

A Bibliometric Review of Sustainable Supply Chain Management: Green Logistics

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ABSTRACT

Green logistics has become a key aspect of sustainable supply chain management, owing to growing concerns regarding environmental impact, operational efficiency, and technological change. The present study offers a bibliometric review of the research on green logistics and sustainable supply chains that was published between 2015 and August 2026. Based on the PRISMA framework, 861 records were found in ScienceDirect, and 374 peer-reviewed papers were kept for analysis following a screening process and the elimination of duplicates. The analysis employed Bibliometrix, Biblioshiny, and VOSviewer to look at publication trends, the co-occurrence of keywords, thematic structures, and the development of research themes. The results show a considerable growth in the field, with sustainability, green logistics, the circular economy, and sustainable supply chains serving as the main themes. More recent research is increasingly incorporating artificial intelligence, blockchain, electric vehicles, and optimisation. The study also points out gaps in integrated supply chain approaches, real-data validation, social sustainability, and standardised measurement, and thus suggests avenues for future research.

1. INTRODUCTION

Logistics often goes unnoticed because much of it happens behind the scenes. Products are stored, transported and delivered to customers, but these activities have significant environmental impacts. Transport accounts for roughly 20% of global CO₂ emissions, while energy-related CO₂ emissions reached 37.8 gigatonnes in 2024. The green logistics market was estimated at approximately USD 1.51 trillion in 2024 and is projected to grow through 2030. Green logistics is therefore increasingly connected not only to environmental concerns but also to business decisions involving cost, efficiency, investment and environmental performance.

Green logistics involves reducing the environmental impact of logistics activities while maintaining operational efficiency. However, organisations often face trade-offs between environmental objectives and operational requirements, such as fuel efficiency, delivery time and cost. Technological developments, including electric vehicles, artificial intelligence and optimisation techniques, are increasingly being explored to address these challenges. Recent studies have examined machine learning, optimisation and electric vehicles as potential approaches to improving the sustainability of logistics operations (Comi & Idone, 2026; Mamaghani & Battaia, 2026a).

As research in green logistics has expanded, it has become increasingly difficult to understand the development of the field through individual studies alone. Bibliometric analysis provides a systematic way to examine large bodies of literature by identifying publication trends, frequently used keywords, research clusters and emerging themes. This approach helps reveal how research priorities have changed over time and how different areas of green logistics are interconnected.

Existing literature covers a wide range of perspectives, including organisational performance, national logistics performance, technological developments, routing and optimisation. Research has also increasingly examined digital technologies such as artificial intelligence and blockchain, along with electric vehicles, circular economy practices and decarbonisation. These developments indicate that green logistics has expanded from a relatively focused environmental topic into a broader research area involving technology, operations, sustainability and supply chain management.

This study therefore presents a bibliometric review of research on sustainable supply chain management and green logistics published between 2015 and August 2026. The review uses the PRISMA framework to systematically identify

and screen relevant literature. The search was conducted using ScienceDirect with terms including “green logistics”, “sustainable logistics” and “sustainable supply chain”. The initial search produced 861 records. After removing 42 duplicates and conducting title and abstract screening, 374 peer-reviewed documents were retained for the final analysis. Bibliometrix and Biblioshiny were used for bibliometric analysis, while VOSviewer was used to visualise keyword relationships.

The analysis examines publication trends, keyword co-occurrence, thematic structures and the evolution of research themes. Before 2020, research was comparatively smaller and included themes such as financial performance and third-party logistics. Around 2020, circular economy and green supply chain management became more prominent, while from 2023 onwards, sustainable logistics, environmental performance and digital technologies gained greater attention. Sustainability appeared 69 times among the keywords, while green logistics appeared 45 times, highlighting their central role in the literature.

The keyword analysis also identifies major research clusters covering sustainability and circular economy, green logistics, carbon footprint and sustainable logistics, management and digital transformation, and blockchain, green manufacturing and decarbonisation. The Callon strategic diagram identifies sustainable logistics and green supply chain as motor themes, while sustainability, logistics and circular economy appear as basic themes. Overall, the findings show that sustainability remains central to the field, while research is increasingly integrating operational approaches such as routing and optimisation with digital technologies including artificial intelligence and blockchain.

2. RESEARCH METHODOLOGY

The following section describes the process by which the literature relevant to this study was identified, screened, and analysed. Since the objective is to outline the intellectual structure of research into green logistics and sustainable supply chains, a two-stage approach was employed: the identification and selection of the literature using the PRISMA framework as adapted for bibliometric studies, and then the conduct of bibliometric analysis with the help of the Bibliometrix R-package together with its Biblioshiny interface, as well as the use of VOSviewer for network visualisation.

Research Objectives

The methodology was based on four objectives: first, to identify a wide and appropriate range of peer-reviewed publications concerning green logistics and sustainable supply chain management; second, to apply a clear and repeatable screening procedure which excluded duplicates and material that was not relevant; third, to examine the field's growth over time, identify the leading sources, and find out who the most influential contributors were; and fourth, to discover the field's conceptual structure by using science-mapping techniques that reveal motor, basic, niche, and emerging or declining themes.

Data Source and Search Strategy

The bibliographic records were obtained from Science Direct because of its coverage of journals in operations management, logistics, transportation, and environmental sciences. A structured search string, based on the terms 'green logistics', 'sustainable logistics', 'sustainable supply chain' and other synonyms, was carried out on the titles, abstracts, and keywords from 2015 up to August 2026. The records were then exported in RIS format and imported into Mendeley Reference Manager for organisation and duplicate removal before bibliometric analysis.

Prisma Statement and Study Selection

The study followed the PRISMA guidelines for reporting systematic reviews.

The review adhered to the four-phase PRISMA protocol, adapted for use in bibliometric research. Figure 1 presents the PRISMA flow diagram for the selection process.

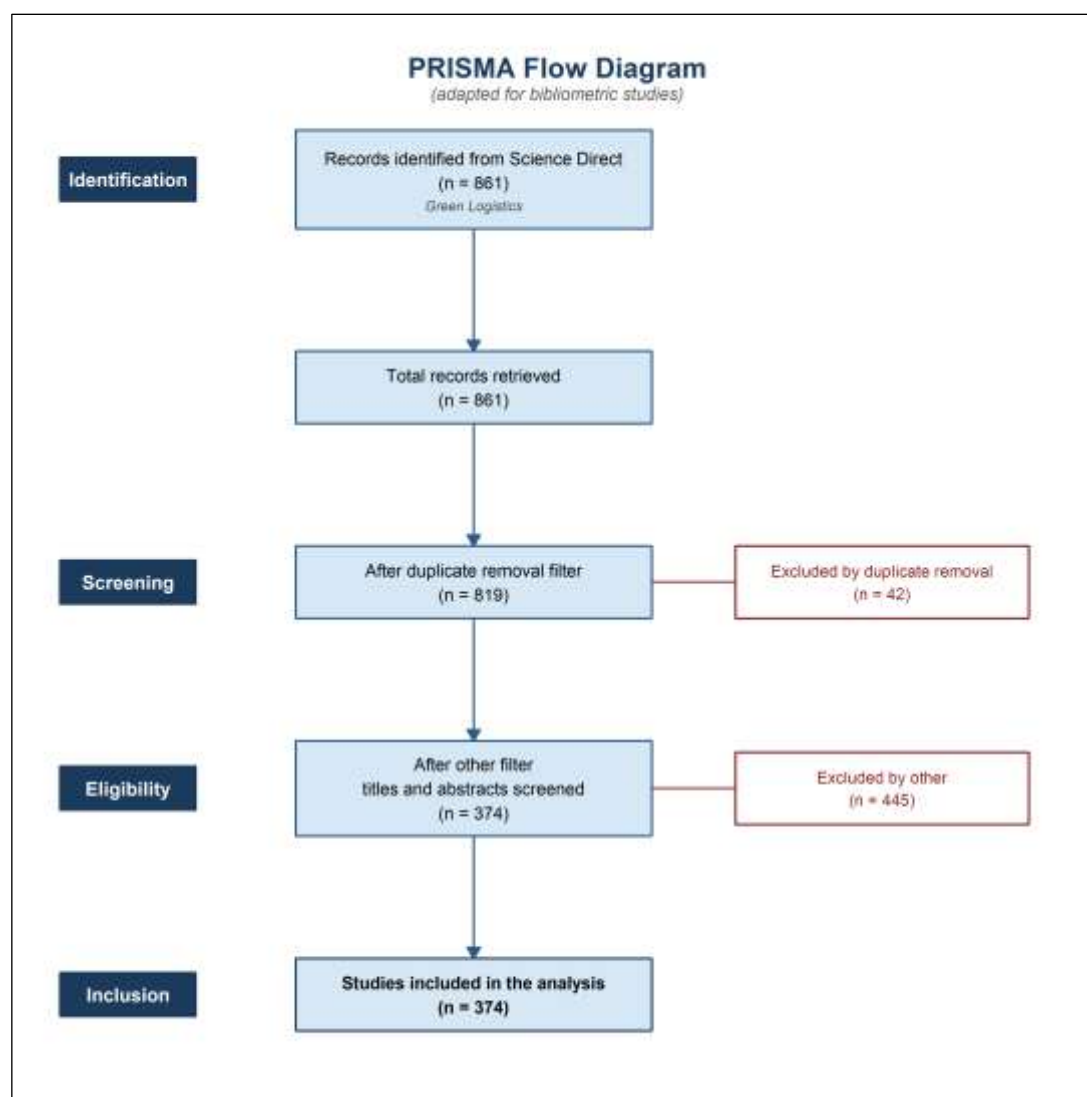


Figure 1. Adapted PRISMA flow diagram showing the identification, screening, eligibility, and inclusion of records.

A total of 861 records were retrieved from ScienceDirect. Forty-two duplicates were eliminated by means of Mendeley's automated tool and by manual verification, resulting in 819 distinct records. The titles and abstracts of these records were next assessed against the inclusion criteria, which required that the studies provide a substantial treatment of the environmental or sustainability aspects of logistics, transportation, or supply chain management in the context of a peer-reviewed research article or a review article. This process excluded 445 records that were off-topic, editorial in nature, or not sufficiently relevant, and left a final set of 374 documents.

Bibliometric Analysis Approach

The set of 374 documents was imported into Bibliometrix for R and then analysed using Biblioshiny, a method which has also been employed in recent scientific-mapping studies in this area (Alzate et al., 2024), as shown in similar supply chain scientific-mapping research (Peykani et al., 2026). Bibliometric analysis involves the quantitative examination of bibliographic data by means of citation, co-citation, and co-word relationships in order to identify patterns that a narrative review would not easily be able to reveal, as shown in the umbrella review by (Islam et al., 2024).

The study was carried out in three stages: first, an analysis of the output growth and how this growth was distributed among journals and authors; second, science mapping, which involved the use of the Callon strategic diagram, thematic evolution analysis, multiple correspondence analysis, and hierarchical clustering in order to reveal the field's conceptual structure, techniques that have also been used in similar bibliometric studies focusing on sustainability (Dehghani et al., 2026); and third, network analysis, in which keyword co-occurrence networks were constructed using VOSviewer to illustrate how strongly and in which clusters the frequently used terms were connected, once more in agreement with their application in other parts of the corpus (Alzate et al., 2024).

3. LITERATURE REVIEW

Conceptual Background

Green logistics refers to practices adopted to minimise the ecological and environmental impacts of supply chain and transportation activities. The growth of quick commerce illustrates its importance: frequent orders require processing, packaging and delivery, each carrying an environmental cost. As these activities are repeated across millions of orders, the convenience of fast delivery raises questions about sustainability. Green logistics has therefore moved beyond being treated as an additional corporate social responsibility. Businesses face pressure from investors, consumers and other stakeholders to reduce environmental harm without compromising costs, operational efficiency or service quality.

The literature reviewed, published between 2015 and 2026, examines organisational performance, national-level logistics performance and technological developments. It covers manufacturing, retail, healthcare, aviation, maritime transport and food supply chains across different regions. This breadth presents green logistics as a wider operational challenge rather than an issue confined to particular industries. The discussion connects organisational practices with national capabilities and developments in artificial intelligence, electric vehicles and optimisation. Existing systematic and bibliometric reviews are also considered to identify how these research areas have been studied and where their coverage remains fragmented.

Evidence from the Literature

Research on organisational performance generally reports positive effects from adopting green logistics practices, although these effects depend on how the practices operate within a firm. Evidence from Vietnamese third-party logistics (Nguyen-Huynh-Thanh & Nhu-Mai, 2026) providers shows that sustainability improvements occur largely through greater operational efficiency. This relationship is particularly relevant for resource-constrained firms, where environmental initiatives also need to support everyday operations. Research from Bangladesh by (Emon & Khan, 2026) similarly find direct benefits from green procurement and sustainable manufacturing, while eco-friendly transportation and reverse logistics become more significant through green logistics. Individual practices therefore need to be understood within the wider logistics system.

At the national level, researchers use composite Green Logistics Performance Indices to examine the relationship between logistics, environmental performance and trade. These indices combine logistics and environmental indicators, often through principal component analysis. Research on ASEAN economies, (Thu & Thu, 2026) finds that stronger logistics performance in exporting countries supports export value, whereas stronger green logistics performance in importing countries can operate as a non-tariff barrier. Similar patterns appear in research on Vietnam's regional trade (Duzgun & Nguyen, 2026). Environmental improvements may therefore strengthen domestic competitiveness while creating difficulties for exporters unable to meet greener market standards. Logistics efficiency and environmental performance emerge as connected capabilities rather than necessarily opposing objectives.

Technological research focuses increasingly on combining machine learning with conventional optimisation methods. One vehicle-routing study by (Mamaghani & Battaia, 2026a), combines XGBoost with adaptive large neighbourhood search to address simultaneous pickup and delivery and time-window constraints. Tighter emissions limits reduce carbon dioxide emissions, but also increase costs and service-window violations. The trade-off is less expensive in rural networks than in urban ones. This finding highlights the importance of network structure: an environmental constraint cannot be assumed to produce the same operational consequences across different delivery settings.

Electric-vehicle research by (Papini et al., 2026) also demonstrates the importance of model design. In a Chinese location-routing case study, full electrification reduced emissions by approximately 69 percent while maintaining broadly comparable costs. A weighted model balancing cost and emissions achieved a reduction of around 16 percent while almost doubling total system costs. Within that case, a gradual or weighted optimisation approach did not necessarily provide a better economic and environmental balance. Such findings require attention to the specific network and model rather than treating electrification outcomes as uniform.

Machine learning is being applied beyond routing. Research by (Hmamou et al., 2026) combining demand forecasting with optimisation compares genetic algorithms, particle swarm optimisation, ant colony optimisation and simulated annealing. Particle swarm optimisation achieved the fastest convergence for demand forecasting, while ant colony

optimisation performed particularly well in routing. The proposed response is phase-aware algorithm selection, using different methods at different logistics stages. More broadly, the reviewed models increasingly account for charging constraints, live traffic, uncertain demand and consumer preferences. Their practical value depends on producing logistics systems that remain environmentally, commercially and operationally workable outside the model.

Taken together, the literature shows that green logistics extends beyond reducing transport emissions. Organisational capabilities, national performance and technological choices all influence its effectiveness. Technology alone is insufficient without financial resources, stakeholder involvement and suitable operating conditions. The main gap is the need for an updated bibliometric and systematic review connecting these separate areas and incorporating the developments discussed in the 2025 and 2026 literature. Bringing together artificial intelligence, electric vehicles, consumer behaviour and optimisation would help explain both the growth of the field and changes in its research focus.

4. DATA ANALYSIS

This section presents the findings from the analysis of the final set of 374 documents conducted using Biblioshiny and VOSviewer. The analysis is divided into four parts matching the structure outlined in Section 3.5: performance analysis (publication trends and productivity) keyword and trend-topic analysis, network analysis (keyword co-occurrence) and science mapping / thematic analysis (conceptual structure, thematic clusters and thematic evolution).

Performance Analysis: Annual Scientific Production:

Figure 2 shows the number of scientific publications in the collection. From 2015 to 2019 output remained single digits to low double digits, indicating that green logistics and sustainable supply chains were still a minor area of research. A turning point occurred during 2020–2021, when focus on supply chain related ideas began to drive output. After this period annual production started rising in 2023 and reached its peak in 2024. 2025 shows a drop in the number of researches, but this does not necessarily indicate a genuine decline in research output. It is possibly because the year is incomplete and databases have not yet been added. The curve is expected to rise more in 2026 as records continue to grow. When 2025 is excluded due to its data, a second-order polynomial model fits the annual series more accurately than either a linear ($R^2 = 0.82$) or exponential fit ($R^2 = 0.90$) as shown in Figure 2a. This suggests that the field is growing at an increasing rate and not a constant pace.

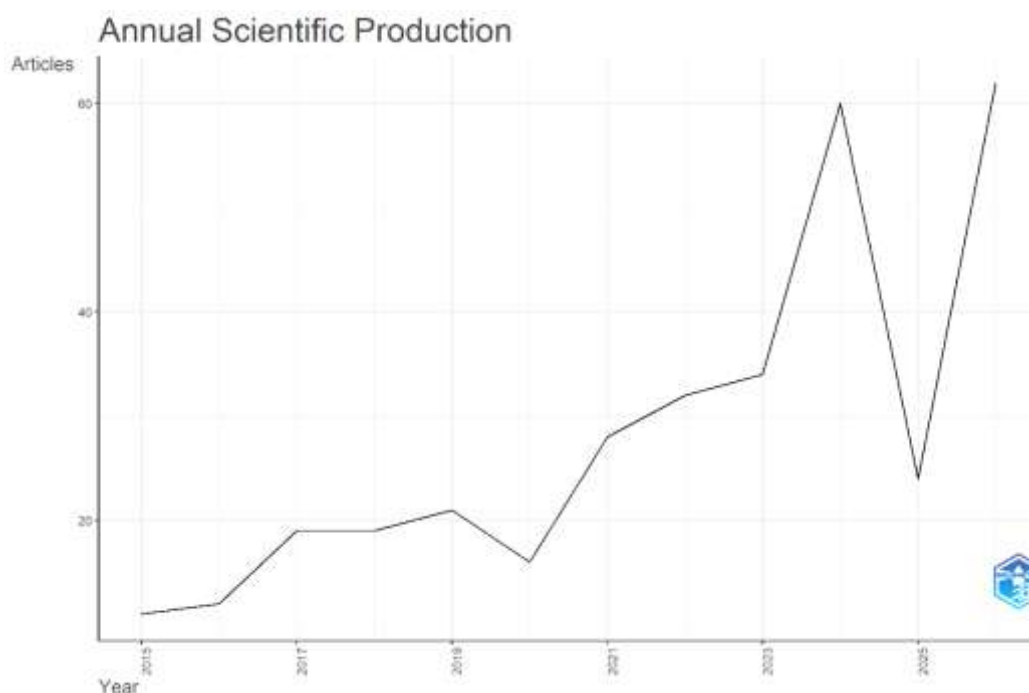


Figure 2. Annual scientific production of documents on green logistics and sustainable supply chains, 2015–2026.

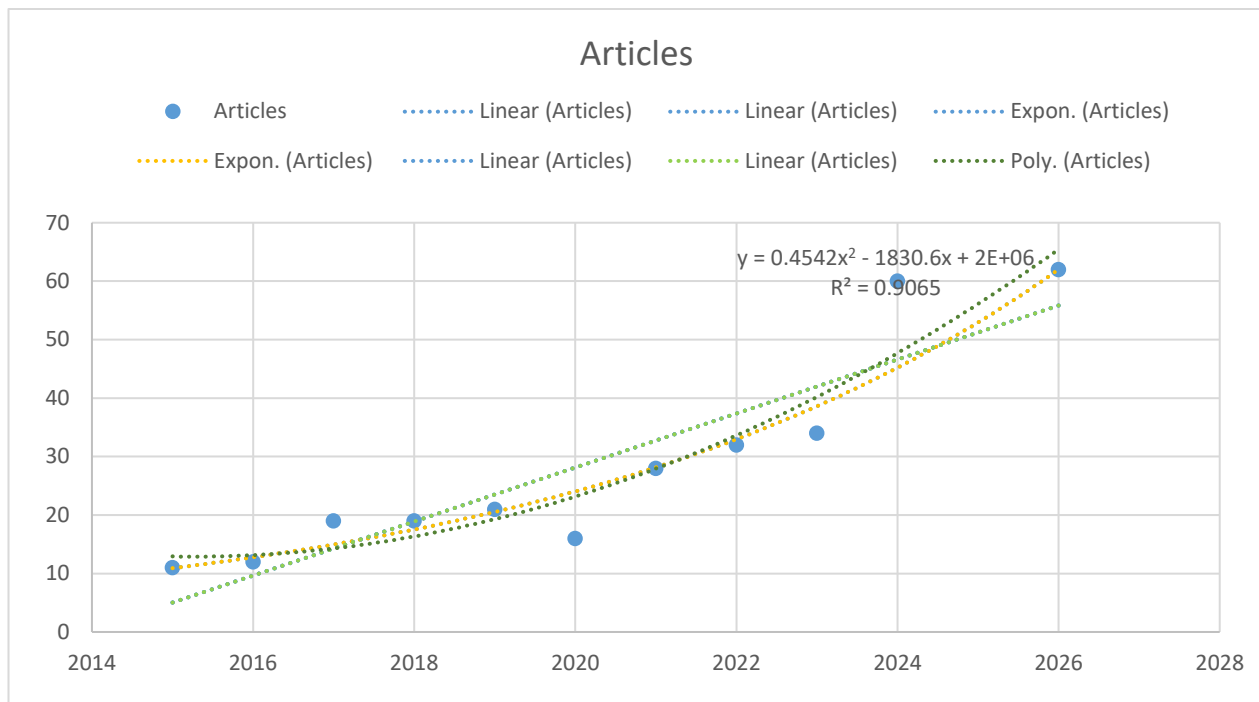


Figure 2a.

Growth-fit comparison (linear, polynomial, exponential) of annual scientific production, with 2025 excluded because the available data for that year is incomplete.

Source and Contribution Analysis:

Biblioshiny's source distribution analysis reveals that the corpus is not randomly spread across journals. Instead it concentrates in a set of defined channels. The Journal of Cleaner Production leads the list followed by Cleaner Logistics and Supply Chain, Transportation Research Procedia, Computers & Industrial Engineering and the Transportation Research Part E and Part D series.

These sources reflect the focus of green logistics research. The dominance of journals with sustainability or transportation-and-environment missions shows that this field sits at the intersection of cleaner production scholarship, transportation science and key areas of production and supply chain activities literature.

Transportation Research Procedia stands out because it signals that much of the research is shared first at conferences. This pattern is common in growing sub-disciplines. A small group of researchers mainly linked to urban logistics and reverse logistics, produce a large share of the output. Meanwhile many contributors publish one paper showing that the field is still attracting new participants. The earliest years of the corpus illustrate this trend well, with representative early publications (Kumar et al., 2015) show a focus on reviews rather than empirical studies. This aligns with a phase where the field was still defining its concepts and vocabulary especially before 2018.

Keyword and Trend-Topic Analysis:

Each bubble represents a keyword with position indicating the median year of use and size showing how often it appears.

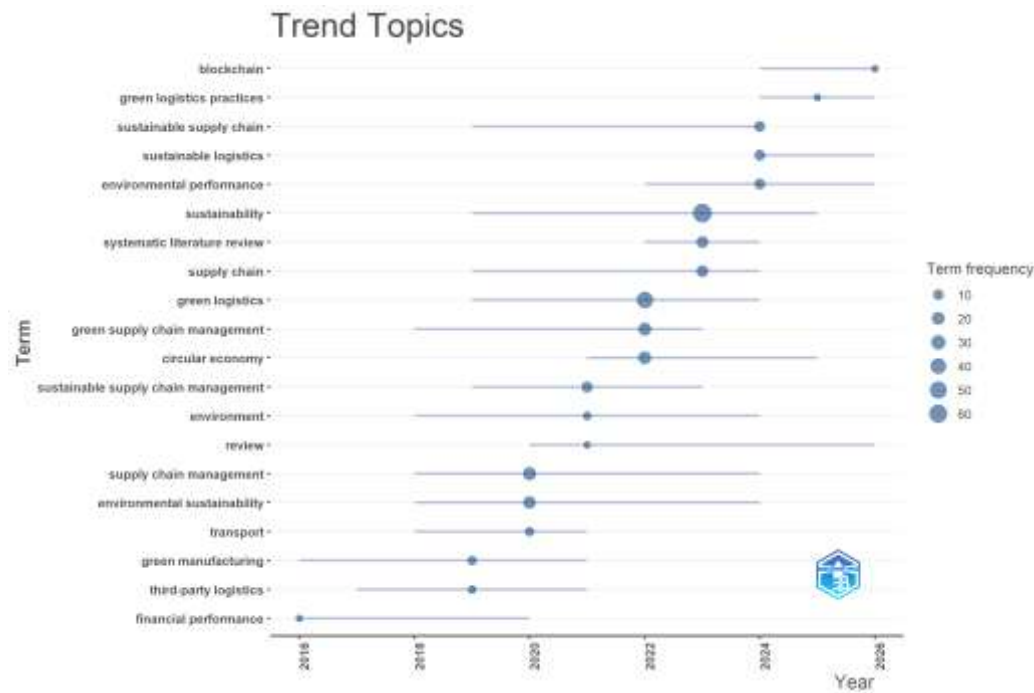


Figure 3. Illustrates the timing and frequency of author keywords in research on logistics and sustainable supply chains.

The trend-topic map clearly traces the evolution of terms. In the years 2016 to 2020 the most common keywords include "financial performance" "third-party logistics" "green manufacturing" and "supply chain activities". This reflects that there was a focus on maintaining profitability while conducting business sustainably. (Bastas & Liyanage, 2018). From 2020 onward the focus shifts toward terms like "circular economy" "green supply chain activities" and "sustainability". This shows that researchers started looking at sustainability as a central part of supply chain management, with focus on increased use of technology. (Dehghani et al., 2026). Total frequency of keywords over the whole corpus, as opposed to over time, is shown in Figure 3.



Figure 4. Tree map of author keyword frequencies across the 374-document corpus.

The frequently used keywords are "sustainability" (69 times 13% of all keyword instances) and "green logistics" (45 times, 9%). Next come "supply chain activities" (22times) and "logistics" (20 times).

Beyond this core a secondary layer of keywords includes "industry 4.0" "economy" "reverse logistics" "decarbonization" "blockchain" and "digital transformation". They confirm the growing integration between technology and sustainability. (Alasmari & Alzahrani, 2025)

Network Analysis: Keyword Co-occurrence:

Figure 5 presents a keyword co-occurrence network created using VOSviewer. It shows which terms frequently appear together in the documents. The lines represent the strength of the relationship between terms, while the colours indicate the different clusters.

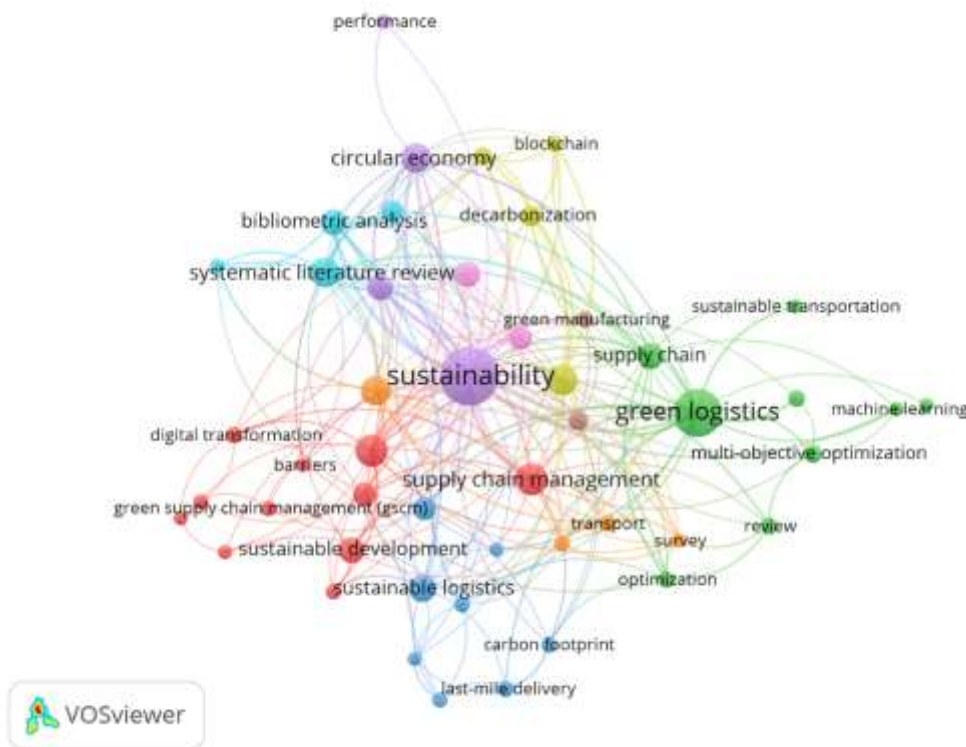


Figure 5. Keyword co-occurrence network created using VOSviewer, showing clusters of related author keywords

The purple cluster is centred around “sustainability” and “circular economy”. This is the most densely connected cluster reflecting the major role of sustainability and digital transformation in shaping current research themes (Pi & Tang, 2025).

The green cluster is one of the most clearly defined groups. It is centered around “green logistics”. It focuses on improving logistics operations while reducing environmental impact, using optimisation techniques and technology (Galkin et al., 2025) .

The blue cluster includes “carbon footprint” and “sustainable logistics”. It is focused on the environmental impact that logistics create.

The red cluster contains the management side of sustainability, including the barriers, digital transformation around it.

The yellow cluster tells us how researchers are using fields like blockchain and green manufacturing practices to achieve decarbonization.

Science Mapping and Thematic Analysis:

The Callon strategic diagram, which plots keyword clusters based on their centrality and density, was used to create a thematic map in Biblioshiny in order to understand the structure of the field. This produced four quadrants: motor, basic, niche, and emerging/declining themes, each of which represents a distinct role in existing research.

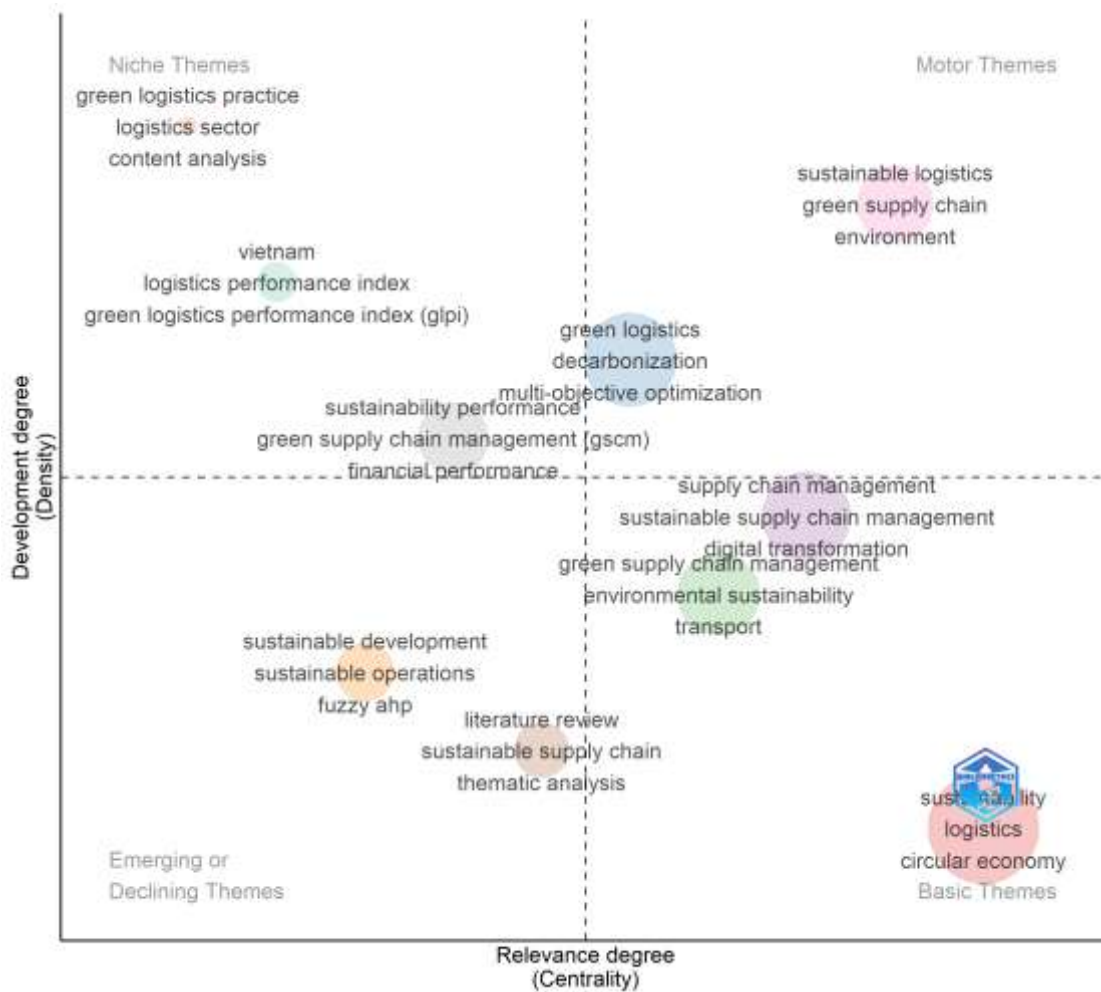


Figure 6. Thematic map of green logistics and sustainable supply chain research

The cluster that includes "logistics," "green supply chain," and "environment" is positioned in the upper-right quadrant, which represents the motor themes. These are important topics that actively help in development of the field. The lower-right quadrant, which contains the basic themes is dominated by a large group that includes "sustainability," "logistics," and "circular economy." They are widely connected to other themes. They are also linked to a cluster focused on "supply chain activities," "sustainable supply chain activities," and "digital transformation." (Kazancoglu et al., 2018; Seroka-Stolka Oksana & Ociepa-Kubicka, 2019). In the left quadrant, which represents niche themes we find specialized clusters such as "green logistics practice," "logistics sector," "content analysis," "logistics performance index," and "green logistics performance index (GLPI)." These topics are more focused and often tied to countries or methods. These themes are not yet strongly connected to the broader research area (Van Vo & Nguyen, 2023). The lower-left quadrant includes themes that are either emerging or becoming less prominent. This includes "development," "sustainable operations," "fuzzy AHP," "literature review," "sustainable supply chain," and "thematic analysis." Some of these topics are new while others were once popular but are now being replaced by integrated themes.

Figure 7 shows the conceptual structure of the research based on Multiple Correspondence Analysis (MCA) of keyword co-occurrence.

-Figure 8 shows a clustering dendrogram of the same keywords. Both figures support the grouping seen in the diagram. One region shows a scattered cluster of optimization and urban/last-mile related terms like "vehicle routing problem," "multi-objective optimisation," "urban freight transport," and "co-emissions." The other region shows a group around "sustainability," "logistics," "circular economy," "artificial intelligence," and "blockchain." The results suggest two main research streams, one focused on operations research and optimisation, and the other on sustainability, technology and management.

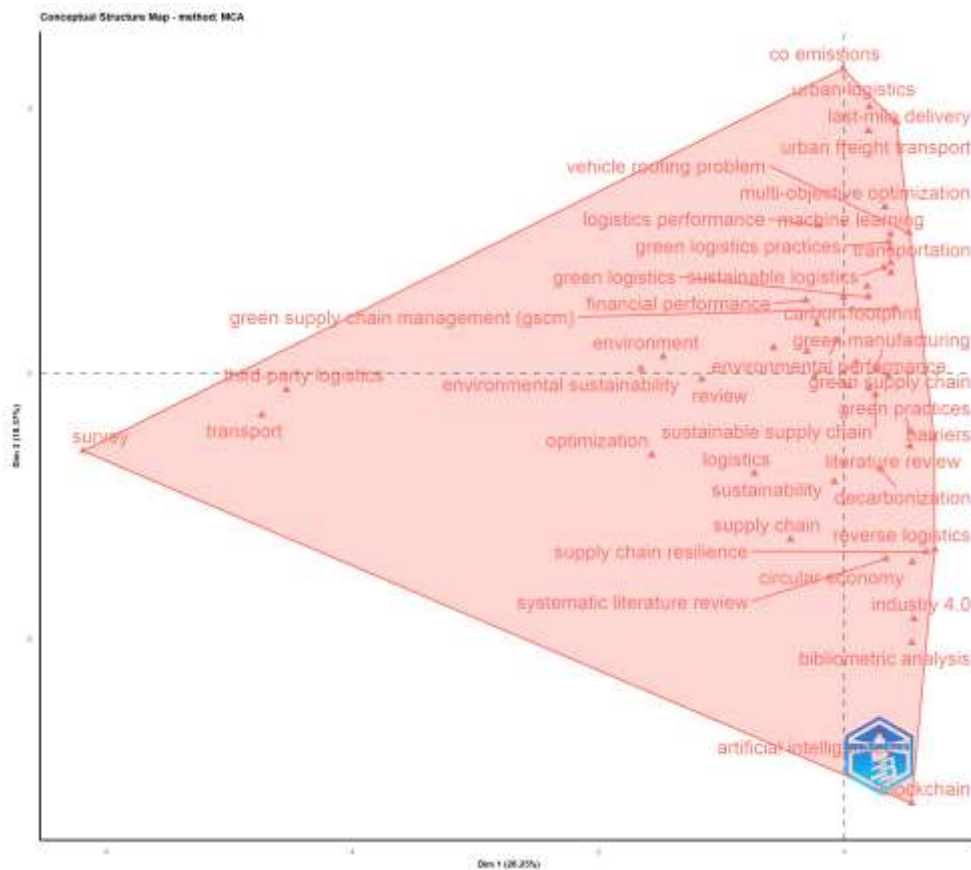


Figure7. Conceptual structure map (Multiple Correspondence Analysis) of author keywords.

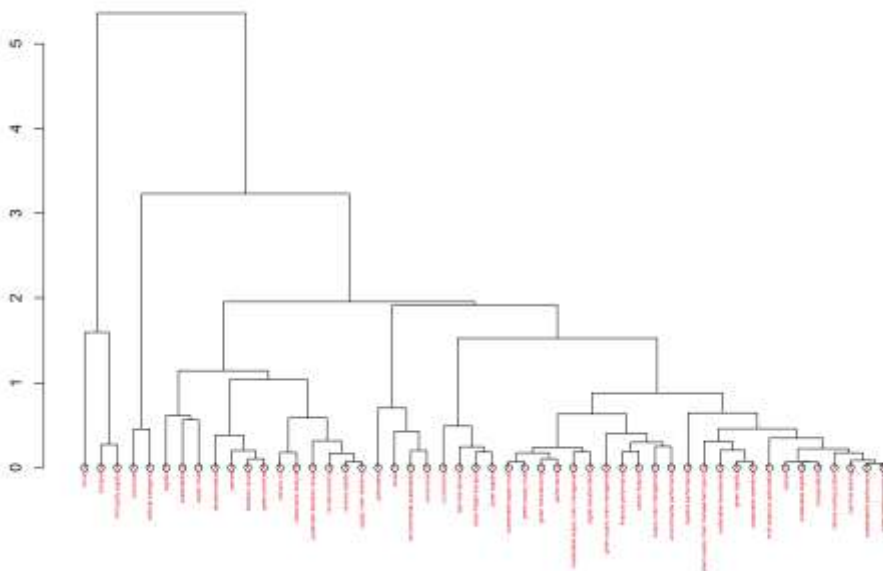


Figure8. dendrogram showing the hierarchical clustering of keywords

Thematic Evolution:

A thematic evolution study using a Sankey diagram was conducted by dividing the research corpus into two periods: 2015–2023 and 2024–2026. The goal was to see how keyword clusters from the period relate to clusters in the second.

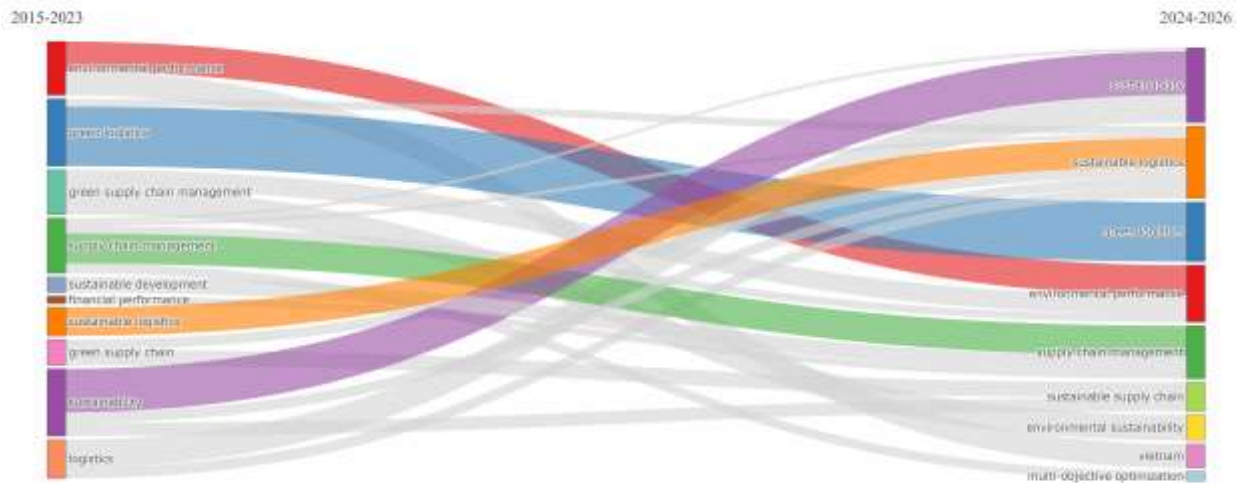


Figure 9. Thematic evolution of the green logistics and sustainable supply chain literature, comparing cluster composition in 2015–2023 against 2024–2026.

Sustainability’ and ‘environmental performance’ remain important themes in both periods. This shows that they continue to be a central part of the field. The 2015–2023 theme "green logistics" flows completely into the 2024–2026 theme, showing continuity across both periods.

At the time several earlier more focused themes such as "financial performance," "green supply chain," and "sustainable development" have moved into broader categories like "sustainability" and "sustainable logistics." This suggests research has become more integrated, with earlier discussions being incorporated into a broader sustainability framework.

5. FUTURE RESEARCH AGENDA

Basis and Approach

This future research agenda is based on the green logistics literature reviewed for this project, 374 papers retrieved and analysed between 2015 and 2026, along with a bibliometric analysis of that collection. This agenda avoids repeated narrow points like “more research is needed on sustainability” or “more research is needed on AI”. Some papers that were reviewed already review the future research agendas but with a very limited scope and only looks at a very small part of green logistics, such as electric vehicles in road freight (Alarcón et al., 2023), warehouse management (Minashkina, 2024) or artificial intelligence in reverse logistics (Moosabeiki Dehabadi et al., 2026). Also, many papers are just the review papers instead of original studies, which shows that these papers just summarize the existing studies rather than giving new ideas.

Instead of repeating these same points, this agenda tries to focus on the main five weak points that were noticed repeatedly throughout the whole collection of papers: research mainly focuses on a particular section of green logistics rather than working as a whole; evidence on “green practices improve performances” relies on surveys instead of real data; new AI methods are only tested on its own example rather than compared with each other; Most papers don’t focus on social measures like worker’s condition; there is no fixed method that is used to judge how green a company’s practices really are.

Fragmented Coverage Across the Supply Chain

The biggest pattern that was observed throughout all the papers was that research stays split into separate topics instead of looking at the full chain of decisions. Green logistics covers many practices like choosing suppliers, warehousing,

optimal transport routes and managing returned goods. However, most papers hardly connect these practices together and give a bigger picture.

(Patella et al., 2026) focused specifically on road freight de-carbonisation and found that most papers only fix a certain criteria like shifting to electric trucks while avoiding other options such as fixing the amount of goods to be shipped or choosing other modes of transportation such as trains or ships. Only a few studies looked at the problem from different angles and worked on it. (Tetteh et al., 2024) who reviewed a very large set of papers on green logistics said that findings across different studies often contradict each other because nobody connects the work together.

The clearest proof of this research gap is that even papers that review other papers and suggest future research agendas are only focusing on particular topics. For example, one review only focuses on warehousing (Minashkina, 2024), other focuses only on electric trucks (Alarcón et al., 2023) while one review only covers artificial intelligence in reverse logistics (Moosabeiki Dehabadi et al., 2026). Even though these research gaps are genuine, none of them connects warehousing, delivery routes and AI in reverse logistics in a single framework.

Future researchers should test which green logistics decisions need to be worked together and which decisions can work efficiently on their own. There is at least one example where different topics are connected: (Xie et al., 2024) combines energy use, cold storage inventory and transport decisions together instead of working separately on them. The next step is to use joined up model and compare it with separate ones which will help in better analysis.

Studies Rely on Opinions Instead of Real Data

The second research gap is how the performance and result is measured. When the researchers want to show that how practice actually resulted, the usual method is survey. These surveys are may be biased because for each individual manager the ratings may differ. It depends on how green the company wants to be and there is no single unit of measuring it.

(Tetteh et al., 2024) found that almost 91% of research papers on green logistics practice base their review on the questionnaire based approach. Some examples are: (Ellison et al., 2024) surveyed 220 manufacturing firms in Ghana using the same questionnaire with questions like rating of environmental pressure, green strategy, sustainability performance, etc. (Ajibike et al., 2021) followed the exact same process with 185 different Malaysian construction firms. In both the cases nothing was really measured instead it was just opinions which differed because of different country and different line of business.

However, there are always exceptions: (Du & Li, 2022) did something different, instead of conducting surveys, they used real government data from 285 different Chinese cities, tracked over 15 years, to prove their study. This study shows that a different method can be adopted and can work. However, these are rare exceptions in a large body of papers.

Future researchers should combine the survey reports with real data with numbers like transportation cost, performance numbers, etc. and then test the results. This will give a better and unbiased view on the performance. Furthermore, the surveys should be altered according to the country it is being conducted in and according to the industry type. Where surveys are still needed, testing the same questions with more countries will give a proper pattern.

Absence of Cross-Method AI Benchmarking

The next research gap is that new AI models are emerging and helping solve the problems but they are only built for that particular situation. The same AI model is not being tested against some different situation or against some proven mathematical solutions which were being used before AI. (Garside et al., 2024) reviewed 458 papers which use the same mathematical solution and is now standard way of solving the problem. However, these AI models lack the testing results against these standardized formulas and methods.

Some examples are: (Erdem et al., 2026) built a method combining scheduling rules with deep learning for routes with multiple depots and split deliveries, but tested only on their own case. (Mamaghani & Battaia, 2026b) combined a machine learning with a search algorithm for reverse logistics routing, but tested only on very small examples. Even (Moosabeiki Dehabadi et al., 2026) reviewed this limitation in use of AI and machine learning and suggests that more testing is needed in this field

Future researchers should mainly focus on shared test problems of a situation and testing each method and AI against it to prove that their AI model is reliable. Without this there is no proof that AI method is better than traditional mathematical methods.

Neglect of Social Sustainability: Worker Conditions

Green logistics research measures the environment problems like carbon emissions, fuel use, pollution, etc. carefully but pays very less attention to how it affects people who are actually doing the work like warehouse staff, drivers and factory workers.

(Minashkina, 2024) who reviewed sustainable warehouse management research clearly says this, most of the practices found in the literature are focused on environment, not on people, even though the working conditions inside a warehouse can be easily seen and measured. (Alarcón et al., 2023) looking on electric trucks, also found the same pattern and stated social factors as one of the eight gaps in his field of study. Every study was mainly focused on cost and emissions.

A few studies do consider social factors. (Ajibike et al., 2021) study attitudes and social responsibility alongside the study of environment. (Duzgun & Atay, 2025) connects green human resource management to green supply chain practices. (Tewari et al., 2026) built a last mile delivery framework which puts technology, sustainability and people as equal and treated people part as something which is usually left out when studying technology and sustainability.

Future research should not treat social measures as an extra. Proper measurement methods for worker treatment and social sustainability should be made and should be treated as equally important as carbon emissions and cost. Warehousing and last mile delivery is the best place to start since the working conditions can be directly observed.

No Shared Way To Measure Green Practices

One of the biggest research gaps that was found is that there is no proper way of measuring the results that can be standardized throughout all researches. There is no single unit of measure to judge how green a company is. Everyone invents their own scoring system instead of using the one that already exists.

After reviewing many papers (Tetteh et al., 2024) found that even the basic idea of green logistics practice is measured in three different ways: sometimes as one single thing, sometimes as two separate things and sometimes as many different things all together. This part is the reason behind many mixed up findings on how the practice is showing the performance.

The same problem occurs in supplier selection. (Aytekin et al., 2024) built a scoring method using vague logic. (Sheikh et al., 2026) invented a method called OPLO-POCOD. (Koc et al., 2023) gave a different extended probability based model. Each method is an improvement of what method was prevailing before but very few test their methods against the other using the same data.

Future researchers should focus on comparing these ranking methods for defining both, green practices and supplier selection, using the same dataset. This will show which method roughly gives the same answer and which method gives different results which will help in measuring better results in future.

Overall Research Direction and Conclusion

These five research gaps all point in the same direction. There is no need for more individual company surveys or any more ranking methods to justify results. There is a large body of research on the green practices, AI integration, etc. What the research still lacks, is the work that connects these pieces together: research on adoption rarely links with research on routing, surveys are rarely measured against the real numbers, the new AI models are only tested on their own case rather than on older methods, researchers limit their field of study to environment without considering social measures and the ranking methods which are never compared and tested against each other.

This points to two goals for future research. First, studies should connect each and every activity in a supply chain instead of treating them as separate. Second, whenever possible, the results should be measured against real and measured data instead of relying on opinions and surveys. This does not mean that the new area of study like AI should be avoided, it should just be proved by comparing already existing data.

6. CONCLUSION

The biggest change among the 374 papers does not lie merely in the number of publications but in the wider range of research areas. In the past the studies had concentrated on a smaller number of topics, whereas more recent research is increasingly linking sustainability with optimisation, digital technologies, electric vehicles, organisational performance and sustainability. By 2026 two main trends can be seen. The first deals with practical matters such as routing, fleet selection and emission reduction, while the second is concerned with emerging technologies such as artificial intelligence and blockchain.

The main academic value of this review lies in the fact that it gives an up-to-date account of this area of study. Although Tetteh et al. (2024) had previously shown that green logistics is a major field of research, their search came to an end in 2024. By incorporating more recent literature it is now possible to follow the further development of the field. The results indicate that the existing sustainability themes have not been abandoned; on the contrary, they are becoming more closely combined with specialised research into optimisation and digital technologies.

A significant research gap still exists. Although technical research is progressing quickly, especially in the fields of optimisation, artificial intelligence, and routing, work is also being carried out on organisational behaviour and consumer responses as well as on policy. Nevertheless, these different areas are not always adequately linked. It is possible for an optimisation model to show that a given solution is technically efficient, but this does not mean that firms will be able to put it into practice, what consumers might do in response, or how regulation might affect it. Research in the future should therefore take a more careful look at both technical and behavioural aspects.

The results also have important consequences for managers since the various aspects relating to routes, vehicles, charging arrangements and service levels are interconnected and a change in one part of the logistics network can have an effect on the other parts (Comi & Idone, 2026; Mamaghani & Battaia, 2026a). Sustainability can therefore be more effectively achieved when environmental factors are included in the current planning processes together with cost, capacity and service rather than being considered only as a matter for reporting.

The literature also shows that simply improving algorithms does not always result in better logistics decisions; reliable data, accurate forecasting and strong organisational capabilities are still necessary. In practice, a simpler approach backed by reliable data can be more useful than a complicated system which a company is unable to implement effectively. This is especially important in view of the growing use of AI and other advanced technologies in logistics.

People are also becoming more important as home delivery and the possibility of returning goods online bring logistical decisions nearer to the point when consumers make their choices. Recent studies have increasingly linked green logistics with business and supply-chain performance indicators (Emon & Khan, 2026; Nguyen-Huynh-Thanh & Nhu-Mai, 2026). There is thus a dilemma since the quickest or most convenient method of delivery might not be the one that causes the least pollution. Green logistics therefore goes beyond internal operational decisions and has to take into account customer and stakeholder expectations.

The issues involved in policy are just as complicated. Research concerning the ASEAN economies has linked logistics and green logistics performance to export activities while at the same time pointing out the problems that arise when trading partners have different environmental standards. Environmental regulation can thus have an impact on both sustainability results and on a company's competitiveness in trade. Sustainability disclosure is also becoming more formally incorporated into the EU's framework, with changes anticipated in 2026, an indication of the efforts being made to balance the value of environmental information against the costs of producing it (Anagnostopoulou, 2025). This situation is pertinent to logistics companies since the reporting requirements can affect their environmental actions and investment decisions.

Other limitations should also be taken into account. The first of these is that the search was carried out on ScienceDirect and as a result publications relevant to this database have not been included. The second point is that even though the same inclusion criteria were used at every stage of the screening process, the decisions regarding the titles and abstracts were not independently checked by a second reviewer.

Another limitation relates to bibliometric mapping, since different authors often use different terms to describe similar concepts. For instance, 'Green supply chain management' and 'GSCM' might refer to the same concept but are shown as distinct keywords. A number of adjustments to the search and export processes were also necessary in order to obtain metadata that was sufficiently complete. Although these limitations do not necessarily diminish the value of the findings, they do affect their generalisability. For this reason, the analysis should be seen as an approximation of the green logistics scholarship identified by the search employed, rather than as a full representation of the entire field.

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