INTERNATIONAL JOURNAL OF ADVANCE RESEARCH, IDEAS AND INNOVATIONS IN TECHNOLOGY

ISSN: 2454-132X
Impact Factor: 6.078
*(Volume 12, Issue 5 - V12I5-1233)*
Available online at: https://www.ijariit.com

# Applications of Operations Research in Retail Management

*Dr. Richa Saxena*
richa.saxena@nmims.edu
*Anil Surendra Modi School of Commerce, NMIMS, Mumbai, Maharashtra*

*Sandhini Gangurde*
sandhini.gangurde261@nmims.in
*Anil Surendra Modi School of Commerce, NMIMS, Mumbai, Maharashtra*

*Rudraksh Garg*
rudraksh.garg045@nmims.in
*Anil Surendra Modi School of Commerce, NMIMS, Mumbai, Maharashtra*

*Sahasra Chilakamarthi*
sahasra.chilakamarthi149@nmims.in
*Anil Surendra Modi School of Commerce, NMIMS, Mumbai, Maharashtra*

*Sehajdeep Singh*
Sehajdeep.singh798@nmims.in
*Anil Surendra Modi School of Commerce, NMIMS, Mumbai, Maharashtra*

*Saatvic Karnawat*
saatvic.karnawat450@nmims.in
*Anil Surendra Modi School of Commerce, NMIMS, Mumbai, Maharashtra*

## ABSTRACT

***Retailers face growing pressure to make faster, data-driven decisions on inventory, logistics, pricing and demand, and the shift to e-commerce and omni-channel retailing since the COVID-19 pandemic has made these problems more complex. This study uses a bibliometric approach to map the literature on the application of Operations Research (OR) in retail management. Using the Scopus database, 316 peer-reviewed journal articles published between 2010 and 2026 were identified through a PRISMA-guided screening process and analysed with Biblioshiny and Microsoft Excel. The analysis covers publication trends, leading sources, keyword co-occurrence, thematic mapping and multiple correspondence analysis. The results show a sharp rise in output after 2020, peaking at 41 publications in 2025. The literature is built mainly around inventory management, forecasting and distribution, with emerging themes in artificial intelligence, omni-channel retailing and sustainability. However, traditional OR methods and newer computational approaches remain largely disconnected. The study also finds that omni-channel research is mostly descriptive, sustainability is rarely built into optimisation models, food-waste research is still exploratory, and few studies are validated with real retail data. Based on these gaps, the paper proposes a future research agenda covering hybrid AI-OR models, omni-channel optimisation, sustainability as a core constraint, perishable-inventory modelling, customer-centric optimisation and field validation with retailers. The findings help researchers position future work and give practitioners a view of which methods are mature and which still need testing.***

**Keywords:** *Operations Research, Retail Management, Bibliometric Analysis, Omni-channel Retailing, Demand Forecasting, Inventory Management, Artificial Intelligence, Sustainability*

## 1. INTRODUCTION

Retailing is under growing pressure to optimise its operations, deliver faster outputs and make more efficient decisions about logistics, inventory, pricing and customer demand. These decisions must keep pace with competitors if a business is to sustain its profitability and maintain its market share. Margins in the sector are often thin, product assortments are broad, and customer expectations around availability, price and delivery speed keep rising. A small error in forecasting or stock planning can therefore lead to lost sales, excess inventory or dissatisfied customers. To cope, individual businesses increasingly need to base their decisions on past data rather than on intuition alone.

A core area of study within this field is the application of Operations Research (OR) to retail management, where quantitative and analytical techniques are used to optimise retail operations. Operations research and decision sciences have been used extensively in retail to cut costs, save time, predict future demand and strategise pricing. The toolkit includes linear and integer programming, inventory control models, queuing theory, simulation, network optimisation and, more recently, machine learning-based forecasting. These techniques are applied to practical questions: how much stock to hold and when to reorder, how to route deliveries, how to

allocate shelf space, and how to set and revise prices across a product's life cycle. Because each of these decisions affects cost and customer experience at the same time, retail is a natural setting for analytical decision-making.

The researchers chose to explore this topic because the retail sector has undergone a massive shift in platform, from physical stores to e-commerce and multi-channel or omni-channel retailing, particularly following the COVID-19 pandemic (2020–present). This shift has changed the nature of retail problems. Retailers must now decide how to fulfil orders from stores or warehouses, how to manage returns, how to cope with volatile demand and how to keep inventory consistent across channels. Techniques that were designed for a single store or a single supply chain are being asked to handle far more complex, interconnected systems. Studying how OR techniques have adapted to these changes is therefore highly relevant, both for understanding where the field stands and for anticipating where it is heading.

This paper uses bibliometric techniques to study and present the key features of the growing literature on the application of Operations Research in retail management. Unlike a traditional narrative review, a bibliometric approach maps a body of research quantitatively. It makes it possible to see how publication output has changed over time, which themes dominate, which themes are emerging and where the literature remains thin. Trends, influential works and thematic developments are highlighted in this study. The study is guided by three broad questions: how research output on this topic has grown, what thematic structure the literature shows, and what gaps remain.

The paper aims to serve two audiences. From an academic point of view, the summary of existing literature is useful for highlighting gaps that could be researched further and for helping scholars position new work within the existing body of knowledge. From a professional point of view, identifying current trends allows organisations to evaluate, and potentially apply, both established and emerging developments in this field. In this way the study tries to connect what researchers are publishing with what practitioners actually need.

The Scopus database is used to gather a sample of research publications, because of its broad coverage of peer-reviewed literature and its structured export options, which suit bibliometric analysis. An initial sample of 801 papers was obtained by searching for articles published between 2010 and 2026 using the keywords "Operations Research" and "Retail Management." A sample of 339 documents remained after conference papers, books, book chapters, conference reviews and duplicate entries were eliminated. These were further screened for eligibility and relevance based on their titles, abstracts and keywords, yielding a final sample of 316 journal articles for evaluation. Restricting the sample to journal articles keeps the focus on peer-reviewed work and makes the documents more comparable with one another.

The rest of the paper presents the publication trends and the thematic structure revealed by the analysis, and then draws these together to identify gaps in the literature. The conclusion summarises the main findings, sets out their implications for researchers and practitioners, acknowledges the limitations of the study and proposes directions for future work.

## 2. LITERATURE REVIEW

**Keywords:** Analytics, Consumer, Customer, Technology, Model, Product, Experience, Sustainability

### 2.1 Keyword Explanations

**1. Analytics:** Analytics is the systematic use of data, statistics and machine learning to find patterns and support decisions. It is the central node on map and the thread running through a literature review on consumer analytics, since it explains how digital traces such as clicks, purchases and reviews become insight into behaviour. Theodorakopoulos and Theodoropoulou (2026) review AI and data-driven techniques like clustering, sentiment analysis and predictive modelling for consumer behaviour analysis, Xiang et al. (2015) apply text analytics to consumer-generated content to study hotel guest experience and satisfaction, and Kasemrat et al. (2025) use predictive analytics to forecast customer behaviour in Thailand's e-commerce sector.

**2. Consumer:** A consumer is an individual who buys or uses goods and services; in this literature it mostly means the online consumer, whose choices and opinions leave measurable data behind. It is the subject of your review and appears in almost every paper, linking to behaviour, engagement, decision-making and sustainable consumption. Pandey (2026) treats consumer engagement as a key source of competitive advantage in digital retail, Theodorakopoulos et al. (2026) argue that understanding consumer behaviour in digital settings now relies on large-scale data and AI-driven analytics, and Ávila-García et al. (2025) study how consumers adopt circular-economy practices.

**3. Customer:** A customer is a person or organisation that buys from a particular firm; unlike "consumer", the term stresses the relationship with a specific company or platform. It marks the business side of the topic, such as customer service, relationship management and satisfaction, and it sits with product and online review on your map. Sharma et al. (2022) examine Amazon customer service and note that product reviews and ratings strongly influence customer sentiment and the final purchase, Kasemrat et al. (2025) analyse 10,000 customer interactions on a Thai e-commerce platform, and Alharthi (2026) tests how attitudes towards AI affect customer experience and purchase decisions among Saudi fashion retail customers.

**4. Technology:** Technology refers to the tools and systems, such as AI, big data, IoT and e-commerce platforms, used to collect consumer data and act on it. It is the enabler in review, explaining why consumer analytics is possible at scale, and it connects to adoption and digital marketing in the red cluster. Bernovskis et al. (2024) describe how decentralised technologies under Society 5.0 reshape e-commerce through AI, big data, real-time data and personalised services, Alharthi (2026) builds on the Technology Acceptance Model, and Ávila-García et al. (2025) review how digital technologies can speed up consumer adoption of the circular economy.

**5. Model:** A model is a simplified statistical, computational or theoretical representation used to explain or predict something; here it usually means a machine-learning or regression model. It covers the methods side of review and links to prediction, accuracy and deep learning in the green cluster, which helps when comparing the techniques studies use. Kasemrat et al. (2025) compare traditional statistics with models such as logistic regression, support vector machines, k-nearest neighbours and random forest,

Wahid et al. (2024) build a logistic regression model of how discounts and product categories affect Amazon ratings, and Zhu et al. (2025) combine text mining with logistic regression.

**6. Product:** A product is a good or service offered to the market, and in analytics research it is also the thing being rated, reviewed, redesigned or removed. It connects consumer voice to business decisions and sits close to online review and quality on your map, which makes it useful for the review-and-rating strand of your literature. Ma et al. (2022) analyse more than 600,000 online reviews of 1,188 energy-saving products from a large Chinese e-commerce platform, Zhu et al. (2025) find that consumer review characteristics are significant factors in product deletion decisions, and Wahid et al. (2024) relate discount strategies to ratings across Amazon product categories.

**7. Experience:** Experience means the overall perceptions and feelings a person has across interactions with a brand, service or platform, often called customer experience. It is a smaller node, but it links analytics to the outcomes firms care about, namely satisfaction, engagement and the consumer journey, so it helps frame why the studies in your review matter. Xiang et al. (2015) study the relationship between hotel guest experience and satisfaction using large scale consumer reviews, Alharthi (2026) tests how AI attitudes influence customer experience, Bernovskis et al. (2024) point to personalised consumer experiences enabled by AI and big data, and Chandra and Verma (2023) report that businesses use big data to create sustainable consumer experiences.

**8. Sustainability:** Sustainability means meeting present needs without compromising the ability of future generations to meet theirs; in consumer research it appears as sustainable consumption, eco-friendly products and the circular economy. It is the smallest keyword but a growing theme at the edge of the red cluster, and it can give literature review a distinctive angle. Chandra and Verma (2023) review big data's role in promoting sustainable-consumption behaviour and note that the findings are fragmented, Emon and Khan (2024) examine how AI-driven insights can support sustainable marketing and customer engagement, and Ávila García et al. (2025) connect digital technologies, consumer behaviour and circular-economy adoption.

## 3. RESEARCH METHODOLOGY

The initial step was taken to identify various fields where OR is applied and the proposed topics were reviewed. A initial literature review was conducted and since, Retail Management had ample literature and was relatable to present industry. Our topic of research was accordingly chosen to be "Applications of Operations Research in Retail Management". Relevant keywords for searching the articles were made and the research papers were gathered from the Scopus database and the sifting was began from the inclusion and exclusion criteria.

Scopus database was chosen to generate bibliographic information due to its extensiveness in providing peer reviewed literature and it has been widely adopted as the research source in bibliometric studies. Search protocol were designed using the keywords, "Operations Research" and "Retail Management" and the publications were done in the years, 2010 to 2026. The study included only the English journal articles. Literature sifting was performed by systematic elimination of literatures based on defined eligibility criteria. Firstly, the articles with very less citations (i.e. 0 or 1), were removed to include publications having a minimum level scholarly impact. Further, document types not fulfilling the inclusion criteria i.e., books, book chapters, conference papers, conference reviews, editorials, notes, reviews, retractions and short surveys were removed.

In 2026, from the publications gathered 36 were removed, which were the low cited articles, 3 were books, 11 book chapters, 27 were conference paper, 2 conference reviews and 1 was removed due to being editorial. In 2025, 26 were low cited articles, 2 were books, 17 book chapters, 46 were conference paper and 4 review articles were removed. Similarly, in 2024 13 were low cited articles, 1 book, 6 book chapters, 22 were conference papers 3 reviews and 1 retracting article was removed. For 2023 6 were low cited, 1 were books, 4 book chapters, 20 were conference papers, 3 review articles and 1 short survey was removed. From the 2022 records 6 were low cited articles, 1 books and 4 were book chapters 14 were conference papers, 2 were conference reviews, 4 reviews and 1 note article were removed. In 2021, 3 were low cited articles, 4 were book chapters, 13 conference paper and 2 review, 1 conference review, 1 editorial and 1 retracted article were removed. For the year, 2020 the dataset included the removing of 5 low cited articles, 1 book, 1 book chapter, 7 conference paper and 2019 the data included 3 were the low cited articles, 5 were book chapters, 11 were the conference paper and 1 review was removed. From 2018, the removing included 2 low cited articles, 10 conference paper and 5 reviews. The year, 2017 included the removing of 2 low cited articles, 1 book, 3 were book chapters, 11 were conference papers. In 2016 1 book 3 were book chapters, 2 were conference paper and 4 were reviews. For 2015, 3 were low cited articles, 2 books, 1 book chapter and 2 were the conference papers were removed. For 2014 from the records, 1 low cited article, 2 books, 6 book chapters, 6 were the conference papers, 1 was the conference review were removed. For the year, 2013 2 low cited articles and 4 were the conference paper were removed. For the year, 2012 1 low cited article and 1 book, 1 were the book chapters, 4 the conference paper and 2 reviews were removed. For the year, 2011 1 low cited article, 1 book chapter, 7 conference paper and 3 were the conference reviews were removed. For the year, 2010 2 were the low cited articles and 1 book, 3 book chapters, 10 were the conference paper, 8 were the conference reviews and 2 were the review articles were removed. The selected article were sifted based on the title, abstract, and keyword and its relevance towards the research objective was identified. Later, 23 articles, which was considered to be not related to the research scope, span year of research and duplicate papers were removed. The remaining dataset contained 316 journal articles. Biblioshiny and Microsoft Excel were used for the analysis of the review. PRISMA Diagram shows the search, inclusion, and exclusion criteria flow chart.

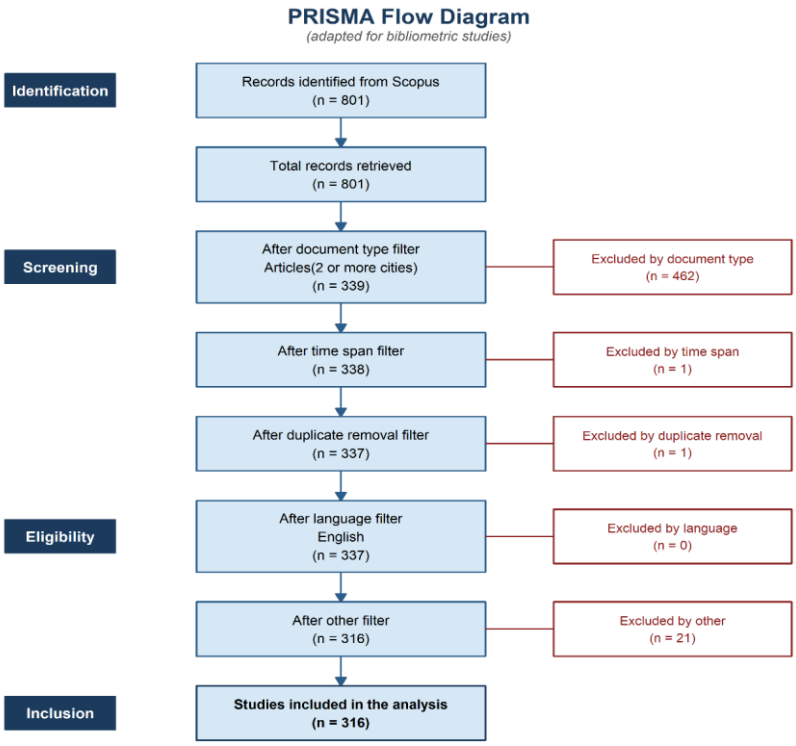


**Figure -1: PRISMA flow diagram (adapted for bibliometric studies)**

The review applied Bibliometric technique which was used systematic and methodical quantify, evaluate, and study the data relevant to the review articles of Application of operations research in retail management. In real terms, bibliometric analysis is a quantitative study of world of academic publishing, research articles, periodicals, patterns of citations, and related bibliographic characteristics. The selected review article files ( ris) were downloaded and was added to reference manager, Mendeley. The bibtext file ( bibtext) containing the metadata of the 316 articles were then exported to biblioshiny package of RStudio. Biblioshiny converted the data in an Excel format ( xlxs) for the Microsoft Excel.

## 4. BIBLIOMETRIC ANALYSIS

The review adheres to the bibliometric method suggested by Douthu et al. (2021). First research objective delves into the existing literature's performance such as publication, sources, authors and citations. The second objectives aim towards the thematic mapping for identifying how keywords related to each other. Lastly the future areas of research is recognized based on the existing gap and trends.

The review utilised Bibliometric techniques to systematically and methodically quantify, evaluate, and study the data pertaining to the review articles of Application of operations research in retail management. In practical application, bibliometric analysis constitutes a quantitative inquiry into the realm of academic publishing, encompassing research articles, periodicals, citation patterns, and associated bibliographic attributes. The selected review article files (.ris) were downloaded and added to the reference manager, Mendeley. The bibliometric file (.bibtext) containing the metadata of the 316 articles was then exported to the biblioshiny package of RStudio. Biblioshiny converted the data in an Excel format (.xlxm) for Microsoft Excel.

## 5. DATA ANALYSIS

In the initial set of analyses, the main goal is to investigate the global characteristics and evolution of retail analytics research. Descriptive statistical analysis is performed to evaluate publication growth, document type, citation trends, and authorship patterns. The annual growth rate and the average document age are investigated to capture the evolution of the field; the average co-authors per document and the share of international co-authorship are analysed to examine research collaboration. The analyses are conducted with Biblioshiny on the Scopus dataset, over the timespan of 2016 to 2026.

The next analyses are focused to identify the main sources of publications and to investigate the conceptual structure of the literature. Publication count and the h-index are used to evaluate source productivity and local impact, while the keyword co-occurrence analysis, the thematic mapping, the multiple correspondence analysis, and the hierarchical clustering are used to reveal the main research themes and relationships between the keywords. These procedures are used to examine the evolution of research on retail analytics and its relation with the application of operations research in the field of retail.

### 5.1 Referring to data

Table 1 shows an overview of the main information about the dataset utilised in the bibliometric analysis of retail analytics. As we can observe from the table, the final dataset consists of 756 documents, published over 434 sources, from 2016 to 2026. The annual growth rate of 25.49% reveals a significant increase in scholarly output, while the average document age of 3.16 years shows that the dataset contains a sizable share of recent publications. In addition, the average 18.79 citations per document give us an indication of the citation impact of the literature. The table reveals as well that there are 727 articles (96.2%), while there are only 29 reviews

(3.8%) in the dataset. Regarding authorship, there are 2,282 authors that produced the documents in the dataset, with 3.34 co-authors per document on average. The share of international co-authorship is 28.31%, indicating the presence of cross-country collaboration in the research process. The keyword information consist of 2,928 Keywords Plus and 2,712 author keywords that reflect the spectrum of concepts represented in the literature.

**Table -1: Main information about the data**

| Indicator | Value |
|---|---|
| Timespan | 2016–2026 |
| Sources (journals) | 434 |
| Documents | 756 |
| Annual growth rate | 25.49% |
| Document average age | 3.16 years |
| Average citations per document | 18.79 |
| References | 0 |
| Keywords Plus (ID) | 2,928 |
| Author's keywords (DE) | 2,712 |
| Authors | 2,282 |
| Authors of single-authored documents | 99 |
| Single-authored documents | 101 |
| Co-authors per document | 3.34 |
| International co-authorship | 28.31% |
| Articles | 727 (96.2%) |
| Reviews | 29 (3.8%) |

Figure 2 offers a visual overview of these indicators and the size of the data. It also compares the publication characteristics, the authorship characteristics, and the keyword characteristics. As the indicators are measured in different units, a log scale is utilised to enhance their visibility. As such, the figure should be interpreted as a visual overview of the information that was presented in Table 1, rather than a basis for the interpretation of the slope between the individual data points.

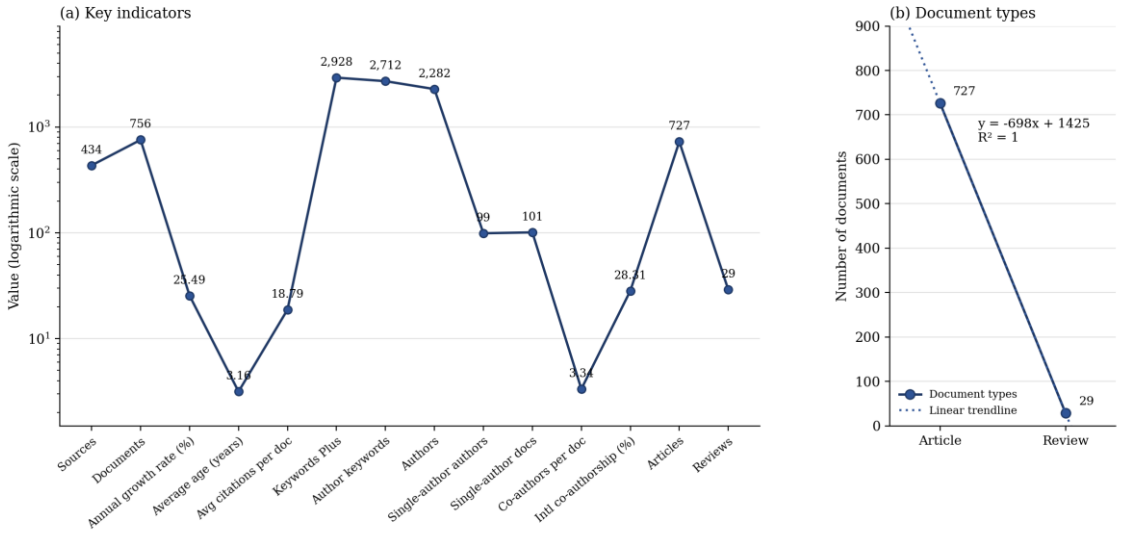


**Figure -2: Main information about the data (line graph): (a) key indicators on a logarithmic scale; (b) document types with linear trendline**

Figure 3 reveals the most relevant sources, according to the publication output. As indicated by the figure, the *Journal of Retailing and Consumer Services* is the most relevant source, with 30 documents, followed by IEEE Access with 14 documents. *Linguistic and Philosophical Investigations* follow with 12, with the *Manufacturing and Service Operations Management* with 10 documents. *Applied Marketing Analytics* and the *International Journal of Retail and Distribution Management*, on the other hand, each contribute nine documents to the data. The publication distribution shows that research related to retail analytics is captured through retail and marketing journals, technology-related publications, and operations management journals.

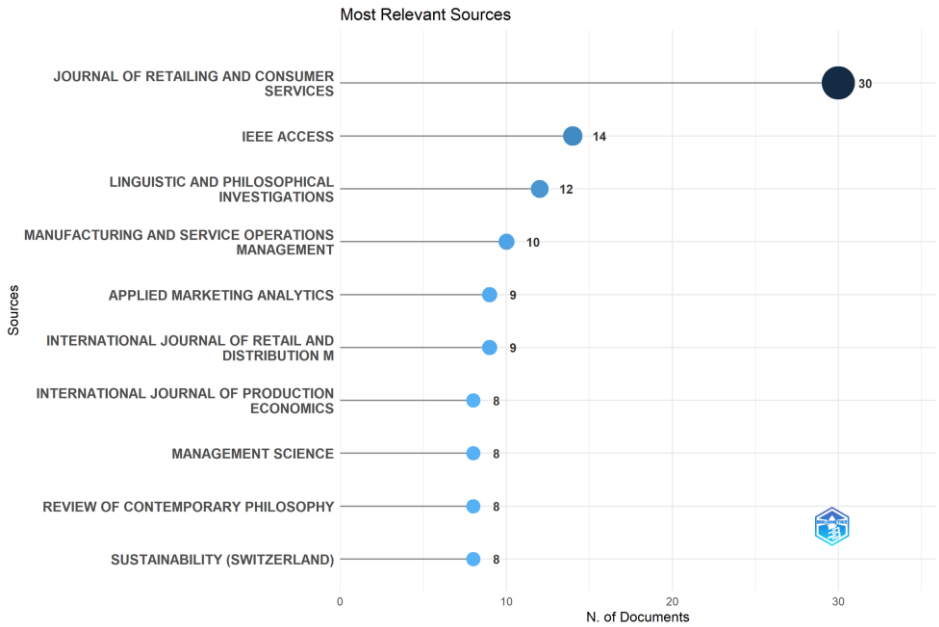


**Figure -3: Most relevant sources by number of documents**

Figure 4 reveals the local impact of the most relevant sources by the h-index. As in the previous figure, the *Journal of Retailing and Consumer Services* ranks first, with an h-index of 15. The *Linguistic and Philosophical Investigations* follows with an h-index of 11, with *Manufacturing and Service Operations Management* and the Review of Contemporary Philosophy having an h-index of 8. Moreover, the *IEEE Access* and the Management Science have an h-index value of 7. These findings reveal that the source productivity and the source impact do not necessarily follow the same pattern.

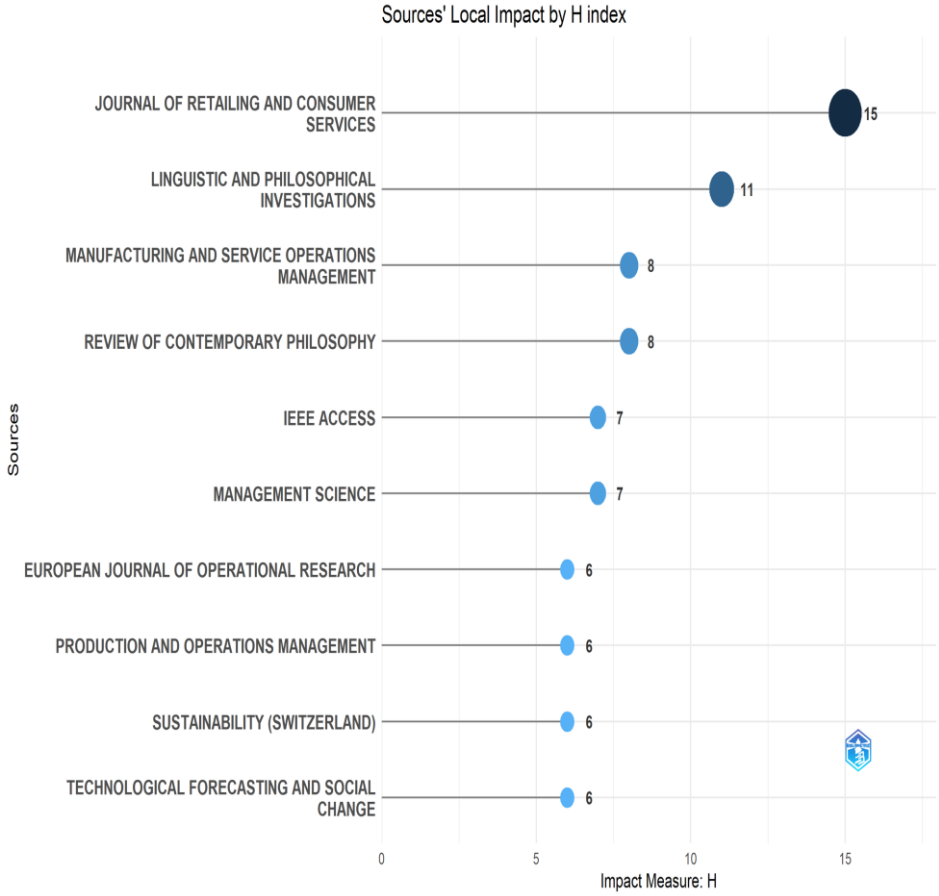


**Figure -4: Sources' local impact by h-index**

Figure 5 illustrates how the most relevant sources grew in terms of publications. The *Journal of Retailing and Consumer Services* grows steadily, with a marked increase after 2025. The *IEEE Access* shows a substantial increase from 2024 onwards, while the *Manufacturing and Service Operations Management* grows mostly between 2019 and 2023, and after that, a rather stable pattern. These differences reveal the varying publications of the contributing journals in the field. However, the unusual publication pattern of the *Linguistic and Philosophical Investigations,* which registered a sudden rise in 2022, followed by no increase, should be considered in the interpretation of the source analysis.

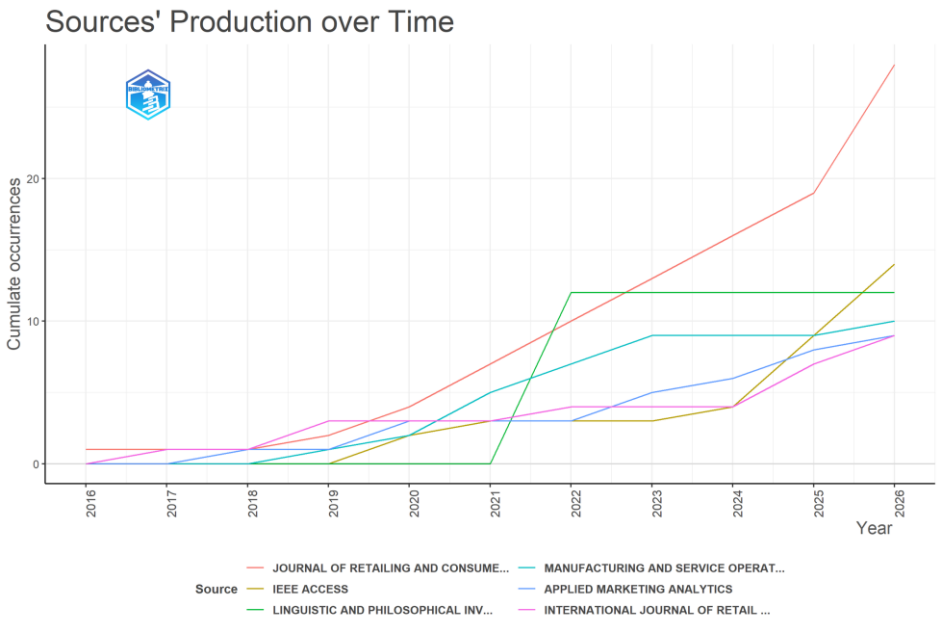


**Figure -5: Sources' cumulative production over time**

The conceptual structure of the literature is investigated in the results provided by Figures 6–8. The keyword co-occurrence network is given in Figure 6, where the node size indicates the frequency of the keyword, and the links reveal the relationship between the terms. This network reveals the existence of four main clusters. The first, in red, focuses on sales, forecasting, predictive analytics, data mining, and decision support systems and shows the application of quantitative techniques to assist in commercial decision making. The second, in blue, emphasises machine learning, artificial intelligence, demand forecasting, inventory control, and customer segmentation. The third, in green, connects data analytics and big data with supply chain management and digital transformation. The last, in purple, focuses on consumer behaviour, marketing, retailing, and social media. (Rooderkerk et al., 2022)

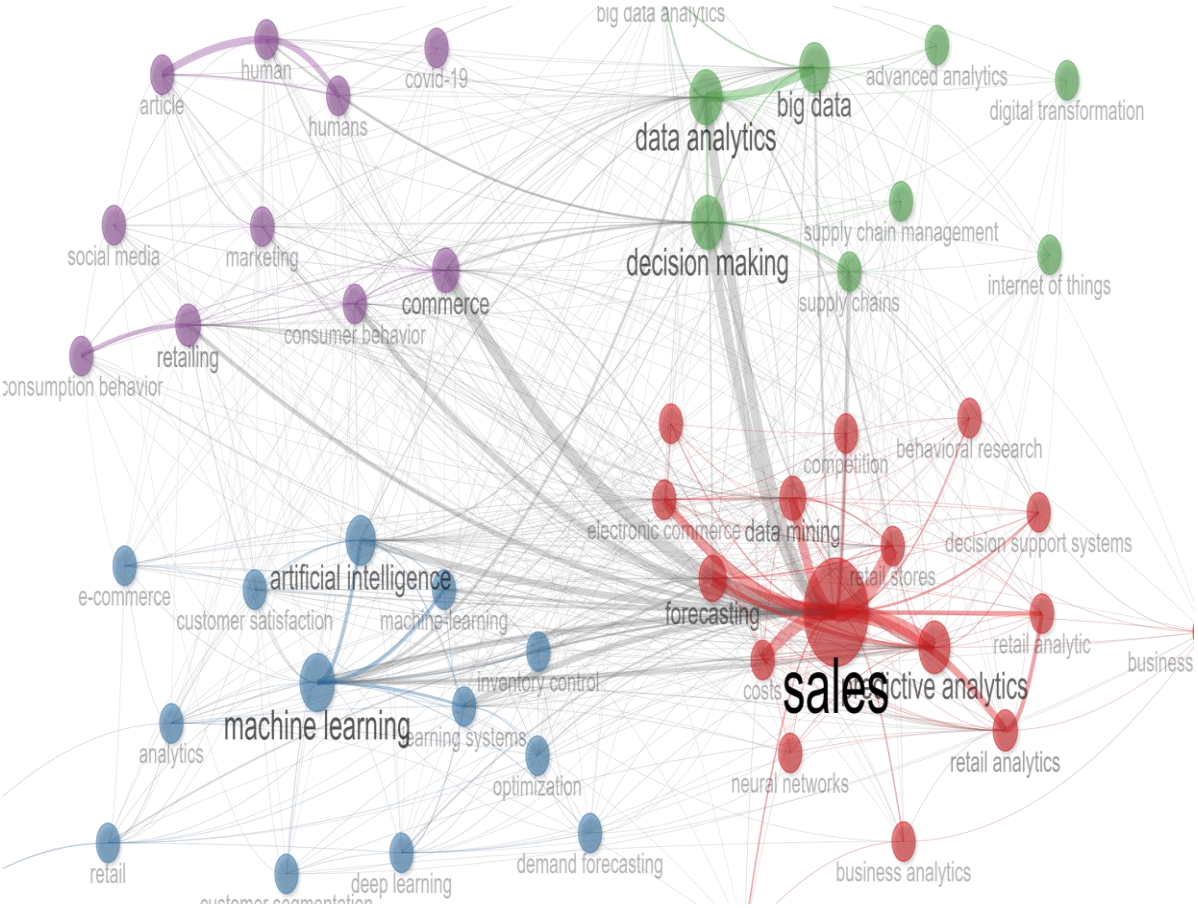


**Figure -6: Keyword co-occurrence network**

Thematic mapping in Figure 7 further differentiates the research themes, based on their centrality and density. The cluster formed by the terms machine learning, predictive analytics, and forecasting appears as a developed motor theme. The terms sales, data mining, and retail analytics form a central theme, within the field. Data analytics, big data, and artificial intelligence appear as the basic themes of the field. This indicates their wide applicability across the literature. In contrast, retailing, social media, and consumption behaviour form a more specific, fringy theme.

**Figure -7: Thematic map**

Figure 8 provides the conceptual structure revealed by the multiple correspondence analysis. The first dimension captures 34.56% and the second, 25.36% of the variance, thus combining for roughly 59.9% of total variability. An operational and modelling area, a strategic and digital area, and a consumer and social area are distinguished by the map.

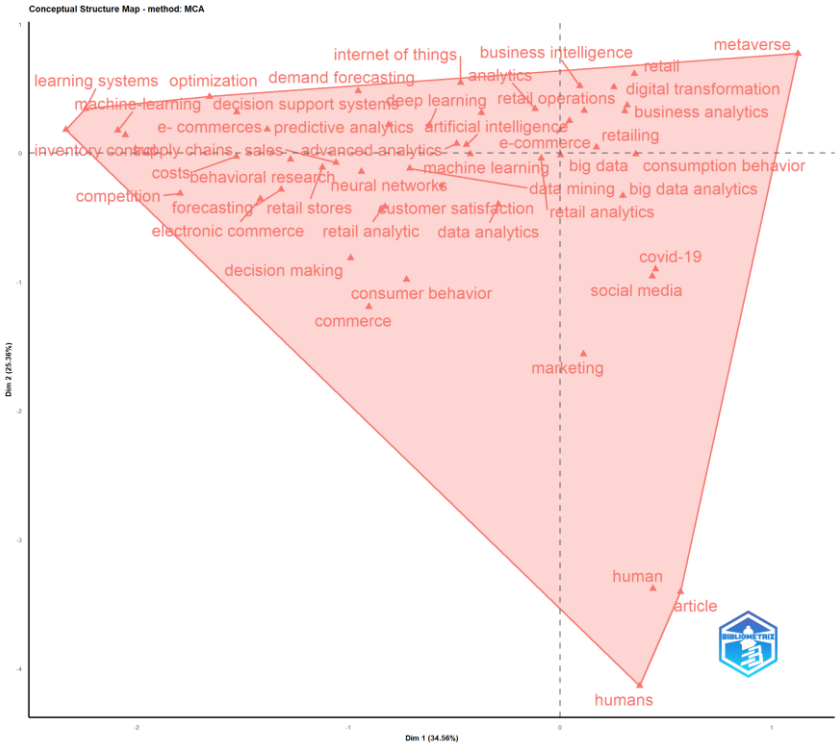


**Figure -8: Conceptual structure map (multiple correspondence analysis)**

Table 1 shows an overview of the main characteristics of the dataset utilised in the bibliometric analysis. As we can see from the data presented in Table 1, the dataset consists of 756 documents published over 434 sources, from 2016 to 2026. The table also reveals the summary statistics of the publication growth, citation patterns, authorship, and keyword features. The annual growth rate of 25.49% and the average document age of 3.16 years reveal that the literature consists of a large share of recent publications. Moreover, the summary statistics of the document type indicate that the 727 documents (96.2%) are article documents, while only 29 (3.8%) are reviews. Figure 2 offers a graphical overview of the main information indicators, illustrating the relative size of the dataset, the authorship characteristics, and keyword counts. As the indicators are measured in different units, the log scale allows the different values to be shown together. The figure thus complements the information provided by Table 1.

The results obtained by the source analysis are presented in Figures 3–5 and in Table 2. As shown in Figure 3, the *Journal of Retailing and Consumer Services* has the most documents (30), followed by *IEEE Access* (14) and *Linguistic and Philosophical Investigations* (12). Table 2 compares the top sources in terms of publication productivity and their local impact. Table 2 compares the leading sources in terms of publication productivity and local impact.

**Table -2: Leading sources by productivity and local impact**

| Source | Documents | H-index | Rank by Documents |
|---|---|---|---|
| Journal of Retailing and Consumer Services | 30 | 15 | 1 |
| IEEE Access | 14 | 7 | 2 |
| Linguistic and Philosophical Investigations | 12 | 11 | 3 |
| Manufacturing and Service Operations Management | 10 | 8 | 4 |
| Applied Marketing Analytics | 9 | – | 5 (tie) |
| International Journal of Retail and Distribution Management | 9 | – | 5 (tie) |
| International Journal of Production Economics | 8 | – | 7 (tie) |
| Management Science | 8 | 7 | 7 (tie) |
| Review of Contemporary Philosophy | 8 | 8 | 7 (tie) |
| Sustainability (Switzerland) | 8 | 6 | 7 (tie) |
| European Journal of Operational Research | – | 6 | – |
| Production and Operations Management | – | 6 | – |
| Technological Forecasting and Social Change | – | 6 | – |

*Note: a dash indicates that the source is not among the top ten in the corresponding chart (Figure 3 for documents, Figure 4 for h-index).*

Figure 4 gives the h-index values, indicating that the *Journal of Retailing and Consumer Services* has the largest value (15) within the dataset. These results show the journal is leading in both publication output and local citation impact. Figure 5 illustrates the sources' cumulative production over time. As we can see in the figure, the Journal of Retailing and Consumer Services grows steadily, while the *IEEE Access* records a marked increase from 2024 onwards. In contrast, the *Manufacturing and Service Operations Management* grows mostly between 2019 and 2023, with a relatively stable pattern afterwards.

The results obtained by the conceptual analysis are presented in the results provided by Figures 6–8. Figure 6 reveals the keyword co-occurrence network showing the relationships between the frequently occurring keywords in the data. The figure also shows the four clusters obtained in the analysis. The network reveals the prevalence of sales, machine learning, data analytics, decision making, and artificial intelligence. Figure 7 gives the thematic map, which compares the identified themes, based on centrality and density. As we can see in the figure, the terms machine learning, predictive analytics, and forecasting form a well-developed, motor theme, while the terms sales, data mining, and retail analytics represent a highly central theme. Figure 8 gives the conceptual structure map, based on the multiple correspondence analysis. The first and second dimension explain 34.56% and 25.36% of the variance, respectively, thus combining for about 59.9% of total variability.

The results we have seen in Figure 5 reveal a variation in the publication output of the most relevant sources over the time. The *Journal of Retailing and Consumer Services* showed a steady growth, while the *IEEE Access* records a marked increase in the publication output from 2024 onwards. In contrast, the *Manufacturing and Service Operations Management* shows a limited growth after 2023. Moreover, the thematic map in Figure 7 did not separate the emerging from the declining themes. Although the terms related to decision support systems and business intelligence may represent the declining themes, the term metaverse could be a topic that is emerging. However, the available analysis could not separate the two, decisively, thus showing the need for further analysis in the form of a trend-topic or a thematic-evolution analysis.

If we now turn to the conceptual structure of the literature, a further analysis reveals that the research on retail analytics includes well established operations research methods and emerging data driven techniques. Whereas the keyword co-occurrence network emphasises the prevalence of sales, forecasting, and decision making, the thematic map reveals that the terms machine learning and predictive analytics form a well developed research theme. Comparing the results given by these analyses with the findings of the multiple correspondence analysis we see the relevance of operational and modelling approaches along with strategic, digital, consumer oriented themes, persistently. Put together, these findings show that the data driven techniques are extending the application of operations research in retailing.(Rooderkerk et al., 2022)

Overall these results show the expansion of the research on retail analytics, including a combination of operational, technological and consumer oriented theme. The findings reveal the prevalence of forecasting, sales analysis and decision support, in addition to the importance of the growing machine learning, predictive analytics and artificial intelligence. The source analysis further shows that *the Journal of Retailing and Consumer Services* ranks as a leading source in terms of both productivity and local impact. Put together, these results show that the data driven techniques are extending the application of operations research in retailing, with particular application to demand forecasting, inventory management, optimisation, and decision making. The findings also show that there are a few limitations, with the absence of cited references and with the inclusion of some publications that may have little relevance in the interpretation of these results. (Kayikci et al., 2022). (Gopal et al., 2024). (Jane et al., 2025)

## 6. FUTURE RESEARCH AGENDA

### 6.1 Introduction

Bibliometric evidence indicates that Operations Research (OR) in retail management has expanded substantially since 2020, peaking at 41 publications in 2025. Yet its operational core remains poorly integrated with emerging technological and sustainability themes. This section identifies the resulting gaps and proposes research directions.

### 6.2 Fragmentation Between Traditional OR and Emerging Computational Methods

The thematic map's separation between the "core" cluster (supply chain, inventory, distribution) and the "emerging" cluster (artificial intelligence, deep reinforcement learning) is mirrored in the literature. Existing studies mostly apply computational techniques to isolated problems rather than embedding them in classical OR structures; Bala's (2012) clustering-based demand forecasts, for example, leave the inventory optimisation logic unchanged. More recent work has begun to close this gap: Dogru and Keskin (2020) review AI in operations management, while Kumar and Khedlekar (2026) go furthest, proposing a hybrid AI-and-blockchain framework combining reinforcement-learning-based inventory management, stochastic demand forecasting, and sustainable supplier selection.

Building on Kumar and Khedlekar (2026), future studies should benchmark hybrid AI-OR frameworks against pure-OR and pure-AI baselines on shared retail datasets.

***Suggested research questions:***

- Does embedding reinforcement-learning-updated parameters in classical stochastic inventory models improve cost and service outcomes versus either approach alone?
- What data and computational constraints limit practical deployment of hybrid AI-OR systems in retail?

### 6.3 Underdeveloped Omnichannel Optimisation

Omnichannel retailing sits at the periphery of the thematic map. Hübner, Holzapfel and Kuhn (2015) offer an exploratory study of multi-channel operations and Hübner, Kuhn and Wollenburg (2016) propose a strategic planning framework for last-mile fulfilment in omni-channel grocery retailing, both largely descriptive. Cai and Lo's (2020) review explicitly calls for further research.

Hübner et al.'s (2016) framework could be extended into a formal multi-echelon, multi-channel optimisation model capturing channel substitution and split fulfilment. Distributionally-robust optimisation, absent from the reviewed studies, is a further avenue.

***Suggested research questions:***

- How should inventory be allocated across store and online channels under demand substitution and delivery-cost trade-offs?
- Which optimisation approaches best handle uncertainty in buy-online-pickup-in-store and last-mile logistics?

### 6.4 Sustainability as an Add-On Rather Than a Core Constraint

Sustainability themes appear widely across the dataset but are rarely embedded formally in optimisation models. Swami and Shah (2013) are among the few to incorporate environmental objectives into a channel-coordination model, whereas Kotzab, Munch, de Faultrier and Teller (2011) take a conceptual, case-based view of environmental retail supply chains.

Future research could extend coordination models such as Swami and Shah (2013) into multi-objective, Pareto-based formulations that jointly optimise cost, service level and emissions, validated on real retailer data.

***Suggested research questions:***

- How can carbon and waste objectives be built into retail supply-chain coordination models without compromising cost or service?
- What trade-offs arise when sustainability is a hard constraint rather than a secondary objective?

### 6.5 Food Waste Research Remains Largely Exploratory

Several retail food-waste studies are explicitly exploratory, indicating the sub-field has yet to move to formal optimisation. Riesenegger and Hübner (2022) and Filimonau and Gherbin (2017) present exploratory studies of food waste in retail stores and UK grocery retail respectively. Huang et al. (2022) link food-waste management to retail customer value propositions, but without formal modelling.

Future studies should develop quantitative OR models of perishable inventory and markdown or donation decisions that trade off spoilage cost, disposal cost and customer value.

***Suggested research questions:***

- What markdown and donation policies minimise waste-related cost while preserving customer value?
- How can perishable-inventory models reflect real-time spoilage risk in fresh categories?

### 6.6 Weak Empirical and Field Validation

Much of the literature relies on synthetic data or single-case illustrations. Exceptions include Hardgrave, Aloysius and Goyal's (2013) RFID field experiments on inventory record inaccuracy and Siebers, Aickelin, Celia and Clegg's (2010, 2011) simulation-based retail case studies of customer experience and people management.

Future research should follow Hardgrave et al.'s (2013) field-experiment model, partnering with retailers to pilot newer optimisation and AI-based models under live operating conditions rather than relying on simulation.

***Suggested research questions:***

- What operational outcomes result from deploying AI-augmented inventory or omnichannel models in live retail?
- What barriers do retailers face in adopting field-tested OR models at scale?

### 6.7 Underexplored Behavioural and Customer-Centric Dimensions

Customer-facing themes remain separate from the operational core. Yavas, Babakus and Ashill (2010) link management commitment, service climate and frontline performance to customer satisfaction and sales, while Arineli and Quintella (2015) examine customer experience management and productivity.

Future work could incorporate choice-model-based demand estimation or personalised assortment and pricing informed by the satisfaction drivers identified by Yavas et al. (2010), linking optimisation to customer-centric strategy.

***Suggested research questions:***

- How can satisfaction and service-climate indicators enter retail assortment and pricing optimisation as constraints or objectives?
- Which behavioural factors most moderate the effectiveness of OR-based customer-facing interventions?

### 6.8 Methodological Limitations of the Bibliometric Study

Two limitations apply to the bibliometric analysis itself. First, it relies exclusively on Scopus data; future work should combine Scopus with sources such as Web of Science to verify whether the thematic structure holds across coverage. Second, citation fields were unavailable, so influence and impact could not be assessed; re-running with correct citation data would enable indicators such as citations per year and co-citation networks.

## 7. CONCLUSION

To conclude, this study used bibliometric techniques to examine and analyse the growing body of literature on the application of Operations Research in retail management. The analysis is based on a final sample of 315 journal articles from Scopus, published between 2010 and 2026. The findings offer insight into the thematic structure, publication trends and direction of research in this field, while also identifying the research gaps that shape a future research agenda.

The publication trend analysis shows that research output in this field, while not uniform, has grown considerably over the years. There was a sharp rise in publications after 2020, whereas the 2010s saw only modest output. The highest number of publications was in 2025, with 41 publications. This timing coincides with the post-pandemic shift towards e-commerce and omni-channel retailing described in the introduction, which suggests that changes in the retail environment have drawn scholarly attention to the topic. It also suggests that the field is still active and expanding rather than settled.

The thematic mapping revealed that the field is built mainly around its operational components: inventory management, trend forecasting and distribution. These are long-standing retail concerns, and the dominance of these themes shows that traditional OR applications remain the foundation of the literature. Emerging areas of study also appear, including artificial intelligence, omni-channel retailing, sustainability and algorithmic management. A closer examination, however, reveals that the established and emerging areas are largely separate and disconnected. Studies applying computational methods tended to layer these techniques on top of existing frameworks instead of embedding them in a unified decision-making framework. Only one paper, written in 2026, begins to combine these approaches, using an AI–blockchain hybrid framework that integrates reinforcement learning, demand forecasting and supplier selection. This suggests the field is only at the beginning of this convergence.

Omni-channel retailing appears to be discussed mostly in descriptive terms rather than from a practical or optimisation-based perspective. Sustainability is widely discussed but rarely built into cost-oriented or service-oriented models. The studies were also found to rely largely on synthetic data and single-case illustrations, and field-tested studies of adequate scale were rare. Without real-world validation, it is hard to know whether the proposed models would perform under the constraints retailers actually face. Customer-facing and behavioural dimensions were likewise found to be largely separate from the operational core of the field, even though customer behaviour drives much of the demand that operational models try to serve.

These findings are relevant to both scholars and industry professionals.

For researchers, the identified gaps point towards a clear future research agenda:

- Hybrid AI–OR models, as opposed to pure OR or pure AI models. Combining the predictive strength of AI with the decision-making structure of OR could address problems that neither handles well alone.
- Formal multi-layered optimisation models for omni-channel fulfilment, so that decisions about inventory, delivery and returns across channels are made together rather than separately.
- Sustainability embedded as a hard constraint within multi-objective coordination models, rather than treated as an afterthought or a secondary goal.
- Formalised treatment of perishable inventory and better decision-making in food-waste management, where poor planning has both financial and environmental costs.
- Customer satisfaction and service-climate indicators included in assortment, pricing and optimisation decisions, so that models reflect the customer experience and not only cost.

There is also a significant gap in field-validated studies carried out in partnership with retailers. Such collaboration would move the literature beyond synthetic data and give models a realistic test.

For industry professionals, the results show that analytical and optimisation-based approaches are becoming increasingly relevant to today's retail problems. They also show a disconnect between conceptual interest in AI and sustainability and the quantitative application of either. Practitioners should therefore be cautious about assuming that published models are ready for deployment, and should treat the literature as a source of promising ideas that still need testing in real operating conditions.

The researchers acknowledge the following limitations. The Biblioshiny dataset lacked citation-related data, so citation-based metrics could not be analysed reliably, and influence in this study is therefore judged mainly by thematic and publication patterns. The research was also limited to the Scopus database, so relevant literature indexed elsewhere may not have been included. In addition, the keyword-based search may have missed studies that address the topic using different terminology. A multi-database approach would help future bibliometric studies, as would repeating this study when more citation data is available.

The major research gaps identified above (hybrid AI–OR integration, omni-channel optimisation, sustainability modelling, food-waste decision-making, empirical validation and customer-centric optimisation) offer the most promising prospects for advancing the field beyond these constraints.

Overall, the literature shows a field that is growing quickly and has a strong operational foundation, but whose newer themes have yet to be fully integrated into it. Closing that gap will require models that combine technical sophistication with real-world testing and a broader view of what retailers are trying to achieve. Researchers who address these gaps are well placed to make a meaningful contribution, and practitioners who follow the field closely will be better prepared to adopt new methods as they mature.

## REFERENCES

[1] Arineli, A., & Quintella, H. L. M. de M. (2015). CEM: Increasing productivity through the management and monitoring of experiences provided to customers. Cogent Business and Management. https://doi.org/10.1080/23311975.2015.1023015

[2] Bala, P. K. (2012). Improving inventory performance with clustering based demand forecasts. Journal of Modelling in Management. https://doi.org/10.1108/17465661211208794

[3] Cai, Y. J., & Lo, C. K. Y. (2020). Omni-channel management in the new retailing era: A systematic review and future research agenda. International Journal of Production Economics. https://doi.org/10.1016/j.ijpe.2020.107729

[4] Dogru, A. K., & Keskin, B. B. (2020). AI in operations management: applications, challenges and opportunities. Journal of Data, Information and Management. https://doi.org/10.1007/s42488-020-00023-1

[5] Filimonau, V., & Gherbin, A. (2017). An exploratory study of food waste management practices in the UK grocery retail sector. Journal of Cleaner Production. https://doi.org/10.1016/j.jclepro.2017.07.229

[6] Hardgrave, B. C., Aloysius, J. A., & Goyal, S. (2013). RFID-enabled visibility and retail inventory record inaccuracy: Experiments in the field. Production and Operations Management. https://doi.org/10.1111/poms.12010

[7] Huang, I. Y., Manning, L., Wood, V., James, K. L., Millington, A., Grigoriadis, V., & Ward, S. (2022). Creating sustainable value through food waste management: does retail customer value proposition matter? British Food Journal. https://doi.org/10.1108/BFJ-06-2021-0693

[8] Hübner, A., Holzapfel, A., & Kuhn, H. (2015). Operations management in multi-channel retailing: an exploratory study. Operations Management Research. https://doi.org/10.1007/s12063-015-0101-9

[9] Hübner, A., Kuhn, H., & Wollenburg, J. (2016). Last mile fulfilment and distribution in omni-channel grocery retailing: A strategic planning framework. International Journal of Retail and Distribution Management. https://doi.org/10.1108/IJRDM-11-2014-0154

[10] Kotzab, H., Munch, H. M., de Faultrier, B., & Teller, C. (2011). Environmental retail supply chains: When global Goliaths become environmental Davids. International Journal of Retail and Distribution Management. https://doi.org/10.1108/09590551111159332

[11] Kumar, L., & Khedlekar, U. K. (2026). A hybrid AI and blockchain framework for intelligent supply chain optimization with reinforcement learning-based inventory management, stochastic demand forecasting, and sustainable supplier selection. Soft Computing. https://doi.org/10.1007/s00500-025-10947-8

[12] McColl-Kennedy, J.R., Zaki, M., Andreassen, T.W., Coote, L.V., Brea, E., Willer, F., & Andrade, J. (2025). Digital twins: a game changer in customer experience. *Journal of Service Management*, *37*(4), 1–31. https://doi.org/10.1108/JOSM-12-2024-0540

[13] Riesenegger, L., & Hübner, A. (2022). Reducing Food Waste at Retail Stores—An Explorative Study. Sustainability (Switzerland). https://doi.org/10.3390/su14052494

[14] Rooderkerk, R.P., DeHoratius, N., & Musalem, A. (2022). The past, present, and future of retail analytics: Insights from a survey of academic research and interviews with practitioners. *Production and Operations Management*, *31*(10), 3727–3748.

[15] Siebers, P. O., Aickelin, U., Celia, H., & Clegg, C. (2010). Simulating Customer Experience and Word-Of-Mouth in Retail — A Case Study. Simulation. https://doi.org/10.1177/0037549708101575

[16] Siebers, P. O., Aickelin, U., Celia, H., & Clegg, C. W. (2011). Towards the development of a simulator for investigating the impact of people management practices on retail performance. Journal of Simulation. https://doi.org/10.1057/jos.2010.20

[17] Swami, S., & Shah, J. (2013). Channel coordination in green supply chain management. Journal of the Operational Research Society. https://doi.org/10.1057/jors.2012.44

[18] Yavas, U., Babakus, E., & Ashill, N. J. (2010). Testing a branch performance model in a New Zealand bank. Journal of Services Marketing. https://doi.org/10.1108/08876041011060477