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A Bibliometric Analysis of Inventory Management Research

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Abstract: This study presents a bibliometric review of research on inventory management and its relationship with supply chain optimization. Drawing on a Scopus dataset assembled through a PRISMA-guided screening process, the study examines publication patterns, leading journals, authorship and collaboration, citation impact, and the conceptual themes shaping the field. The final dataset is reported as comprising 2,336 publications for the principal bibliometric analysis, while the results section also provides a focused dataset summary for 2016–2025. Analysis using Biblioshiny highlights sustained growth in research output, a broad and interdisciplinary journal base, substantial international collaboration, and recurring themes involving supply chain management, inventory control, optimization, sustainability, and datadriven decision-making. The review also identifies opportunities to strengthen collaboration across research communities and to further investigate technology-enabled, multi-objective, and sustainability-oriented inventory policies. By mapping the structure and development of this literature, the study offers an overview of the field's current research priorities and directions for future work.

Keywords: *Inventory Management; Inventory Optimization; Supply Chain Management; Bibliometric Analysis; Systematic Literature Review; Biblioshiny; Sustainability; Operations Research.*

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I. INTRODUCTION

Somewhere between a warehouse shelf and a balance sheet lies one of the oldest, most quietly consequential problems in business: how much stock should a company hold? Hold too little and a firm loses sales, frustrates customers, and risks its reputation the moment demand outpaces supply; hold too much, and capital is frozen in unsold goods, storage costs balloon, and, for a growing number of firms, so does their carbon footprint. Inventory management is thus not a back-office detail confined to warehouse operations, but a strategic lever that touches profitability, sustainability, customer trust, and, as recent research shows, the integrity of a company's financial reporting. This tension between scarcity and excess is the underlying problem this paper sets out to explore, though not by solving it for any single firm. Individual companies have been wrestling with the trade-off for as long as there have been shelves to stock, but the academic community has responded by building an enormous, fragmented body of research around it, spanning economics, operations research, accounting, engineering, and, more recently, computer science. That volume of work is itself an opportunity: if the individual studies within it can be mapped, rather than read one at a time, the collective picture they form can say something that no single paper could say on its own about how the field understands and continues to reshape the problem of holding the right amount of stock. Rather than solve the inventory problem directly, then, this paper asks a broader question: what does the accumulated body of academic research tell us about how this problem has been studied, where the field's attention has concentrated, and where it still has room to grow?

Inventory decisions have never been a purely operational concern, and the research literature has increasingly framed them that way. In particular, over the past decade, scholars have framed inventory management as a decision-making problem whose consequences extend well beyond the stockroom floor. Tiwari, Daryanto, and Wee (2018), for example, developed an integrated inventory model for deteriorating and imperfect-quality items that explicitly weighs carbon emissions from transport, warehousing, and disposal against the usual cost concerns of ordering and holding stock, effectively treating environmental impact as a variable that managers can, and

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arguably should, optimize alongside price and quantity. Feng, Li, McVay, and Skaife (2015) approached the same broad subject from an almost entirely different angle, showing that firms with weaker internal controls over financial reporting also tend to manage their inventory less effectively. Together, this suggests that inventory decisions are entangled not only with logistics and sustainability, but also with a firm's governance and reporting practices. These two threads of research, while appearing distant on the surface, converge on the same underlying point: inventory management sits at the intersection of operational planning, financial accountability, and increasingly, environmental responsibility, making it a genuinely useful lens through which to study how organizations make decisions and solve problems under real constraints.

As the authors approaching this topic, what struck us was less any single study, but the sheer scale and spread of the literature itself. Inventory management, it turns out, has been examined from almost every conceivable angle: humanitarian logistics, blood supply chains, blockchain traceability, deep reinforcement learning, and sustainability-driven cost models, to name only a few, and often by small, self-contained groups of researchers who rarely seem to cross paths with each other. It was this scattering that motivated us to pursue a bibliometric mapping of the field, rather than a narrower conceptual study of one inventory model or industry. We wanted to step back from any individual paper and ask what the literature looks like, in the same way an analyst might study a market. This paper is guided by three research objectives. RO1 seeks to understand the broad publication trends within inventory-management research: how output has grown or held steady over time, where that research tends to be published, and who is producing it. RO2 turns inward to the specific findings uncovered within the corpus itself, including its citation patterns, its recurring thematic clusters, and the collaborative structures that connect its authors. RO3 looks forward, using the gaps, imbalances, and clusters uncovered along the way to sketch a short agenda for where inventory-management research might reasonably head next. Together, these three objectives move from the descriptive to the interpretive to the forward-looking, shaping the structure of everything that follows in this paper.

To answer these questions, this study draws on a corpus of 441 indexed papers on inventory management, compiled from bibliographic export data and analyzed across publication year, venue, authorship, citation impact, keyword themes, and co-authorship structure. The picture that emerges is that of a mature but notably decentralized field. Annual output has held fairly steady at roughly thirty to forty papers a year since 2015, with a modest uptick around 2021 that plausibly reflects the post-pandemic surge of interest in supply chain resilience and inventory risk, a period when the fragility of global supply chains became difficult for any researcher, or business, to ignore. That research is spread thin across 208 different journals, although the European Journal of Operational Research stands out as the field's dominant outlet. Authorship follows a similar pattern of dispersal: no single researcher dominates the corpus, and even its most prolific contributor appears in only five papers, suggesting a wide but loosely connected research community.

Citation activity tells a related, if slightly different, story. Of the 377 papers in the corpus with a recorded citation count, the largest share clusters in the twenty-six to fifty citation range, and the field's average of 38.4 citations per paper is driven up by a small number of outsized successes; just six papers in the entire corpus have crossed the two-hundred-citation mark. Beyond the umbrella term "inventory management" itself, the keywords authors attach to their own work cluster around a recognizable set of live sub-themes, including sustainability and carbon emissions, spare-parts logistics, blood and healthcare supply chains, dynamic pricing, and decision-making under uncertainty. These are not fringe interests confined to a handful of outlier papers; they recur often enough across the corpus to suggest they represent the field's current centers of gravity, the questions researchers keep returning to, even as they approach inventory management from different disciplinary starting points.

Mapping who wrote with whom adds to this picture, and arguably the most human point. The co-authorship network breaks into many small, tightly-knit clusters of roughly three to seven researchers, each publishing repeatedly together but rarely reaching across to collaborate with other groups. This is consistent with a field organized around independent, self-sustaining research groups, and it echoes the same dispersal already visible in the authorship and journal data. The ten most-cited papers in the corpus represent this same thematic spread, spanning sustainable inventory modelling, the relationship between internal financial controls and inventory practice, humanitarian and blood-supply logistics, and more recent applications of machine learning and blockchain to inventory control, a reminder that this is a field still actively absorbing new tools.

The remainder of this paper is organized to walk through this information in approximately the order it was uncovered. It begins by tracing publication volume over time, then turns to the journals and authors that shape the field, as well as the distribution of citation impact across the corpus. It then maps the keyword themes that recur most often, and the co-authorship clusters that structure the field's collaborative activity, before closing with a closer look at the ten most-cited papers individually. The paper ends with a conclusion that draws these threads together, considering what this body of research contributes to business practice, where its findings can reasonably be applied, and the limitations of this study, namely the time and technical constraints under which it was conducted.

II. LITERATURE REVIEW

- *Importance of the Topic*

Inventory management is a key aspect in Operations Research because it is majorly responsible for improving cost efficiency, customer service, and operational resilience for almost every industry that produces, stores, or moves physical goods. Effective inventory decisions help ensure a

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firm can meet fluctuating demand needs of the market without tying up excessive capital in stock, and poor inventory practices are consistently linked to stockouts, waste, and eroded profit margins. The scale of academic interest mirrors this practical importance: the literature search conducted for this project returned slightly over 2,300 peer-reviewed articles published between 2016 and 2027, spanning applications from perishable agri-food supply chains to humanitarian logistics, blood banking, and electric-vehicle component sourcing etc. This breadth reflects the fact that inventory management is not a narrow technical sub-field but a foundational Operations Research problem that recurs across manufacturing, retail, healthcare, agriculture, and emerging technology sectors alike. Understanding how this literature has evolved, and where current research attention is concentrated, is therefore essential to situating this project's own contribution within an active and rapidly growing body of knowledge.

➢ *General Comments on the Relevant Literature*

A large and growing body of literature has explored inventory management from an operations research perspective with output of papers and research nearly tripling between 2016 and 2026. Current literature tends to focus on the use of inventory management in the context of supply chain decision making, rather than as a stand-alone operational issue. Using this subset of 2026, a co-occurrence analysis was performed in VOSviewer, which shows a structured overview of where recent research is focused and identifies seven thematic clusters of recurring keywords. The strongest concentration is around supply chain integration and optimization, such as 'supply chain management', 'inventory optimization', ‘demand forecasting' and ‘sustainability', reflecting a shift in current research to investigate how inventory decisions interact with other aspects of supply chain performance and environmental goals. The second large cluster consists of “decision making”, “deep learning”, “information management”, and “inventory control” and shows the use of decision support systems and machine learning tools in classical inventory related issues (Abuhasel, 2026) ;(Bhavikatta & Goluguri, 2026). There is a relatively small body of literature that is concerned with cost oriented themes ("cost accounting," "cost benefit analysis," "budget control") and sustainability oriented themes ("carbon," "carbon economy," "circular economy") each forming their own smaller, distinct clusters, suggesting that while cost efficiency remains a persistent research concern, environmental and economy considerations have emerged as a separate and increasingly prominent line of enquiry e.g., (Abbasi et al., 2026) . Overall, the general trend in the literature indicates that the research on inventory management is gradually shifting from cost-minimization, deterministic models, to multi-objective, technology-based and sustainability oriented models.

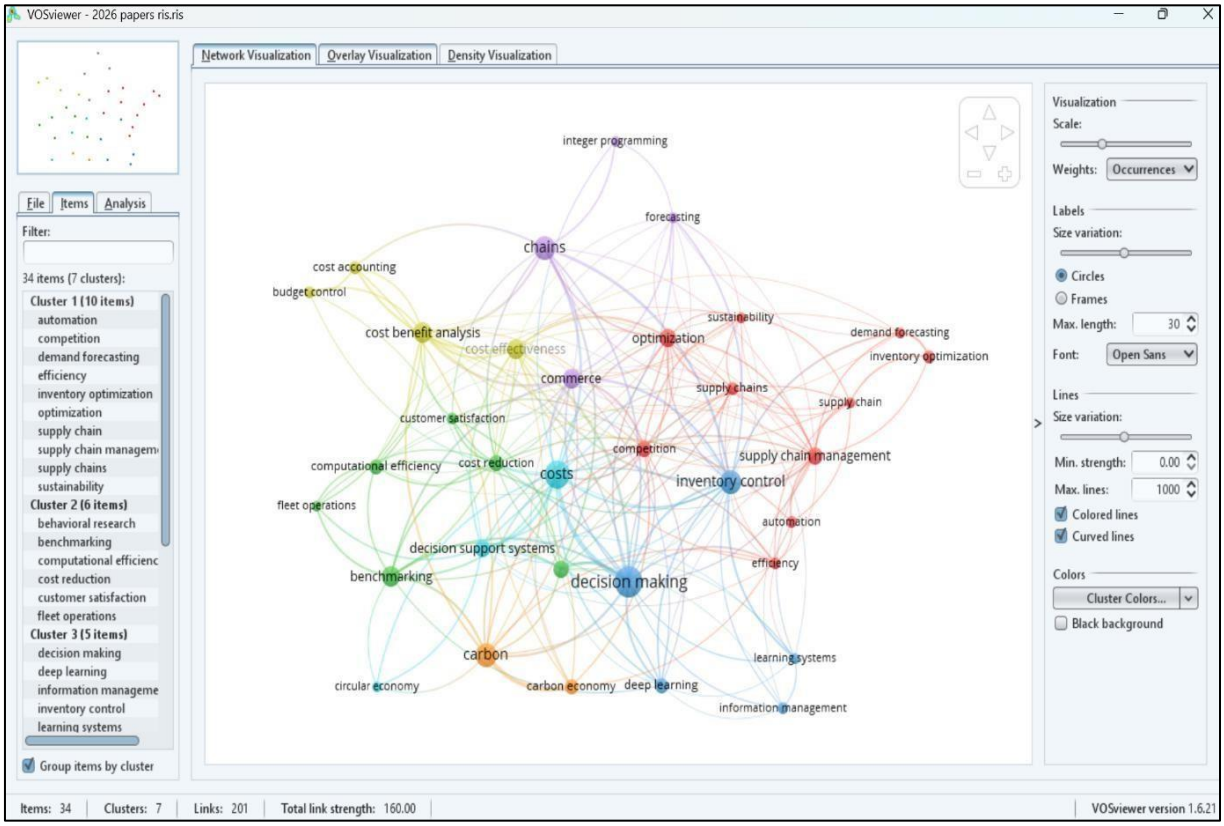


Fig 1 VOS Viewer Keyword Co-occurrence Network of Recent Inventory Management Research.

➢ *Historical Perspective*

The study of inventory systems has traditionally been an area of study in Operations Research having a long history of research since the classical deterministic models, including the Economic Order Quantity model developed in the early twentieth century. This project has synthesized a more recent period of this history (2016-2027), characterized less by the development of fundamental models, and more by the

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development of contextual diversification. In the early instances in this dataset (2016), the majority of the problems are structural and deterministic in nature, including integrated production inventory location (Alavi et al., 2016) and robust global supply chain design under uncertainty (Almaktoom et al., 2016) . (Pourhejazy & Kwon, 2016) review of "the new generation of operations research methods in supply chain optimization" is itself a useful marker of the field's state at that time, characterizing the discipline that we are transitioning from traditional mathematical models to a combination of simulation and advanced optimization algorithms.

Over the past decade, publication volume has grown substantially and steadily, from 138 articles in 2016 to 402 in 2026 within this dataset, nearly a threefold increase, with the sharpest acceleration visible from 2023 onward. This growth has been accompanied by a marked shift in subject matter. Whereas the early papers in the dataset largely centred on cost- and locationoriented deterministic modelling, the 2026 literature is increasingly organized around digital and sustainability-driven themes, namely artificial intelligence and deep-learning-based forecasting, digital twins for adaptive planning, and carbon-constrained or circular-economyoriented inventory policies. It is only in the past five years that systematic and bibliometric reviews of adjacent supply chain sub-domains have begun to emerge in meaningful numbers, suggesting that inventory management research has matured to a point where scholars are now consolidating and mapping the field itself, rather than solely producing new primary studies.

- *Meta-Literature: Existing Bibliometric and Systematic Reviews*

A further, more targeted search was conducted to identify any existing bibliometric or systematic-review-type studies already published within the broader supply-chain and inventory-management space, since these represent the closest methodological precedents for the present study. Searching titles, abstracts, and keyword fields for the term "bibliometric review" returned 13 papers. Their distribution across time is itself informative: only one appears earlier than 2022 within this corpus (Pourhejazy & Kwon, 2016) , and the remaining 12 are concentrated between 2022 and 2026, with more than half published in 2025 or 2026 alone. This pattern reinforces the historical observation above: formal bibliometric and systematic-review methodologies have only recently become a popular way of synthesizing this literature.

Thematically, these 13 papers cluster around a small number of recurring sub-domains rather than spreading evenly across inventory management. Blood supply chain management accounts for three of the thirteen, each independently arguing that this area has grown enough to warrant its own science-mapping treatment eg. (Imamoglu et al., 2023). Artificial intelligence is the second recurring focus, appearing in five of the reviews e.g.(Ferreira et al., 2025), which suggests that AI-enabled decision-making has become prominent enough to justify several near-simultaneous systematic treatments rather than a single consolidated one. The remaining papers address narrower topics such as circular supply chains, multi-echelon vehicle routing, and perishable supply chains. This indicates that as the base literature has grown, researchers have increasingly turned to bibliometric methods to make sense of narrower, fast-growing sub-topics rather than the field as a whole. This supports the rationale for the present study. Because over 2,300 primary papers focus on general inventory management, and related sub-domains have already been analyzed bibliometrically, applying this structured mapping to Operations Research is both timely and methodologically justified.

- *Existing Bibliometric and Systematic Reviews Relevant to Inventory Management*

Table 1 Existing Bibliometric and Systematic Reviews Relevant to Inventory Management

Year	Author(s)	Title	Journal
2026	Baghalzadeh & Shishehgarkhaneh Moehler	Application of Recommender Systems in SCM: A State-of-the-Art Review	Intelligent Systems with Applications
2026	Dadi	AI, Blockchain, ERP, and ML in Fisheries Supply Chain Optimization: A Systematic Literature Review	Jurnal Optimasi Sistem Industri
2026	Fonseca	AI-Enabled Sustainability in SME Supply Chains: A Systematic and Bibliometric Review	Management and Marketing
2025	Changalima	Trends and Knowledge Themes in 100 Most-Cited Publications on the Blood Supply Chain	Modern Supply Chain Research & Applications
2025	Ferreira	The Use of AI in SCM: Systematic Literature Review and Future Research Directions	IEEE Access
2025	Ghouati	Evolution and Impact of AI in Sustainable SCM: Systematic Literature Review and Bibliometric Analysis	Corporate Governance & Sustainability Review
2025	Siswanto	Analytical Review of Blood Supply Chain Management via Science Mapping	Healthcare Analytics
2024	Nielsen	Systematic Review of Vehicle Routing Problems in Multi-Echelon Distribution	Supply Chain Analytics

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2023	Imamoglu	Systematic Literature Review of the Blood Supply Chain through Bibliometric Analysis and Taxonomy	Systems
2023	Madzík	Supply Chain Research Overview, Early 1980s–COVID Era: LDA-Based Analysis	Computers & Industrial Engineering
2023	Zhang	Circular Supply Chain Management: A Bibliometric Analysis-Based Review	International Journal of Logistics Management
2022	Mirabelli	Optimization Strategies for Perishable Supply Chains: A Literature Review	Journal of Industrial Engineering & Management
2016	Pourhejazy	The New Generation of OR Methods in Supply Chain Optimization: A Review	Sustainability (Switzerland)

III. RESEARCH METHODOLOGY

Systematic literature review (SLR) is an iterative technique helping us examine and synthesise existing research in a subject area(Paul & Rialp, 2020); the present study is comprised of relevant scholarly articles gathered through searches of academic bases. The identified literature was examined using specific selection criteria to ensure its relevance to its objectives. By organising and analysing previous studies, the review provides an overall understanding of the current knowledge and highlights potential directions for future research.

The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) statement was adopted to guide the reporting of the systematic literature review. The review process was conducted in accordance with the PRISMA framework, which provides a structured approach to the reporting of systematic reviews through a checklist and flow diagram. This approach was employed to ensure that the identification, screening, eligibility, and inclusion of relevant studies were reported systematically and transparently(Moher et al., 2010)

The initial database consisted of 5791 records. These papers were then subject to a series of filters based on publishing periods, subject category, language and journal source. This systematic filtering process helped improve the relevance and consistency of the dataset.

- *Article Selection, Inclusion and Exclusion Criteria*

The database research was conducted on 16 September 2026 on Scopus, focusing on using search keywords “inventory” AND "optimisation" AND “supply chain" appearing in the title, abstract and keywords using the PRISMA framework. (Moher et al., 2010)

The selection procedure was based on predefined criteria rather than selecting articles on an arbitrary basis. This is consistent with systematic literature reviews, where the identification and selection of literature are conducted through systematic procedures. (Paul & Rialp, 2020) explain that review articles identify and synthesise relevant literature to provide an understanding of a research domain and help reveal gaps that can guide further research. (Paul & Rialp, 2020)

The initial search generated a total of 5791 research papers. At the first stage of screening, a period-based filter was applied. The publications revealed that the data was present from the year 1988; however, to maintain the most relevant papers, it was filtered to include papers only from 2016, leading us to 3864 papers, excluding 1927 research papers.

Following the period-based filter, no subject area filter was applied, since the subject is essential and widely used in all areas of engineering (1104), computer science (915), decision sciences (813), business, management and accounting (773), mathematics (521), etc.

The next stage involved applying a subject category filter and retaining Articles (2267) and Reviews (69). After this filter was applied, 2408 research papers remained, removing 1456 research papers.

The next screening filter involved applying the language; only publications of the English language were involved in the analysis, which brought us to 2340 papers, removing 68 papers. English was the leading language used in the publications, followed by Chinese and Korean.

In the final process of screening, a journal filter of only academic journals was used to remove conference papers, conference reviews, book chapters, books, errata, and retracted publications to keep relevant abstracts and research methodology, after which we got 2336 research papers, removing 4 papers.

The inclusion criteria primarily consisted of four factors: publication period, publication category, language and journal source. (Moher et al., 2010) Publications meeting the requirements were added in the study. Records that were outside the requirements were removed.

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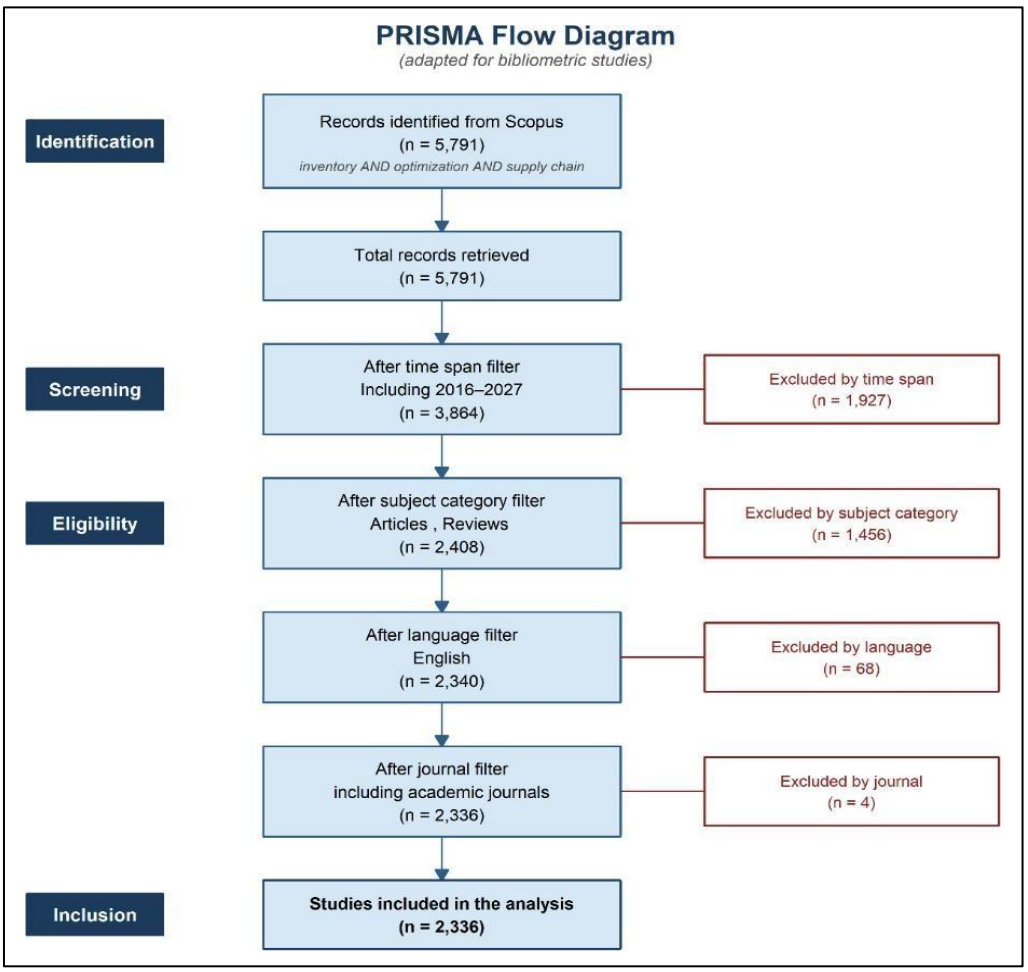


Fig 2 PRISMA Flow Diagram

➢ *Bibliometric Analysis*

Following the selection process, the dataset was analysed using Biblioshiny to examine the characteristics and structure of research relating to inventory optimization and supply chain. The analysis involved in application of techniques involved in timespans, sources, citations, authors and keywords (Donthu et al., 2021) .

The bibliometric analysis in this study follows the four step framework (Donthu et al., 2021).Beginning with defining purpose and scope, Choosing techniques, Collecting the data , Running analysis and reporting findings.

- *Step 1: Define the Aims and Scope of the Bibliometric Study*

The first step involves in establishing the aims and scope of the study, before selecting the techniques or collecting the data.(Donthu et al., 2021). The scope of this research is to examine supply chain management based on its performance.

For the present study, the Bibliometric analysis focused on the research for supply chain management and inventory optimization. The final data set included 2336 papers which is sufficiently large for the bibliometric analysis, as it contains in hundreds or thousands of publications (Donthu et al., 2021)

- *Step 2: Choosing Techniques for Bibliometric Analysis*

The second step involves selecting bibliometric techniques according to the aims and scopes established in Step 1 (Donthu et al., 2021). The techniques should be selected before preparing data as the techniques to a far extent determine the data required.

The major techniques include Performance analysis and science mapping .The performance analysis can examine constituents by citations, authors, institutions, journals, language, while the science mapping reveals relationships within the field using citation analysis, co authorship analysis, co word analysis etc (Donthu et al., 2021). These techniques help determine the research productivity, collaboration of the Inventory optimization and supply chain management research.

- *Step 3: Collecting the Data*

The third step involved in collecting the data after necessary techniques used to filter the data. Data was collected using broad search terms that are enough to generate an optimal dataset(Donthu et al., 2021).

The PRISMA based process was used, The four aspects mainly used for getting the final inclusion dataset were, the publication period, subject area, Language and the academic journal source. This lead to the final inclusion of 2336 articles

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- *Step 4: Running the Bibliometric Analysis and Reporting Findings*

The final step involved in selected analysis and reporting the findings. In this present study the filtered dataset was analysed using Biblioshiny , which helped in the performance analysis and science mapping(Donthu et al., 2021). The analysis examines publication trends, citations, authors, sources, keywords, collaboration patterns. Citation analysis helps identify publications with greater citation impact, co-citation and bibliographic coupling can reveal relationships among publications. Co-word or keyword analysis can further identify major themes and their relationships within the research domain.

Lastly, these were the software's and/or resources that were used for the bibliometric analysis:

- ✓ Elsevier's Scopus is a leading academic database covering peer-reviewed articles, papers, and books. It helped search and filter the literature, cutting the dataset from 1,382 records down to 597 papers.
- ✓ RStudio runs R, the language powering Bibliometrix, the package behind this study's bibliometric analysis. Because Biblioshiny sits on top of it and hides the coding, RStudio was not used directly.
- ✓ Biblioshiny is Bibliometrix's point-and-click interface. The cleaned dataset went into it to produce publication trends, top authors and journals, keyword networks, and thematic maps.
- ✓ Mendeley is reference management software for organizing the literature and generating formatted citations and references. It played no role in the bibliometric analysis itself.

IV. DATA ANALYSIS

This section presents the bibliometric analysis of the selected research literature. The analysis examines publication growth, citation patterns, leading sources, country-level contributions, collaboration patterns and the evolution of major research themes.

➢ *Dataset Summary*

Table 2 Dataset Summary

Indicator	Value
Study period	2016–2025
Documents	1,926
Sources	623
Annual growth rate	12.14%
Authors	4,670
International co-authorship	29.8%
Average co-authors per document	3.37
Average citations per document	23.16

➢ *Main Information / Bibliometric Overview*

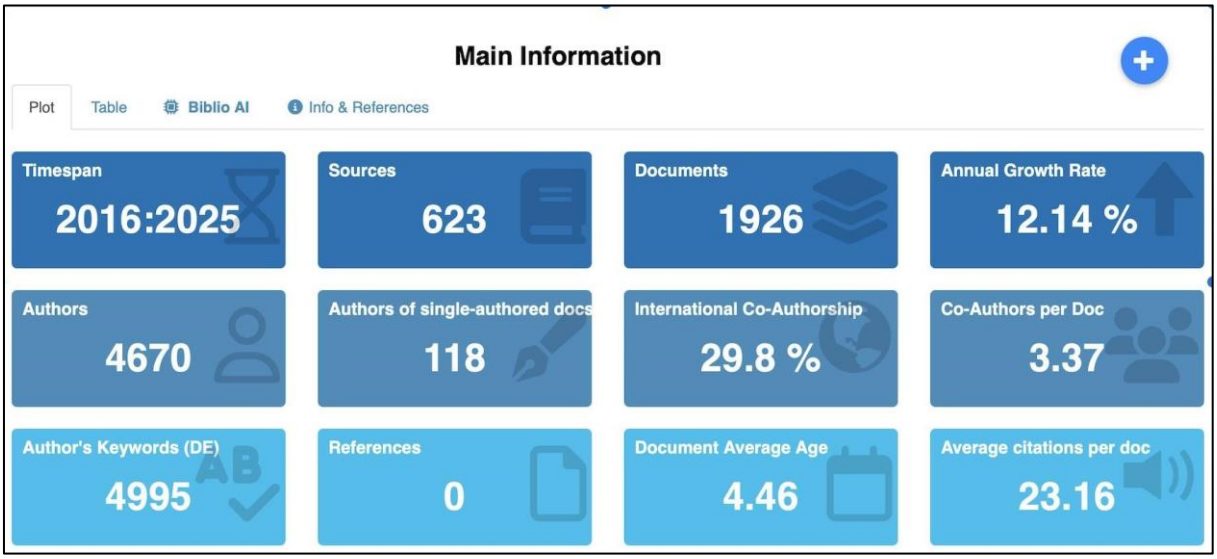


Fig 3 Main Bibliometric Indicators for the Research Dataset.

- Analysis: The bibliometric overview provides a general overview of 2016-2025 research field. The number of documents (1,926) and sources (623) suggest a relatively wide base of publications rather than reliance on key journals. The annual growth rate of 12.14% indicates that the number of research articles has increased during the period.

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The author statistics also show a high level of collaboration. 4670 authors and 118 authors with single authored documents. The average number of co-authors per document is 3.37 and international co-authorship is 29.8%, showing that research frequently involves collaboration within and across countries. Also, the literature has been discussed extensively, as the average of 23.16 citations per document suggests. The indicators indicate generally an increasing field of research that is international and collaborative.

➢ *Annual Scientific Production – Major Sources*

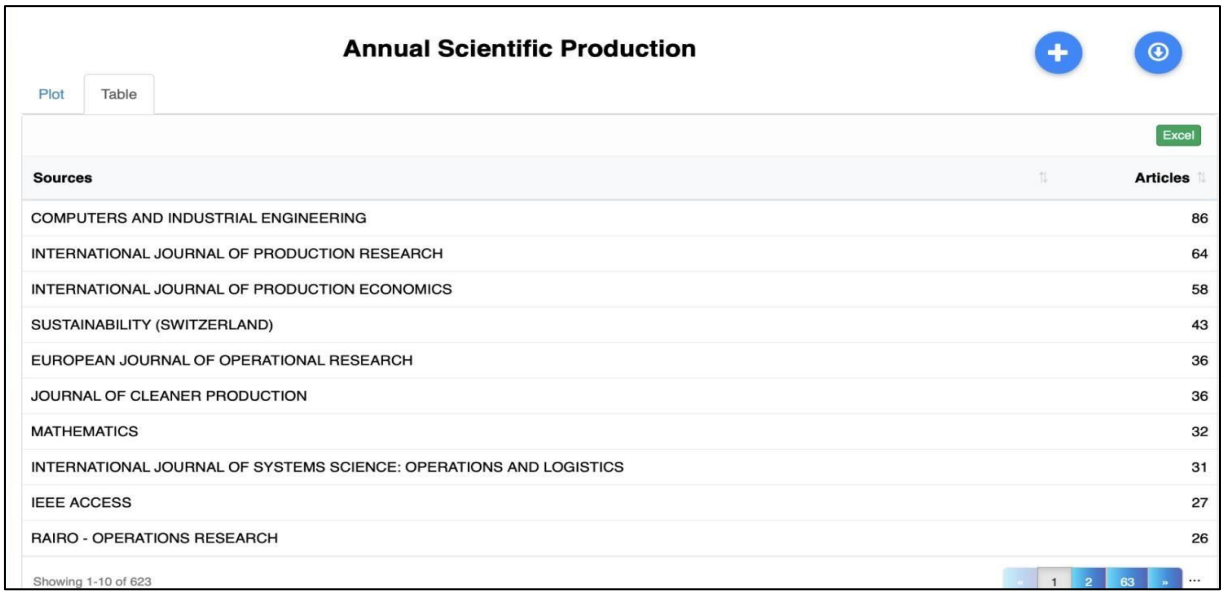


Fig 4 Number of Articles Published by the Leading Sources.

- Analysis: The source-level analysis is used to determine the most influential journals based on the literature. The most articles in the list displayed are in the field of Computer and Industrial Engineering (86). International Journal of Production Research comes next with 64 followed by International Journal of Production Economics at 58.

The other journals with significant contributions are Sustainability (43 articles) and European Journal of Operational Research (36 articles) and Journal of Cleaner Production (36 articles). Other important sources shown include Mathematics, International Journal of Systems Science: Operations and Logistics, IEEE Access and RAIRO – Operations Research.

In this distribution, the subject is interdisciplinary. The main outlets are in the field of industrial engineering and production management, operations research, logistics, sustainability and quantitative methods. The focus of these journals also indicates that there are strong links between supply-chain / optimization related studies and operations / industrial decision making.

➢ *Three-Field Plot*

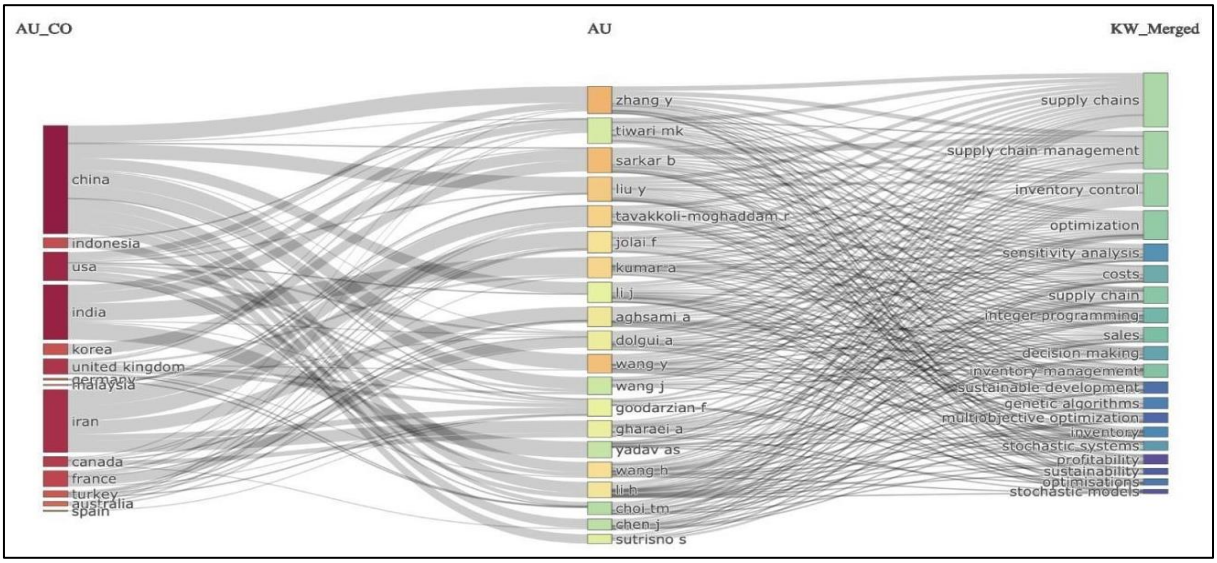


Fig 5 Relationships Among Countries, Authors and Author Keywords.

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- Analysis: The Three-Field Plot links 3 aspects of the literature: countries, authors, and keywords. China has the greatest contribution to the studied countries, while India, Iran, the USA, Indonesia, and several others are represented as well. The middle part of the plot contains the most common authors, including Zhang Y, Tiwari MK, Sarkar B, Liu Y, and others. The right part of the plot demonstrates the keywords related to the studied field. Among the most common terms are supply chain, supply chain management, inventory control, and optimization, while such terms as sensitivity analysis, costs, decision-making, inventory management, sustainability, genetic algorithms, and Multi objective optimization are presented as well. The left part of the plot shows that authors and countries mentioned in the literature are highly integrated with each other, which means that the same authors and countries are involved in different subjects. However, they are linked with the central part of the plot, presenting authors and topics related to supply-chain management and optimization. Thus, this field connects all the other ones, which means that most papers focus on supply chain management optimization and are related to each other.

➢ *Average Citations Per Year*

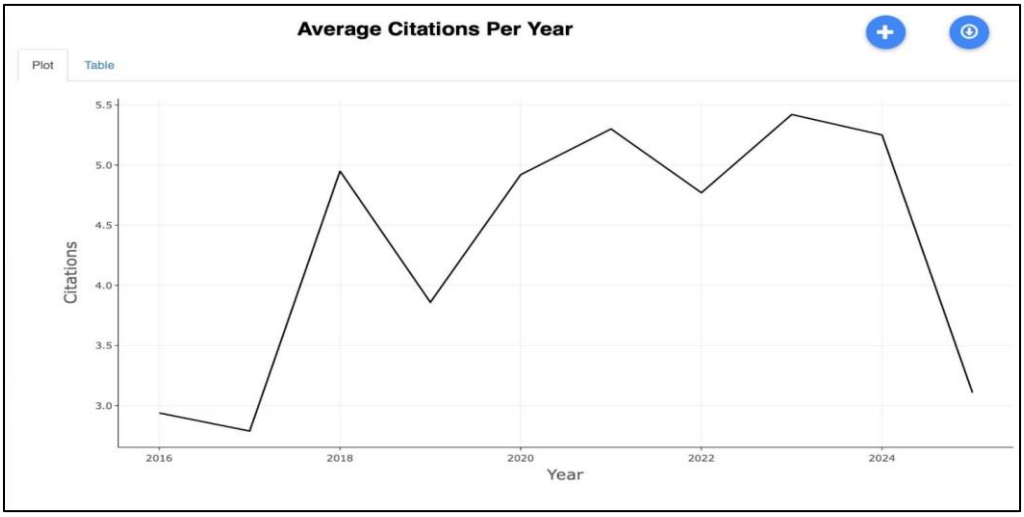


Fig 6 Average Citations Received by Documents Across the Study Period.

- Analysis: Graph depicting the average-citation trends of the citation impact of the literature over time. The average citation is at its peak, specifically at 5.4 per document, in 2023, and reaches a value of approximately 4.8 in 2022. In 2016, the average is at 2.9, and the following year it is 2.8, then it sharply rises to 4.9, drops to 3.9 in 2019, and climbs to 4.9 in 2020 and 5.3 in 2021.

The value is high at 4.8 in 2022, peaks at 5.4 in 2023, and is still high at 5.2 in 2024, but drops to 3.1 in 2025.

A drop in 2025 does not necessarily indicate that research quality and relevance decreased. Recent studies have less time to be cited; therefore, the number of citations for the latest year is impacted by the time difference. Overall, middle years have more accumulated citations.

➢ *Sources' Production Over Time*

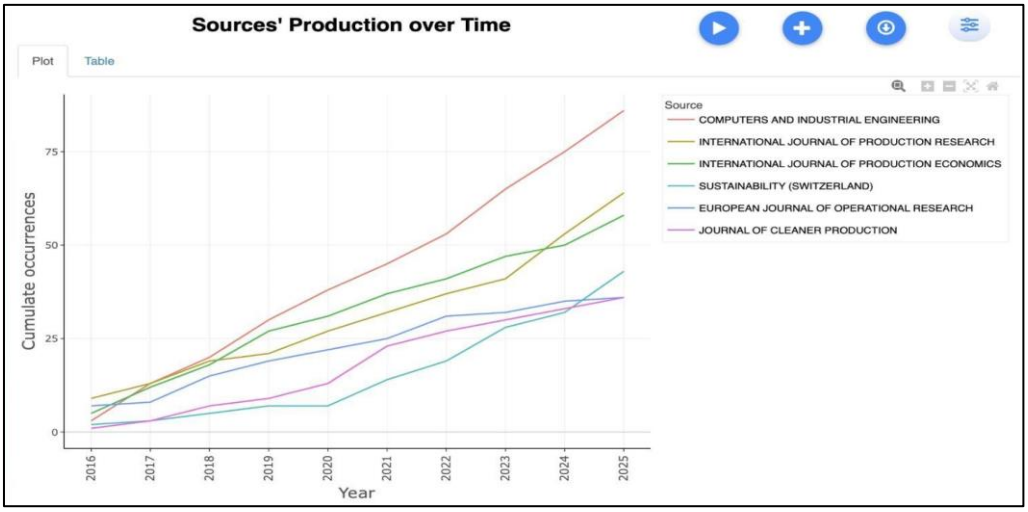


Fig 7 Cumulative Publication Growth of Major Journals from 2016 to 2025.

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- Analysis: The provided graphical data presents a chart that illustrates the cumulative number of publications for the major sources during 2016–2025. It can be observed that Computers and Industrial Engineering had the highest overall growth and is expected to reach approximately 86 papers in 2025. International Journal of Production Research is anticipated to increase to around 64 papers, while International Journal of Production Economics is predicted to amount to approximately 58 papers.

Sustainability (Switzerland) demonstrated a significant surge in cumulative publications during the last years of the timeline, reaching around 43 publications. Similarly, European Journal of Operational Research and Journal of Cleaner Production are forecasted to amount to approximately 36 papers each.

Overall, the cumulative line plot clearly demonstrates that the number of papers published in the outlets has increased over the years. The growth is especially evident after the year 2020, which might signify the rising interest in the field of production, supply, chains, optimization, and sustainability. Therefore, the chart supports the claim presented in the research paper.

➢ *Thematic Map*

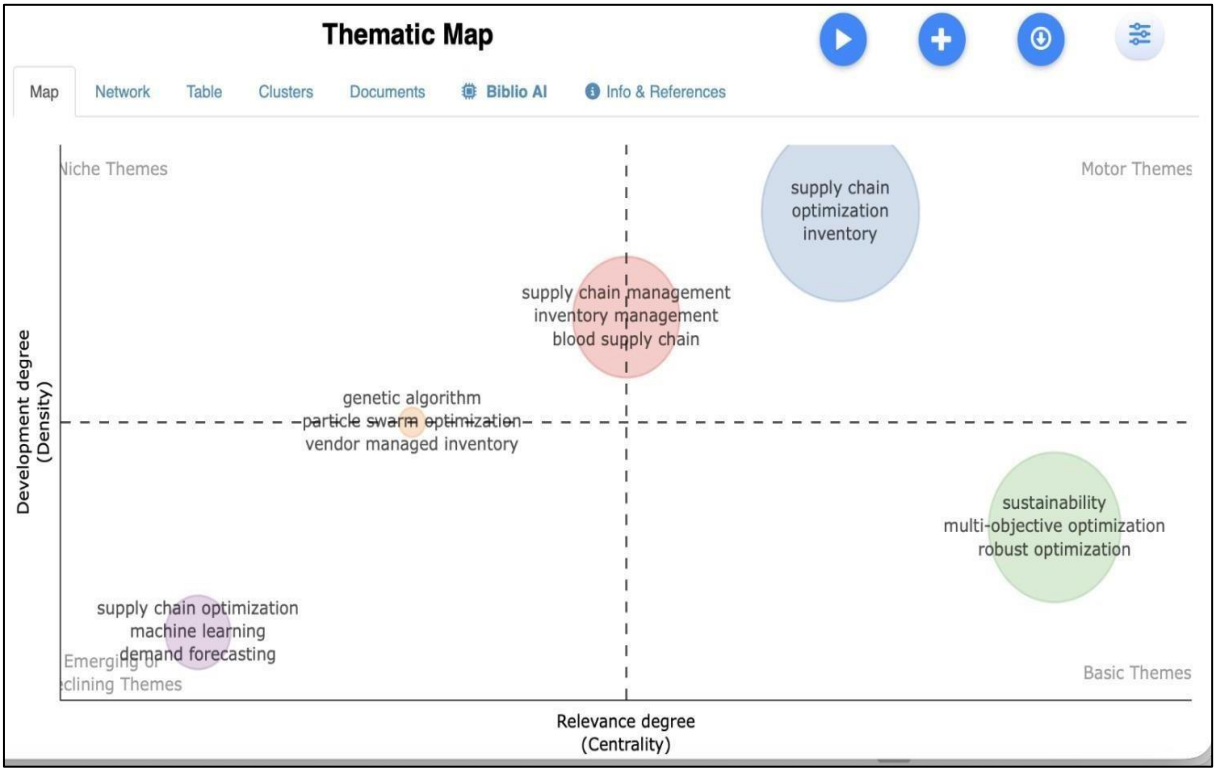


Fig 8 Research Themes Positioned According to Centrality and Density.

- Analysis: The thematic map integrates key terms on two dimensions: centrality, which reflects the themes' relevance or connectedness to the whole corpus, and density, to which denotes the level of internal development of a theme.

The quadrant with the motor-theme contains "supply chain optimization, inventory," which suggests a theme that is both developed and connected to the overall structure of the research.

"Supply chain management, inventory management, blood supply chain" appear in the close vicinity of the central and developed region, suggesting their importance within the field of study.

"Sustainability, multi-objective optimization, robust optimization" emerges as a basic theme. Its moderate level of centrality reflects its connection to the overall field of research, whereas the lower level of density denotes the possibility of its further development, which genetic algorithms, particle swarm optimization and vendor-managed inventory, forming a specialized group.

The area of emerging/declining themes contains supply-chain optimization, machine learning and demand forecasting. These themes could be seen as emerging or declining areas of study or shifts in research priorities. In general, supply-chain and inventory optimization shape the central core of the literature, whereas sustainability and advanced optimization techniques act as key supporting themes.

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➢ *Most Cited Countries*

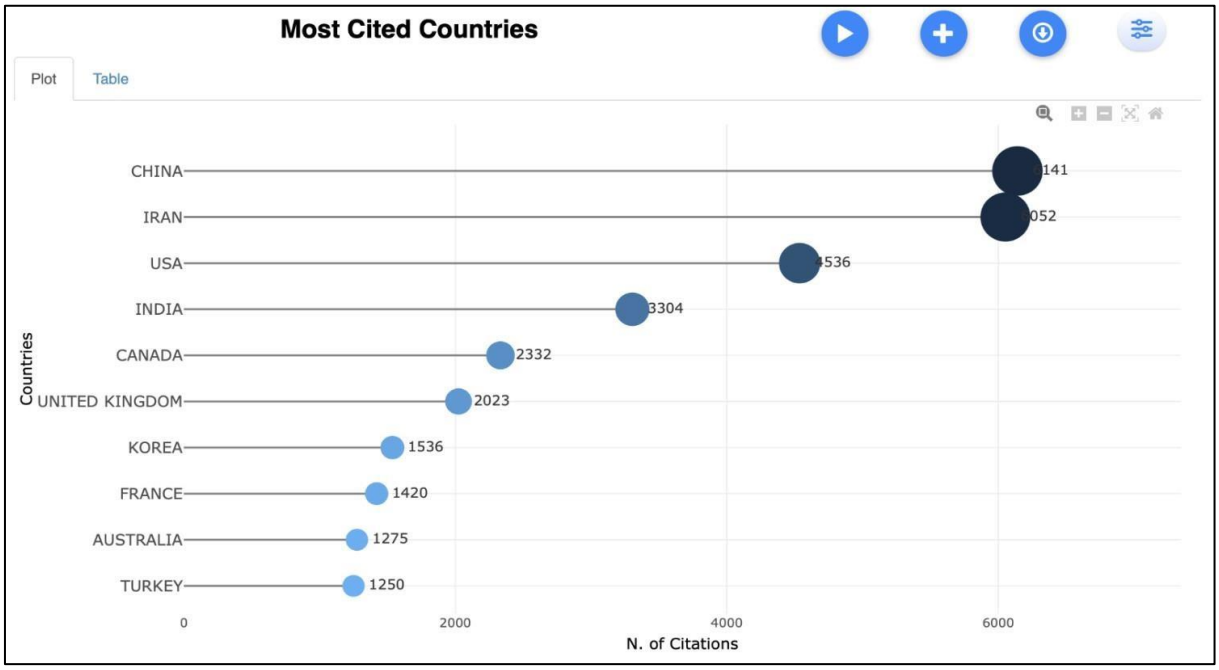


Fig 9 Countries Ranked by Accumulated Citations in the Dataset.

- Analysis: The Most Cited Countries chart ranks countries by the number of citations received by their publications in the dataset. China reports the greatest visible citation count with 6,141, almost tied with Iran, recording 6,052 citations. The USA has 4,536 citations, while India has 3,304.

Canada and the United Kingdom record 2,332 and 2,023 citations, respectively. Korea, France, Australia, and Turkey report 1,536, 1,420, 1,275, and 1,250 citations, respectively.

The results demonstrate a geographical variation in influence with particularly high presence from Asia as well as North America and Europe. China and Iran appear at the forefront in terms of accumulated citations in this dataset. However, citation counts reflect accumulated scholarly attention and can be influenced by publication volume, publication age and collaboration patterns; they should therefore be interpreted as bibliometric indicators rather than direct measures of research quality.

➢ *Countries' Scientific Production*

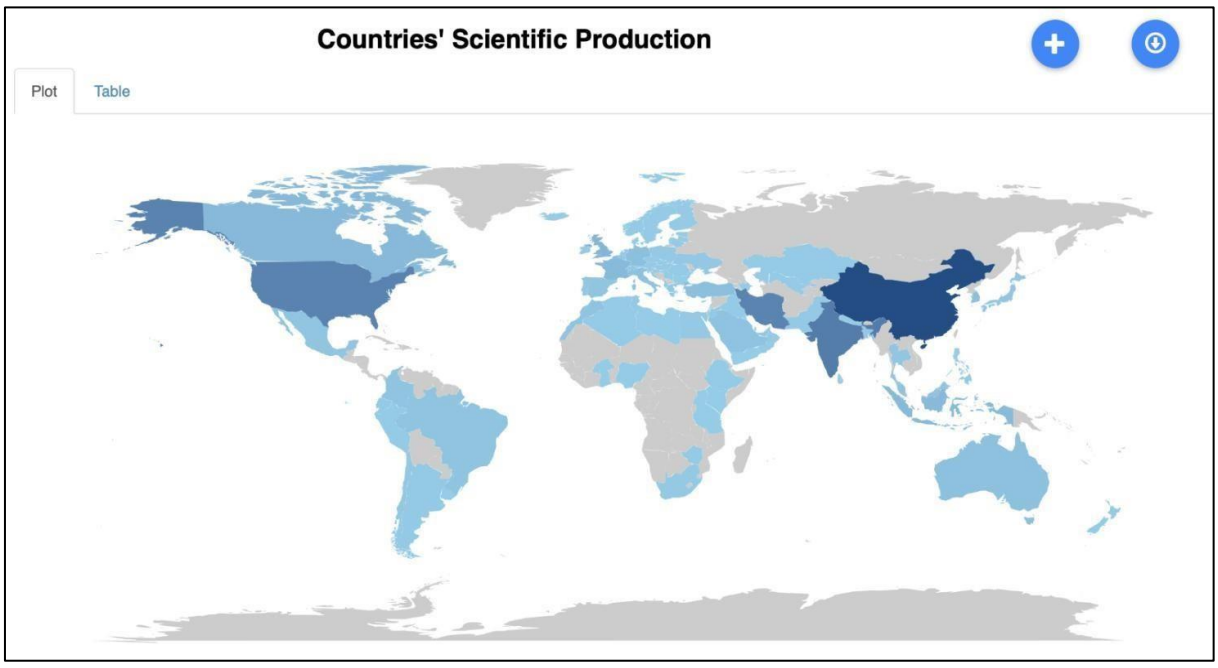


Fig 10 Geographic Distribution of Scientific Production.

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- Analysis: The scientific-production map represents the distribution of research activities. The countries with the strongest shades are China, India, the United States, and Iran, as well as several European, Asian, and other countries.

It can be seen that the research area is international and not concentrated in a particular country or region. It is obvious that Asia has the greatest share of research activity, but North America, Europe, and Australia have significant participation.

Thus, the map reflects the information presented in the main-info panel about international cooperation. Specifically, the fact that 29.8% of articles are written by international teams confirms that this research area is international and involves the collaboration of researchers from different countries and continents. The given map visualizes the internationality of the research area and provides more information than the country citation analysis.

➢ *Sources' Production over Time – Additional View*

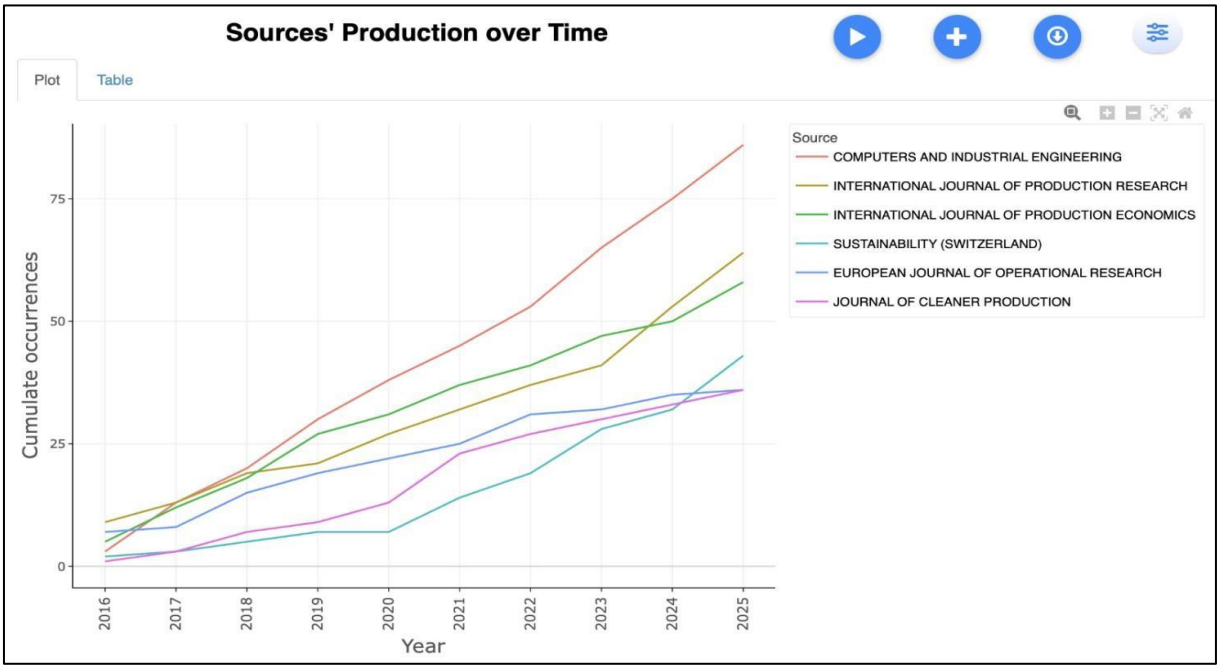


Fig 11 Additional View Confirming Cumulative Source-Production Trends.

- Analysis: This additional source-production perspective further exemplifies the trend, which was noted in the previous cumulative-production chart: Computers and Industrial Engineering remains the most productive source, followed by International Journal of Production Research and International Journal of Production Economics.

The lines indicate ongoing growth during the 2016–2025 period, with certain sources demonstrating increased rates of growth during the later years. Sustainability exhibits an especially notable rise towards the end of the period, whereas European Journal of Operational Research and Journal of Cleaner Production maintain consistent cumulative growth.

Overall, the trends across sources suggest that the publication activity is spread out across several outlets, rather than concentrated in a single publication. This observation further supports the idea that the research area has gained wider acceptance across the industrial engineering, operations research, production management and sustainability fields.

➢ *Overall Findings from the Bibliometric Analysis*

The results of the combined analysis reveal that the research area grew significantly between 2016 and 2025. The high annual growth rate (12.14%) plus the number of documents and sources found shows that this topic has drawn much scholarly interest over the past decade. The author and co-authorship analysis demonstrates that collaboration is a dominant trend in this study, which implies the relevance of the topic. Almost three documents per ten have been published with international collaboration. The source analysis identifies industrial engineering, production research, operations research, and sustainability journals as the major contributors to the study area. At the thematic level, supply chain, inventory control, and optimization emerged as central concepts. Sustainability, robust and multi-objective optimization, machine learning, demand forecasting, and metaheuristic algorithms appear as key related topics for future research.

The country analysis also reveals the international nature of the study. China, Iran, the United States, and India lead the analysis in terms of citation or production of documents, while the world map shows the presence of research in many countries. Finally, the citation trend analysis illustrates that the number of citations increased significantly

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during the middle and end years of the period. However, the authors interpret the low percentage of citations for 2025 with caution, as many documents published in this year still require time to be cited.

V. FUTURE RESEARCH AGENDA AND RECOMMENDATIONS

The sections above describe a field that is large, growing and thinly connected. This section turns those observations into the forward-looking agenda promised under RO3. It sets out two parts. The first one sets out substantive research directions for inventory management, built on the themes that recur across the strands of this project. The second converts both into recommendations for researchers, editors, practitioners and future bibliometric studies. Where we draw on literature from outside our corpus, the aim is to check whether the gaps suggested by our maps are also recognised by the people who work on these problems.

➢ *Substantive Research Directions for the Field*

The directions below follow the themes that our analyses and the literature review identify as the field's centres of gravity. For each, we state the evidence from this project, what outside literature adds, and what remains open. The table at the end of this section summarises them.

- *Learning-Based Inventory Control: From Promise to Practice*

Machine learning and deep learning form the second-largest keyword cluster in the literature review, appear in five of the thirteen existing bibliometric or systematic reviews, and sit among the emerging themes on our thematic map. The outside evidence is more cautious than the volume of publication suggests. Gijsbrechts et al. (2022) tested deep reinforcement learning on lost-sales, dual-sourcing and multi-echelon problems and found it competitive with good heuristics rather than clearly better, and only after considerable tuning. Boute et al. (2022) describe the many design choices and the computing effort that make practical adoption hard, and argue that learning methods should build on the structural insights that inventory theory already provides. Bergsma et al. (2025) add that scaling to realistic problems, large action spaces and algorithm design specific to inventory control remain unresolved, and that stochastic lead times, complementary items, quantity discounts, product obsolescence and multi-echelon networks are still under-studied.

Several lines of work follow. The first is shared benchmarks. Open environments such as ORGym (Hubbs et al., 2020), the multi-echelon MABIM simulator (Yang et al., 2023) and the two-echelon library of Stranieri and Stella (2022) are a start, but studies need to compare against properly tuned classical policies and report computing cost, so that results from different groups can be set side by side. The second is hybrid methods that combine structural policy forms with learned components. The third is explainability: planners are unlikely to accept orders from a model they cannot interrogate. The fourth is prescriptive approaches that go from data to order quantity without an explicit forecasting step, following the data-driven newsvendor of Ban and Rudin (2019).

A newer strand deserves its own attention. Large language model agents have begun to be tested as inventory managers, with promising early results from zero-shot multi-agent systems (Quan & Liu, 2024) and from agents that retrieve similar past situations (Yoshizato et al., 2026). Yet Zhao et al. (2025) show that different models display decision biases resembling those of human managers, including a pull-to-centre tendency and bullwhip-like behaviour. The open question is therefore under what conditions such agents can be trusted, and that calls for stress testing across demand shocks and supply disruptions before any deployment claim is made.

- *Sustainability as a Developed Theme, Not a Side Constraint*

On the thematic map, sustainability, multi-objective optimisation and robust optimisation form a basic theme: connected to the whole field but with low internal density. In the literature review, carbon and circular-economy keywords form separate small clusters. Both observations point the same way, towards a theme that many people touch but few have developed in depth. The early modelling work shows how much the constraint changes decisions. Benjaafar et al. (2013) used simple models to show how carbon caps, taxes and trading alter lot sizing and the value of coordination, and Fan et al. (2018), publishing in a journal that also appears in our source list, extended the economic order quantity model to cap-and-trade with permit sharing in a two-echelon chain. Tiwari et al. (2018) brought emissions from transport, warehousing and disposal into the same cost function as ordering and holding.

What is still thin is empirical grounding and breadth. Future studies could measure emissions beyond transport and storage, to include the embedded emissions of the goods themselves; model policies under carbon prices that change over time; connect inventory with returns and remanufacturing in circular chains; and treat waste as an objective rather than an afterthought. Hasiloglu-Ciftciler and Kaya (2025) take a step in that direction with a bi-objective model of profit against waste for perishable food, showing that sharing stock between branches reduces waste, and they themselves flag scalability and omnichannel settings as next steps. Calibrating such models with company data, and testing them against emerging disclosure rules, would move the theme from stylised models towards decision tools.

- *Resilience and Uncertainty after the Pandemic*

The modest rise in output around 2021, noted in the introduction, and the faster growth since 2023 in the literature review both fit the wider shift in supply chain research documented by Ivanov (2024), who finds that after 2020 attention moved from preparedness and prediction towards recovery and adaptation, with newer interest in digital technology, viability and ripple effects across industries. Guo et al. (2024) review the inventory side of resilience, covering stockpiling, multi-sourcing, capacity reservation and flexible contracts, for supply-side and demand-side disruption.

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Two questions stand out. The first is how resilience buffers trade off against the sustainability objectives above: extra safety stock protects against disruption but raises holding cost, obsolescence and emissions, and few models weigh these together. Robust and multi-objective optimisation, already a basic theme on our map, is the obvious toolkit. The second is empirical. Much of the modelling literature recommends larger buffers after a shock, but we did not find in our sources much evidence on what firms actually did with inventory policies after 2020, or whether it paid off. Panel studies using financial-reporting data could test this, and would also reconnect the operational literature to the reporting angle raised by Feng et al. (2015).

- *Perishables, Blood and Healthcare: A Bridge Between Clusters*

Blood supply chains sit close to the motor-theme region of our map, and three of the thirteen existing reviews in the literature review are devoted to them (for example Imamoglu et al., 2023). Earlier work, such as the classification by Beliën and Forcé (2012), shows the problem has long been studied through product type, solution method and decision level. Perishable agri-food and fisheries supply chains appear in other reviews in the same table. These communities describe the same core structure, stock that ages, shortage that carries a high cost and waste that carries another, yet they appear to publish and cite largely among themselves.

This is a concrete place to test the paper's main argument about connection. A shared taxonomy of perishability, covering fixed and random shelf life, age-dependent demand and substitution, would let results from blood banks, grocery retail and fisheries be compared directly. Joint studies could ask which policies transfer between settings and which depend on the severity of shortage. Implementation studies in hospitals, where data are sensitive but decisions are consequential, remain scarcer than modelling papers, and would add the most value.

- *Digital Traceability and Digital Twins*

Blockchain and digital twins are both listed among the newer tools the field is absorbing. The outside evidence suggests the research is ahead of the integration. Vazquez Melendez et al. (2024), reviewing 146 academic and industry sources on blockchain provenance, report real promise for traceability and efficiency but an early stage of adoption, a small body of literature and weak collaboration between academia and industry. Guo and Mantravadi (2025) screened 759 articles on digital twins in lean supply chains and retained 33, finding applications concentrated in planning, production and delivery, with little on sourcing and returns.

For inventory research the gap is one of coupling. Technology is often added as an enabling layer without being built into the model. Studies that quantify the value of visibility, meaning how much better an inventory policy performs when shared, traceable data replace delayed or noisy information, and what that data sharing costs, would show when the technology pays for itself. Digital twins also offer a safe environment in which to test learning-based policies before they touch real stock, which links this theme back to Section 2.1.

- *Governance, Behaviour and the Human in the Loop*

The introduction highlights Feng et al. (2015), who tie weaker internal controls over financial reporting to poorer inventory management. That thread sits apart from the modelling-heavy industrial engineering and production journals that dominate our source analysis, and in our reading of the corpus it is seldom joined up with optimisation work. Yamini and Gajanand (2022) reviewed experimental research on inventory decision biases from 2000 to 2020 and called for studies that go beyond the ordering decision and treat inventory choices as part of wider supply chain decisions.

Both threads become more pressing as algorithms take over ordering. Questions worth pursuing include when and why planners override model recommendations, how incentives and controls shape those overrides, and whether algorithmic ordering improves the quality of inventory reporting or merely moves errors elsewhere. The finding that language models reproduce human-like biases (Zhao et al., 2025) suggests the behavioural literature is relevant to machines as well as to people.

Table 3 Summary of the Proposed Research Agenda

Theme	Evidence in this project	Open question	Suggested approach
Learning- based control	Second keyword cluster in the literature review; machine learning on the thematic map; five of thirteen existing reviews	Does it beat tuned classical policies at realistic scale, and can planners trust it?	Shared benchmarks, hybrid structural- learning policies, explainability, stress tests of LLM agents
Sustainability	Basic theme with low density; separate carbon and circular clusters	How do carbon, waste and cost trade off with real company data?	Broader emissions accounting, time- varying carbon prices, circular flows, empirical calibration
Resilience	Growth after 2020; robust optimisation as a basic theme	What do buffers cost in emissions and obsolescence, and what did firms actually do?	Multi-objective robust models; panel studies with financial-reporting data
Perishables and blood	Blood supply chain near the motor themes; three of thirteen reviews	Which policies transfer between blood, food and fisheries?	Common perishability taxonomy; joint studies; hospital implementation

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Traceability and twins	Blockchain among top-cited recent applications	What is visibility worth inside an inventory policy?	Value-of-information models; twin-based policy testing; sourcing and returns
Governance and behaviour	Internal controls and inventory in the topcited papers	How do overrides, incentives and reporting quality interact with algorithmic ordering?	Behavioural experiments with decision-support tools; archival studies
Field structure	Small co-authorship clusters; 208 journals; 29.8% international co-authorship	Is the field truly fragmented or is this a data artefact?	Network metrics, disambiguated authors, multi- database corpus, normalised citations

➢ *Recommendations*

- *For Researchers*

Authors working on learning-based or sustainability-oriented models should compare their methods against tuned, published baselines and make their code and instances available, so that the next group can build on them instead of rebuilding. Validation on real or realistic data should be treated as the norm and not the exception. Sustainability measures such as emissions and waste could be reported alongside cost as a matter of routine. Most importantly given our main finding, researchers could deliberately cite and co-author across the clusters identified here, for example by pairing a blood-supply group with a food-retail group, or an operations group with an accounting group.

- *For Journal Editors and Conference Organisers*

A field spread over more than two hundred outlets in one corpus, and over 623 sources in another, would benefit from places where the pieces meet. Special issues organised around cross-cutting questions, such as perishable inventory across healthcare and food or the cost of resilience in carbon-constrained chains, would draw different groups into the same conversation. Encouraging authors to deposit data and code, and to use a shared keyword vocabulary, would make the literature easier to retrieve and to map accurately. Reviewer pools drawn from outside an author's usual circle would also help ideas to travel.

- *For Practitioners*

The conclusion already advises that themes recurring independently across unconnected groups are better guides to practice than any single highly cited paper. To that we add three suggestions. Learning-based replenishment should be piloted against a tuned conventional policy and judged on cost, service and stability before it replaces it. Explanations for automated orders should be available to planners, with a clear process for overrides. And firms could begin to track carbon and waste at the level of inventory decisions, because the research is moving towards models that need such data.

- *For Institutions and Funders*

Since international co-authorship already accounts for close to thirty per cent of documents, with China, Iran, the United States and India leading on output or citations, funding for multicountry consortia and shared data infrastructure could build on existing ties. Settings that appear less represented in our country analysis, including small and medium enterprises and developing economies, would be natural candidates for case-based work.

- *For Future Bibliometric Studies of this Field*

Studies that follow ours should fix and publish their search protocols, triangulate across at least two databases, disambiguate authors, use normalised citation indicators, compute networklevel collaboration measures, and follow topics through time. With more time and technical support than we had, a project of this kind could also pair the map with a content-coded review of the leading papers, as described in Section 1.5.

Taken together, these steps share a single logic. The map produced here suggests that inventory management does not lack models, methods or motivation. What it may lack is accumulation, in the sense of one group's findings becoming another's starting point. The agenda above is intended to make that kind of accumulation easier to achieve and, just as importantly, easier to verify.

VI. CONCLUSION AND LIMITATIONS

This study set out to map the academic literature on inventory management as a field in its own right, and the findings reported above represent one step towards that end. Overall, the results of this study suggest that inventory management has developed into a broad, steady, and unusually decentralized area of research. Publication output has been reasonably consistent at thirty to forty papers a year since 2015, with no individual author or research group dominating the field, and distributed across 208 separate journals. Taken together, these results suggest a field driven by a relatively broad, loosely connected community of contributors working, often in parallel, on closely related problems. This pattern of steady, distributed growth is worth noting briefly, as it runs somewhat counter to the assumption that mature academic fields tend to consolidate around a small number of leading journals and research groups over time. Inventory management, by contrast, appears to have expanded outward rather than inward, accumulating new contributors and outlets at a fairly constant rate.

A closer examination of the corpus reveals a similar pattern. It was found that citation impact within the field is markedly uneven: an average of 38.4 citations per paper conceals a distribution in which a small number of studies, just six papers with over two hundred citations, account for a disproportionate share of the field's overall influence. This finding is consistent with the overall pattern of thematic clustering observed across the literature, in which authorsupplied keywords repeatedly converge around sustainability and carbon emissions, spareparts and healthcare logistics, dynamic pricing, and decision-making

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under uncertainty. It appears, then, that while the volume of research on inventory management continues to grow steadily, its intellectual attention has settled around a fairly compact set of recurring concerns, rather than being spread evenly across the discipline's many possible sub-topics. This is roughly in line with what might be expected of a mature applied field: as a body of research accumulates, certain sub-topics tend to dominate, either because they address particularly pressing real-world problems (such as the sustainability pressures now facing most supply chains) or because they lend themselves more readily to the modelling techniques favoured by the field's methodological traditions.

Perhaps the most striking finding to emerge from this study concerns the structure of collaboration within the field. Rather than forming a single large, interacting research community, the co-authorship data reveal a landscape broken into many small, self-contained clusters of three to seven researchers who publish prolifically within their own circle but scarcely engage with other groups. This finding has implications beyond bibliometric curiosity: it suggests that the field's overall progress may be limited not by the scarcity of ideas but by the scarcity of communication between these groups, and later sections of this discussion will return to this topic. It is also worth noting that this clustering pattern is consistent with, and arguably explains, the finding that no single author or institution dominates the field: a selfcontained group of researchers will almost inevitably distribute its output more evenly than a single large laboratory.

In terms of practical relevance, the findings of this study offer several contributions for business practice. Firms and practitioners drawing upon the inventory-management literature would be well-advised not to conflate any single influential paper as representative of a field-wide consensus, as no consensus seems to exist in any straightforward sense. It is recommended, instead, that greater attention be paid to themes that recur independently across other unconnected clusters of researchers, as such convergence is arguably a more reliable indicator of practical relevance than any single study's citation count. Sustainability-related cost modelling, uncertainty-aware planning, and the rising prominence of machine learning and blockchain in inventory control all meet this criterion within the present corpus, and therefore merit particular attention from practitioners seeking evidence-based guidance.

The findings of this study also have a number of applications beyond this direct concern. For researchers newly coming into the field, this study offers a navigational aid: it identifies clusters of authors and journals that are actively working on a given sub-topic (be it carbon-conscious inventory design or the link between internal financial controls and stock management) and allows the researcher to approach this literature more precisely than a simple keyword search would permit. For journal editors and conference organizers, the scale of dispersion documented here (208 outlets for a field of this size) and the lack of authorship that exceeds five papers (even in the most prolific contributors) point towards an opportunity: special issues or cross-disciplinary panels could be used to draw these otherwise disjointed clusters into more direct conversation with one another. For practitioners, meanwhile, the ten most-cited papers identified in this study are a reasonable starting point, having withstood a greater degree of scrutiny from the wider literature than most other studies in the corpus, even where this scrutiny has been confined to a single research community.

As with any study of this kind, a number of limitations must also be acknowledged. Foremost was the constraint of time available for completing the analysis; a bibliometric study of this scope would traditionally benefit from an iterative refinement process that involves adjusting keyword groupings, verifying author identities manually, and cross-referencing citation counts across multiple bibliographic exports rather than relying on a single one. Similarly, a related limitation concerns the underlying data: journal and author names were retained in their original exports and were not reconciled manually for spelling variants or differences in name ordering, a common shortcoming of such studies. A limitation of this one's technical expertise is also worth noting: bibliometric analysis draws on methods from information science, statistics, and network analysis that extend beyond the disciplinary background of the present authors, so more advanced techniques (such as algorithmic author disambiguation, fieldnormalized citation weighting, or topic modelling of keyword data) could not be used within this study.

It is important that this analysis be regarded as an exploratory account of the field, rather than a definitive or exhaustive one. With these limitations in mind, this study offers a reasonable first impression of the field's overall shape, and it is hoped that this impression might prove useful for researchers and practitioners alike. Further work is required to test whether the clustering identified in this study reflects a truly fragmented research community, or merely the limitations of this dataset and method; a subsequent study with greater access to time and analytical tools would be well-placed to follow up on this question, along with a more thorough, field-normalized assessment of citation impact.

The introduction to this paper stated that this study would move from describing the field to interpreting it, and finally looking ahead. This section serves as the last leg of that journey: the descriptive segment demonstrated that inventory management research is a large, steady, and oddly scattered field, and the interpretive segment traced this scatter down to citation patterns, recurring themes, and a co-authorship network that scarcely interacts with itself. This final segment is a fairly simple assertion that the field's next big leap forward will not come from one clever new inventory model, but from whether these many small, capable groups of researchers choose to connect. We set out to build a map of where the field currently stood: what happens next, whether people follow this map to continue walking the same separate paths, or actually connect them, is up to who reads this next.

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In conclusion, this study has demonstrated that inventory management remains a steadily active and expanding area of academic inquiry, shaped less by a handful of dominant contributors than by a broad, loosely connected community pursuing closely related questions in relative isolation. If this study makes any contribution beyond its individual findings, it is to suggest that the future progress of the field will be shaped as much by strengthening the connections between its many small research communities as by the discovery of any single new inventory model or technique.

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