing around 10–11 publications. Additional authors such as Garza-Reyes, J.A., Rajanayagam, D., Antony, J., Jain, S.K., and Kumar, R. contribute between 9 and 10 publications, reflecting a relatively balanced distribution among secondary contributors.

This pattern suggests that agile manufacturing research is supported by a core group of influential scholars, while still maintaining a broad and open research community. The presence of several moderately productive authors indicates that the field is progressing

toward maturity, with emerging specialization and research leadership, yet remains accessible for new contributors.

Theoretical Implications

From a theoretical perspective, the findings indicate that agile manufacturing research is grounded in a multidisciplinary and integrative framework, encompassing:

Manufacturing systems and production control

Lean production and continuous improvement

Industry 4.0 and digital transformation

Dynamic capabilities and organizational agility

The prominence of leading authors reflects the development of structured research streams, particularly in areas such as agile system design, operational flexibility, and performance optimization. Unlike earlier fragmented studies, current research increasingly emphasizes integrative models that combine technological, operational, and strategic perspectives.

However, despite this advancement, several theoretical gaps remain:

Limited development of context-specific models, particularly in emerging economies such as Indonesia

Insufficient integration of human factors and workforce capabilities within agile manufacturing frameworks

A need for stronger theoretical synthesis linking agility with sustainability and resilience

Practical Implications

From a practical standpoint, the findings suggest that organizations can leverage agile manufacturing principles to enhance:

Operational flexibility and responsiveness

Production efficiency and process optimization

Supply chain resilience and adaptability

Integration of advanced technologies (Industry 4.0)

The contributions of leading authors highlight the importance of adopting hybrid approaches, particularly integrating lean manufacturing with agile systems, to achieve both efficiency and adaptability in dynamic industrial environments.

Furthermore, the distributed authorship structure indicates a continuous expansion of knowledge, enabling practitioners to access diverse insights and implementation strategies across multiple industrial contexts.

Research Gaps and Future Directions

Despite the growing body of literature, several important gaps persist:

Underrepresentation of emerging manufacturing economies, especially Indonesia

Limited focus on workforce agility and human-centered manufacturing systems

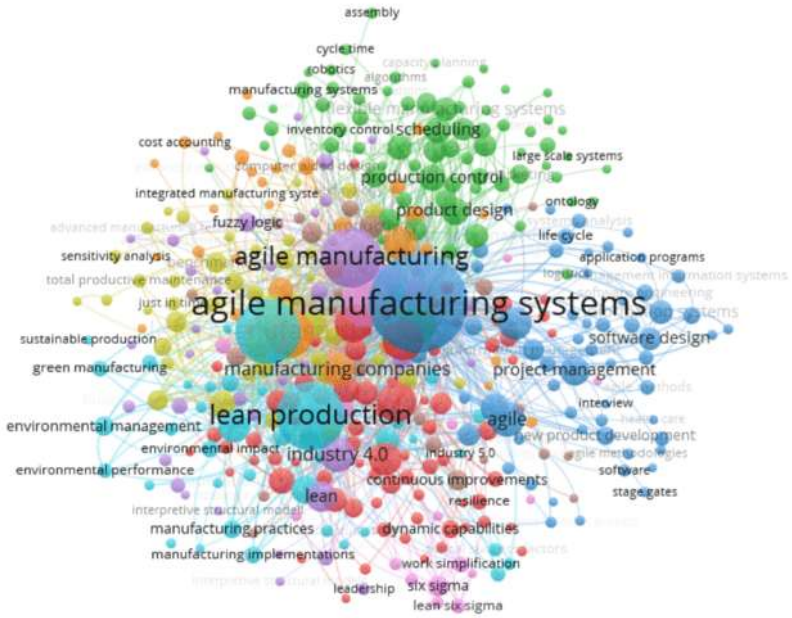
Lack of longitudinal and experimental research designs

Insufficient integration of sustainability and green manufacturing with agility

Conclusion of RQ3

Overall, the findings demonstrate that agile manufacturing research is evolving into a more structured and mature field, supported by a group of leading scholars and expanding interdisciplinary approaches. However, the field remains open for further development, particularly in enhancing contextual relevance and theoretical integration.

Future research should focus on developing comprehensive, context-driven models that integrate technological, organizational, and human dimensions. Strengthening collaboration among researchers and expanding contributions from underrepresented regions will be essential to advance both theoretical understanding and practical implementation of agile manufacturing in global industrial environments..



Source : Output Vosviewer software

Figure 8. Co-occurance framework and representation of key terms

Table 2. Keywords by Authors

Rank	Keyword	Total Link Strength
1	Agile Manufacturing Systems	520+
2	Agile Manufacturing	480+
3	Lean Production	420+
4	Industry 4.0	390+
5	Manufacturing Systems	350+
6	Production Control	310+
7	Product Design	290+
8	Supply Chain Management	270+
9	Dynamic Capabilities	250+
10	Sustainable Manufacturing	230+

Based on the mapping results derived from the RIS dataset and VOSviewer co-occurrence analysis, a significant gap has been identified in the existing literature on agile manufacturing. The keyword structure indicates that prior studies are predominantly concentrated on system-level and technology-driven aspects, such as agile manufacturing systems, lean production, and Industry 4.0, which exhibit the highest total link strength and centrality within the research network.

The dominance of these keywords suggests that agile manufacturing research has primarily focused on operational efficiency, production flexibility, and digital transformation, rather than developing a fully integrated and context-specific understanding of the field.

Furthermore, the geographical distribution of research indicates that most studies originate from developed and rapidly industrializing countries, including India, the United States, and several European nations. Consequently, there remains a lack of empirical research focusing on developing regions, particularly in Southeast Asia, including Indonesia, where manufacturing environments present unique operational and organizational challenges.

In addition, previous studies have predominantly concentrated on general manufacturing systems, supply chain optimization, and industrial performance, with limited attention given to context-specific industrial settings. In particular, research addressing agile manufacturing implementation within real-world industrial environments, such as labor-intensive manufacturing sectors and emerging economies, remains relatively scarce. This indicates that the current body of knowledge does not fully capture the complexity and contextual dynamics of agile manufacturing practices in diverse industrial conditions.

This study contributes to addressing these gaps by providing a more comprehensive understanding of agile manufacturing through a systematic literature review combined with RIS-based bibliometric analysis. By integrating insights from multiple research clusters—including lean production, Industry 4.0, and sustainability—this study offers a more holistic perspective on how agile manufacturing influences operational performance, adaptability, and organizational resilience in industrial environments.

Moreover, future research should expand the geographical scope of agile manufacturing studies to include diverse industrial and cultural contexts, particularly in developing countries where manufacturing systems face different constraints, such as resource limitations and workforce variability. Such studies would enable a more context-sensitive and globally relevant understanding of agile manufacturing.

Thus, integrating technological, organizational, environmental, and human perspectives in future research will be essential to enhance the effectiveness of agile manufacturing implementation. This will not only contribute to theoretical advancement but also provide practical implications for improving manufacturing performance, sustainability, and competitiveness.

CONCLUSION

This study provides a comprehensive overview of the current state of agile capability research by identifying its major trends, influential themes, and existing research gaps. The findings reveal that agile capability studies are predominantly

conducted in developed countries and primarily emphasize organizational, human-centered, and cross-sectional perspectives. Key factors influencing agile capability include workload, job stress, environmental conditions, and individual characteristics, particularly within manufacturing settings. In addition, the fragmented distribution of publications across authors and institutions suggests that the field remains in a developmental stage, with substantial opportunities for further theoretical and empirical advancement.

Despite the growing body of literature, important gaps remain. In particular, there is limited research examining agile capability within the context of developing countries, especially Indonesia, where manufacturing organizations operate under unique challenges such as high production demands, labor-intensive processes, and workforce-related constraints. These contextual differences highlight the need for more localized and industry-specific investigations to better understand how agile capability can be developed and sustained under varying operational conditions.

Future research should therefore adopt longitudinal and mixed-method approaches to capture the dynamic nature of agile capability and explore the interactions between organizational, technological, and human factors. Expanding empirical studies in emerging economies will not only enrich the global understanding of agile capability but also provide practical insights for managers and policymakers seeking to enhance organizational resilience, workforce adaptability, and sustainable competitiveness in increasingly dynamic manufacturing environments.

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