

Sustainability of Air Logistics: A Bibliometric Analysis

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Corresponding Author: Selvi Vural**RESEARCH ARTICLE**<https://doi.org/10.30518/jav.1534869>**Abstract**

The aim of this study is to identify the gap in the literature based on past research on the sustainability of air logistics and to guide new research in this context. In this research, bibliometric analysis method was used. In this context, firstly the studies were extracted from the WOS (Web of Science) database. Later, it was analysed with the Vosviewer program and studies on the sustainability of air logistics were examined in detail to direct future research. As a result of the bibliometric analysis on the sustainability of air logistics, it was determined that there were 146 studies between 1985-2024. The vast majority of these were in English and in the Proceeding Paper type. Most studies belong to the field of science, and the share of research in the social sciences in the total is quite low. In terms of research categories, research specific to the fields of engineering and management is common. This research which aims to provide a comprehensive perspective on the sustainability of air logistics by capturing the relationship between its past and future, is a first in the literature and is believed to contribute theoretically and practically.

1. Introduction

In recent years, while discussions about climate change and the global climate crisis have decreased, the issue of how close we are to a point of no return for these changes has become more prominent. Many researchers point out that humanity may be preparing for its own end in this process, and state that one of the most important reasons for this is the increase in carbon dioxide emissions, and that this increase is largely due to the influence of humans (Issa & In'airat, 2024). For this reason, interest in the concept of sustainability among societies, states and businesses is increasing day by day, and policies and strategies developed in this direction are being discussed. Although human needs diversify and increase due to various reasons such as population growth, urbanization and internal migration, "sustainability" has become one of the most frequently mentioned concepts today, where resources are gradually decreasing, polluted and even disappearing. Sustainability is a concept that expresses the ability to be permanent and emphasizes the necessity of relationships in various fields to be in harmony (Lozano & Barreiro-Gen, 2023).

According to Meuer et al. (2020), with globalization, many sectors, industries and many businesses operating within this framework are implementing policies, strategies and collaborations within the scope of sustainability. When we look at the historical development of the aviation industry; Liberalization, globalization, commercialization and privatization trends have been the locomotives of the sector. Air logistics is considered an important component of the aviation industry as it has a common denominator in terms of

speed, reliability and punctuality. Air logistics is the efficient transportation of large or small and value-added materials by air, which is generally not possible to transport by road, and has an important place in international trade due to the services it offers (Hryhorak & Šimák, 2020). Especially considering the historical development process of the aviation industry; The development of international trade also contributes to the development of air logistics, and this is a harbinger of the general economy and developments in the sector. Therefore, the existence and continuity of a business in any field is directly related to how much it embraces sustainability in its activities and relationships. In this context, the air logistics sector and the businesses operating under this umbrella are also a part of this sustainability approach. There is a close relationship between the structural sustainability of these businesses and their sustainable activities (Wu & Yang, 2021).

The concept of sustainability is defined by Mahanayak (2024), with a more economic approach, as "meeting today's needs without jeopardizing the ability of future generations to meet their needs." In other words, this approach, which emphasizes that the needs of future generations should not be ignored while meeting the needs of today's generations, requires businesses to take a more foresighted and proactive approach. Establishing the correct relationship between the past and the future is an important part of being a sustainable business and gaining competitive advantage. In the light of this information, it would be appropriate to examine the sustainability of air logistics, which is an important part of the air transportation system in the aviation sector, with the bibliometric analysis method in terms of the analysis of past research and the direction of future research.

When the relevant literature is examined, it is seen that air logistics has been analyzed using bibliometric methods in a study conducted by Ertugut and Altinkurt (2021). However, that study primarily focused on the concept of air cargo and did not provide a comprehensive and sustainability-oriented analysis of the broader air logistics framework. Therefore, it is evident that further research is needed to address this gap. Especially in recent years, the existence and continuity of businesses have been increasingly linked to sustainability efforts. Organizations in the air transportation sector have also started to prioritize sustainability in various operational and strategic activities. In this context, the present study, which focuses on the sustainability of air logistics businesses as a key component of the air transportation system, is significant in terms of both its academic contribution and its potential relevance for practitioners. Despite increasing global attention to sustainability in air transportation, academic literature still lacks focused and interdisciplinary bibliometric analyses on sustainable air logistics. This study aims to contribute to the field by identifying thematic and structural patterns in literature and by uncovering research gaps that can guide future interdisciplinary work.

2. Literature Review

2.1. Air Logistics

Logistics is a concept that has depth and diversity, both etymologically and depending on its areas of use. If we consider this concept under the umbrella of social sciences and organizational research, logistics takes place within a series of management planning (service, material, information and capital flow) in a business. It means that the right thing is at the right place and time, or in other words, where it should be according to spatial and temporal criteria (Cooper et al., 1997). Logistics is a systematic process that consists of a series of activities and needs to be managed. Logistics is a phase of the supply chain phenomenon that carries out and supervises planning for the effective and efficient flow and storage of goods, services or related information, from production to the end user at the point of consumption, in order to meet customer needs in a global and widespread sense (Hashmi, 2023). Therefore, since logistics is a system and consists of many components connected to it, it is difficult to define it as a single concept or variable. Under the umbrella of management science, addressing businesses with an open system approach and emphasizing that resources or activities are an art of management are also inclusive in terms of logistics. For this reason, logistics is important on the basis and specifically of the transportation activity carried out.

Air logistics means ensuring the safe forward and backward flow of the product or service in the supply chain, considering the wishes, needs and expectations of customers while carrying out air transportation activities. The main emphasis of air logistics is on speed, safety and punctuality (Gritsenko & Karpun, 2020). Today, air logistics is a component of modern logistics and an important part of the volume of development in international trade. There is a principle of mutual dependence between international trade and air logistics due to the open system approach. The development of international trade improves air logistics, and the developments in the air logistics sector improve the overall economy and increase the international trade dynamics. In addition, air logistics connects world markets and provides coordination between supply chains (Ferencová & Hurná, 2017).

According to Paraschi (2022), one of the sectors where logistics transportation has made great and significant developments or progress, especially in recent years, is air or

airline transportation. An important reason for this is that one third of the world's trade is carried out by air transportation, as it is a fast and safe mode of transportation, especially in long ranges. Regarding air transportation, in which high value products are transported, as it is a very safe type of transportation compared to other transportation modes; In the forecasts made until 2024; It is expected that the world economy will grow by an average of 2.9% per year, the number of world airline passengers will grow by an average of 4.8% per year, and the world air cargo transportation will grow by an average of 6.2% per year.

Air logistics focuses largely on customer-oriented activities, and to reduce customer costs, extra services such as supply, design, storage, export, import and distribution are offered in an integrated manner, as well as the transportation of products (Liu et al., 2017). However, the reasons why air logistics are generally preferred include the presence of very large shipments that cannot be transported by road and the transportation of heavy items in a safe and fast, effective and efficient manner. With increasing international trade activities and borders becoming invisible in the future, customers will continue to desire to reach their orders as soon as possible and senders will continue to provide the fastest, safest, most secure and high frequency transportation service to meet customers' demands (Gazi, 2024).

In the light of this information, it is believed that the air logistics sector will maintain its current share in logistics activities and even increase this share exponentially in the following years. The art and skill of managing the resources and activities of the air logistics sector is an indicator of its effectiveness and efficiency (Rahman et al., 2024; Mızrak, 2024). Ultimately, this refers to the importance of both the sustainability of current activities in a narrow sense and the sustainability of its visibility and power in international trade and the world economy in a more comprehensive approach. For this reason, the issue of sustainability of air logistics attracts significant attention and the future direction of the sector arouses curiosity.

2.2. Sustainability

The term sustainability has a differentiation from past to present in terms of approach, context and origin, and in its simplest form, it emphasizes a livable world that today's people can leave to the future or future generations (Gatto, 1995; Mahanayak, 2024). Accordingly, it is based on considering the impact on the environment on all actions or activities carried out by people and managing them in an appropriate, proper and stable (sustainable) manner. The first definition of the phenomenon of sustainability was made by the United Nations Environment and Development Commission in 1987. This report, called *Our Common Future* by the relevant commission, both places responsibility on states and institutions/organizations to evaluate their activities in terms of environmental, economic and social aspects, and offers an opportunity to explain the concept of sustainability with concrete data.

The concept of sustainability is considered in economic terms as "meeting today's needs without jeopardizing the ability of future generations to meet their needs" (WCED, 1987). In other words, it is argued that the vital continuity of future generations and all humanity should be considered when meeting today's needs. In this context, the vital continuity pattern in question does not actually depend on a single component or variable but is addressed with a multidimensional approach. The vital continuity or sustainability of future generations depends on three elements: environmental, economic and social. Among these, the

literature focuses on environmental sustainability, economic sustainability, and lastly, to a lesser extent, social sustainability (Purnamawati et al., 2023; Nguyen & Kanbach, 2024).

As stated by Knezevic Cvelbar et al. (2024), environmental sustainability is today seen as an important part of sustainable development and as a significant element based on competition, responsibility and legitimacy on behalf of businesses along with stakeholder groups such as employees, customers and the social environment. As a matter of fact, all activities carried out by human hands or under supervision have a great impact on the protection of the environment and the sustainable use of natural resources. Failure to use natural resources appropriately or properly reveals a violation of sustainable use principles and a violation of environmental sustainability. In fact, the concept of sustainability was born at this point, and for many years the problems caused by environmental destruction and violations, and the solution proposals developed for this issue have been emphasized (Bateh et al., 2013).

However, it is true that the fundamental condition of sustainability is the harmonious relationship between humans and nature, otherwise, if this situation is ignored, possible negativity (rapid depletion of natural resources or uncontrolled resource consumption, environmental destruction and lack of planning and protection, etc.) are inevitable (De Giacomo & Bleischwitz, 2020). Environmental sustainability balances the protection of natural ecosystems and meeting human needs. It is advocated that people and nature can co-exist and that not only environmental but also social and economic conditions that enable meeting the needs of future generations should be created or maintained. At the same time, the aim is to leave a sustainable world to future generations by reducing the environmental impacts of economic and social development (Busch et al., 2024).

According to Amrutha and Geetha (2020), social sustainability is a concept that emphasizes the necessity of developing both human and social capital. It is generally based on the necessity of preserving existing talent for the sake of the integrity of society and the achievement of goals. At this point, it is essential to ensure that personal needs are met within society based on the human subject. In the conceptual framework, social sustainability refers to the social values that determine a society's vision plans and the level of their realization; It reveals its approach to social identity, relationships and institutions. While human capital describes the characteristics of employees as stakeholders and the individual aspects of relevant partnerships, social capital reveals the nature of organizations that serve society, such as a successful education system, infrastructure and promotion of entrepreneurship (Mani et al., 2020). In other words, if a business is socially sustainable, it can protect and grow its social capital if it supports both the capital of its stakeholders and its social goals.

Finally, as stated by Dyllick & Hockerts (2002), the social acceptability or legitimacy of a business increases thanks to its stakeholders being compatible with the goals and values of a socially sustainable business. So, ultimately, it is clear evidence that a business is socially sustainable, as its employees' understanding, compliance and integration with its value perceptions supports the realization of its sustainable activities. This also indicates that a business with a strong social aspect and focus on the skills, motivation and loyalty of its employees can achieve significant economic development and growth.

According to Ruggerio (2021), economic sustainability is an important criterion or determinant of sustainable

development, as in other dimensions of sustainability. In this context, an approach in which recycling-based products are produced and economic strategies focused on social responsibility are adopted, in economic cooperation with the environment, whether at the international or national level, is a requirement of sustainable development. Accordingly, the sustainability of an economic system by Ukpoju et al. (2024) is explained in relation to the fact that it has a basis that will ensure that debts remain at a manageable level, considering the stability in the production process and sectoral imbalances. In addition, it is critical for economic sustainability for businesses to have a structure in which environmental benefits are balanced with economic costs by managing resources such as equity capital, foreign resources and intellectual capital.

While maintaining the economic activities of businesses, protecting or sustainably using natural resources, sparing use of non-renewable resources and switching to the use of renewable resources are important sanctions of economic sustainability (Meuer et al., 2020). This approach, on the one hand, reduces the risk of depletion of natural resources, and on the other hand, helps businesses maintain their long-term economic sustainability. The most ideal sustainable economy model has a criterion that can ensure minimum resource consumption or efficient resource use, minimum ecological impact and maximum general welfare (Chopra et al., 2024). Therefore, the economic sustainability of a business is actually directly related to its consideration of both social and ecological elements. Therefore, taking all these factors into consideration is seen as a guarantee of the welfare and vital continuity of both today and future generations, and all segments of society have great duties to build a sustainable future today.

3. Materials and Methods

This research is carried out to identify the gap in literature based on past research on the sustainability of air logistics using the bibliometric analysis method and to direct new research in this context. Bibliometrics, first defined by Pritchard in 1969, is the application of mathematical and statistical methods to books and other publications (Salinas-Ríos, 2022). Other researchers also define bibliometrics as the application of mathematical and statistical methods to communication tools and books, as well as the quantification of bibliographic information used in analysis and the quantitative study of physically published sources or sources of bibliographic information (Broadus, 1987), or the study of the development process and nature of a discipline and written literature. It is addressed as illuminating communication processes (Hood & Wilson, 2001). However, bibliometric analysis is also the quantitative evaluation of bibliographic material. In this analysis method, the main themes in a specific subject area are determined and the literature is examined extensively (McBurney & Novak, 2002; Kanbur, 2023).

Bibliometrics is a new discipline that guides people who want to conduct research in the mass of scientific knowledge that increases with the development of technology. Bibliometric analysis, on the other hand, is a type of analysis aimed at comparing and classifying concepts rather than comparing researchers (Castillo-Vergara et al., 2018). This method provides a visual depiction of a research field by classifying articles, authors and journals (Donthu et al., 2021). At the same time, text mining applications are used for purposes such as obtaining data such as authors, institutions, journals, keywords and citations to network or map a certain subject or field, and to reveal aspects of the research that may be important in the future (CheshmehSohrabi & Mashhadi,

2022). With these techniques used, analysis techniques have emerged such as analyzing the contributions of a country, institution or an author, determining the contribution of the publications to the scientific field, and determining the number of citations to a source in the same publication (Lim & Kumar, 2024).

There are two approaches in this analysis method: performance analysis and scientific mapping. While the performance analysis approach focuses on the citation-based impact of publications, scientific mapping analysis aims to examine the conceptual structure of publications through scientific mapping (Bota-Avram, 2023). There are many databases from which the data needed in bibliometric analysis can be obtained. Among the scientific literature sources, Web of Science, Scopus, CiteSeer, MEDLINE, PubMed and Google Scholar are frequently used databases (AlRyalat et al., 2019; Balogun, 2023; Ortega & Delgado-Quirós, 2024). Citation indexes produced by Thomson Reuters, Web of Science, Science Citation Index (SCI) and Elsevier's Scopus, are frequently used databases in bibliometric research for reasons such as providing detailed information about the articles they contain, covering publications in many disciplines, and indexing prominent international peer-reviewed journals (Cabeza et al., 2020).

There is various software used to analyze the data obtained from these databases. Software such as Science of Science (Sci2) Tool, Bibexcel, CiteSpace II, Network Workbench Tool, IN-SPIRE, CoPalRed, Leydesdorff's Software, R, VantagePoint and VOSViewer, each of which have different analysis techniques and algorithms, are used for scientific mapping purposes (Kehinde et al., 2023). The VOSviewer program, developed for scientific mapping in bibliometric analysis, is a useful program in terms of its functionality and ability to create large, understandable and easy-to-interpret maps (Cheng et al., 2023). Accordingly, in this research, bibliometric analysis technique, which is a quantitative research method, was used and the Web of Science database, which is frequently used in bibliometric research, was used.

By entering "air logistics and sustainability", "aviation logistics and sustainability", "air logistics businesses and sustainability", "air logistics airports and sustainability" and "air logistics industry and sustainability" in the search section of the database, both words can be combined. The studies were filtered. The current study did not include the word air cargo and other combinations derived with the word air cargo. This was a deliberate methodological choice to focus specifically on "air logistics," which incorporates operational and systems-level logistics strategies beyond just cargo movement. Additionally, the term "air cargo" has been the primary focus of similar bibliometric studies, and our intention was to present a differentiated and complementary perspective.

The main reason for this is that a similar study of the same scope conducted by Erturgut and Altinkurt (2021) was conducted with these words. In addition, although 14 articles related to the subject were found in the Web of Science, it was stated that only 4 of these articles were suitable for use in bibliometric studies for the subject of "air logistics". On the other hand, since the focus of this study was the sustainability of air logistics, only studies within the scope of sustainability were focused on and the research was conducted with the concept of air logistics. Therefore, considering other similar research suggestions and addressing the same subject in different ways can contribute to literature.

All studies have been researched since the first study was conducted without any time limit. As a result, 146 studies (articles, papers, books, article critiques) conducted between 1985-2024 (July 2024) were reached. The articles, papers,

books and article criticism studies obtained after the scanning were evaluated and examined in terms of author, number of citations, field categories, type of study, journal name, indexes, language of publications, institution where they were made and keywords. The data obtained were examined with bibliometric analysis and the VOSviewer program was used for visual mapping. The data was visualized and interpreted in the form of graphs, tables, network maps and density maps. The data obtained within the scope of the study were taken from the Web of Science database, and an ethics committee report was not obtained because the data in this scope did not require ethics committee permission.

4. Result

One of the issues that should be examined in bibliometric analysis is the publication years of the studies. When all studies are examined, it is seen that the first published study within the scope of keywords was conducted in 1985. It is seen that a total of 23 studies were published until 2000 after the first published study. However, this time is not included in the figures and tables below. The tables (see Table 1) below cover the studies published in 2000 and later. It is thought that it would be useful to look at the table below to examine the publication years in more detail.

Table 1. Publication Years

| Publication Years | Record Count | % of 146 |
|-------------------|--------------|----------|
| 2000 | 3 | 2.055 |
| 2001 | 1 | 0.685 |
| 2002 | 2 | 1.370 |
| 2003 | 2 | 1.370 |
| 2004 | 1 | 0.685 |
| 2005 | 2 | 1.370 |
| 2006 | 1 | 0.685 |
| 2007 | 5 | 3.425 |
| 2008 | 2 | 1.370 |
| 2009 | 6 | 4.110 |
| 2010 | 4 | 2.740 |
| 2011 | 6 | 4.110 |
| 2012 | 6 | 4.110 |
| 2013 | 5 | 3.425 |
| 2014 | 6 | 4.110 |
| 2015 | 7 | 4.795 |
| 2016 | 5 | 3.425 |
| 2017 | 9 | 6.164 |
| 2018 | 3 | 2.055 |
| 2019 | 6 | 4.110 |
| 2020 | 8 | 5.479 |
| 2021 | 10 | 6.849 |
| 2022 | 12 | 8.219 |
| 2023 | 10 | 6.849 |
| 2024 | 1 | 0.685 |

When the years in which publications were made are examined in the table (see Table 1), it is seen that the number of publications has increased in recent years. This explains the high ratio in recent years. It is seen that the number of studies conducted in the last five years is 46. The ratio of research to total publications is 31.506%. When the publication average between 2000-2024 is calculated, it is seen that an average of 4.92 studies were published annually. In the last five years, the average rose to 9.2 studies annually. The highest number of studies to date was reached in 2022. 12 studies were published this year, and this number represents a size of 8.219% in the total research.

It is seen that most of the articles found because of the searched keywords are written in English. It is seen that there are articles in Chinese and Russian as well as English, but the number of articles published in these two languages is quite limited compared to English. To address this situation more clearly, it is thought that it will be better understood in the table below with numbers and percentages.

Table 2. Percentage Distribution of Publications by Language

| Languages | Record Count | % of 146 |
|-----------|--------------|----------|
| English | 141 | % 97 |
| Chinese | 3 | % 2 |
| Russian | 2 | % 1 |

The languages of the publications, the number of articles in the language of publication and the total number of articles are given in the table above (see Table 2). In addition, the percentage ratios of the publication languages in the total number of publications are shown in the table. When showing these percentage ratios, if the number after the decimal point is greater than 500, it is rounded up to the next higher number, if it is smaller, it is rounded down to the next lower number to provide whole numbers. Accordingly, 141 articles were published in English in the context of keywords, and this number constitutes 97% of all published articles in total. Three articles were published in the other language, Chinese, and this number corresponds to 2% of the total number. It is seen that 2 articles were published in the other language, Russian, and this number corresponds to 1% of the total published articles.

In addition to the languages of the studies, the institutions that the researchers are affiliated with are also important. The institutions to which the researchers are affiliated, and the number of their publications are given in the table. It is seen that the researchers who published the most within the scope of keywords are the “United States Department of Defense” institution with 16 publications. It is seen that this institution is followed by the “United States Air Force” institution with 13 publications. It was determined that publishers from 185 different institutions published in total. However, the figure includes the first 25 institutions that contributed the most publications. It would be more explanatory to present the institutions whose publications were determined within the scope of keywords together with the number of publications on a table. The tabulated form of the institutions according to the number of publications is given below (see Table 3).

Table 3. Institutions to Which Researchers Are Affiliated and Percentage Share of Publications

| Affiliated Institution | Record Count | % of 146 |
|--|--------------|----------|
| United States Department of Defense | 16 | % 10.959 |
| United States Air Force | 13 | % 8.904 |
| Shanghai University of Engineering Science | 7 | % 4.795 |
| Us Air Force Research Laboratory | 5 | %3.425 |
| Battelle Memorial Institute | 4 | %2.740 |
| General Electric | 4 | %2.740 |
| University of Texas Austin | 4 | %2.740 |
| University of Texas System | 4 | %2.740 |
| Civil Aviation Flight University of China | 3 | %2.055 |
| Civil Aviation University of China | 3 | %2.055 |
| Guilin University of Aerospace Technology | 3 | %2.055 |
| Other | 43 | % 28.764 |

The above table shows the institutions where the publications were made, the number of publications made in these institutions, and the percentage share of the publications made in these institutions in total. It has been determined that a total of 185 different institutions contributed to the publications within the scope of the keywords.

The first 25 institutions with the highest rate are shown in the table. Among these institutions, it is seen that the most publications were made by the “United States Department of Defense” with 16 publications. 10.959% of the total number of articles were made by the authors working in this institution. The “United States Air Force” institution is in second place with 13 publications. 8.904% of the total number of articles were made by the authors working in this institution.

Another institution with the highest number of articles is the “Shanghai University of Engineering Science” with 7 article contributions. 4.795% of the total number of articles were made by the authors of this institution. It is seen that these three institutions contributed to 24.658% of the publications that emerged within the scope of the keywords. The 43 publications presented under the title “other” in the table constitute 28.764% of the total number of publications. The institutions that produced these publications have tried to contribute to the field with a publication each. In addition to the researchers’ institutions, the journals in which the research is published are also of great importance (see Table 4).

Table 4. Publishers of Studies, Number of Publications and Percentages

| Publication Titles | Record Count | % of 146 |
|--|--------------|----------|
| Advances in Intelligent Systems Research | 4 | %2.740 |
| IEEE Autotestcon | 4 | %2.740 |
| Sustainability | 4 | %2.740 |
| Transportation Research Interdisciplinary Perspectives | 4 | %2.740 |
| Transportation Research Part E Logistics and Transportation Review | 4 | %2.740 |
| Advances in Social Science Education and Humanities Research | 3 | %2.055 |
| IEEE Aerospace Conference Proceedings | 3 | %2.055 |
| Nasa Conference Publication | 3 | %2.055 |
| Proceedings of The Society of Photo Optical Instrumentation Engineers Spie | 3 | %2.055 |
| Second Aerospace Environmental Technology Conference | 3 | %2.055 |
| 2005 IEEE Aerospace Conference Vols 1 4 | 2 | %1.370 |
| 2008 IEEE Autotestcon Vols 1 And 2 | 2 | %1.370 |
| Asian Journal of Shipping and Logistics | 2 | %1.370 |
| Cockpit Displays IV Flat Panel Displays for Defense Applications | 2 | %1.370 |
| Construction And Building Materials | 2 | %1.370 |
| Faim 2021 | 2 | %1.370 |
| International Sampe Technical Conference Series | 2 | %1.370 |
| Izvestiya Instituta Matematiki I Informatiki Udmurtskogo Gosudarstvennogo Universiteta | 2 | %1.370 |
| Journal of Turbomachinery Transactions of The Asme | 2 | %1.370 |
| Lecture Notes in Computer Science | 2 | %1.370 |
| Procedia Manufacturing | 2 | %1.370 |
| Proceedings of Spie | 2 | %1.370 |
| Review of Progress in Quantitative Nondestructive Evaluation | 2 | %1.370 |
| 2007 1st Annual IEEE Systems Conference | 1 | %0.685 |
| 2007 IEEE Aerospace Conference Vols 1 9 | 1 | %0.685 |
| Other | 84 | % 59.585 |

The table above shows that a publisher publishes a maximum of four studies. Five different publishers published four studies each, and this number constitutes 10.96% of the total number of publications. These publishers are listed as “Advances in Intelligent Systems Research”, “IEEE Autotestcon”, “Sustainability”, “Transportation Research Interdisciplinary Perspectives” and “Transportation Research Part E Logistics and Transportation Review”. When the publications are examined within the scope of keywords, it is seen that the five publishers that published the most studies published three studies each. It is striking that the percentage ratio of these three studies in total is 10.275%. The following 13 publishers contributed 17.81% to the total number of publications with two publications each. All other publishers other than these publishers published only one study each. The share of the publishers who published one study each in the total publication was 60.955%.

The types of these published studies also vary. The distribution may vary according to different types of studies, such as articles, book chapters or conference proceedings. The table below (see Table 5) examines the types and distribution of studies.

Table 5. Document (Publication) Types

| Document Types | Record Count | % of 146 |
|-----------------------|--------------|----------|
| Proceeding Paper | 75 | 51.370 |
| Article | 64 | 43.836 |
| Correction | 3 | 2.055 |
| Book Chapters | 2 | 1.370 |
| Book Review | 2 | 1.370 |
| Editorial Material | 1 | 0.685 |
| Meeting Abstract | 1 | 0.685 |
| Retracted Publication | 1 | 0.685 |
| Review Article | 1 | 0.685 |

As seen in the table above, nine different types of research have been published within the scope of keywords. The largest proportion among these studies was the Proceeding Paper type with 75 studies. The percentage rate of Proceeding Papers among the total number of publications was 51,370. This rate corresponds to more than half of all studies.

Proceeding Paper is the name given to journal articles that were first presented at a conference and then adapted to be published in a journal in the WoS database in 2008 (González-Albo & Maria Bordons, 2011). It is seen that the most produced research type after Proceeding Paper is Article. It is seen that the number of Articles is 64 among the total studies and the percentage rate is 43.836%. This rate is considerably higher than other research types. Other research types are distributed as Correction, Book Chapters, Book Review, Editorial Material, Meeting Abstract, Retracted Publication and Review Article, and it is seen that 11 studies were conducted in these types. The ratio of these studies to total studies corresponds to 7.535%.

It has been determined that the research or publications conducted were scanned in seven different indexes. These indexes are seen to be “Conference Proceedings Citation Index – Science (CPCI-S)”, “Science Citation Index Expanded (SCI-EXPANDED)”, “Social Sciences Citation Index (SSCI)”, “Conference Proceedings Citation Index – Social Science & Humanities (CPCI-SSH)”, “Emerging Sources Citation Index (ESCI)”, “Arts & Humanities Citation Index (A&HCI)” and “Book Citation Index – Social Sciences & Humanities (BKCI-SSH)”, respectively. Among these indexes, the most research was published in the CPCI-S index, while the least research was published in the BKCI-SSH index. The number of articles published in the indexes and the percentages of these numbers

in total are presented in more detail in the table below (see Table 6).

Table 6. Web of Science Index

| Web of Science Index | Record Count | % of 146 |
|--|--------------|----------|
| Conference Proceedings Citation Index – Science (CPCI-S) | 64 | 43.836 |
| Science Citation Index Expanded (SCI-EXPANDED) | 49 | 33.562 |
| Social Sciences Citation Index (SSCI) | 19 | 13.014 |
| Conference Proceedings Citation Index – Social Science & Humanities (CPCI-SSH) | 17 | 11.644 |
| Emerging Sources Citation Index (ESCI) | 13 | 8.904 |
| Arts & Humanities Citation Index (A&HCI) | 2 | 1.370 |
| Book Citation Index – Social Sciences & Humanities (BKCI-SSH) | 2 | 1.370 |

In the table above showing Web of Science indexes, CPCI-S, where 64 studies were published, ranks first among all indexes with a contribution of 43.836%. It is seen that 49 studies were published in the SCI-EXPANDED index that follows. This index has a size of 33.562% of the total number of studies.

In the SSCI index, 19 studies were published and this number contributed 13.014% of the total published studies. A large part of the total number of studies was published in these three indexes. In the CPCI-SSH, ESCI, A&HCI and BKCI-SSH indexes, where relatively fewer studies were published, 34 studies were published, and this number had a share of 23.288% in the total.

After examining the Web of Science indexes, it is also important to examine the research categories. The Web of Science categories are divided into many titles and some studies can be classified under a single category while others can be included in the subject of more than one category. In this study, the first 25 categories that are covered by most research are discussed and detailed explanations about these categories are shown in the table (see Table 7).

Table 7. Category Classifications of Studies

| Web of Science Index | Record Count | % of 146 |
|--|--------------|----------|
| Engineering Electrical Electronic | 18 | 12.329 |
| Engineering Aerospace | 17 | 11.644 |
| Operations Research Management Science | 15 | 10.274 |
| Transportation Management | 15 | 10.274 |
| Engineering Civil | 13 | 8.904 |
| Materials Science Multidisciplinary | 12 | 8.219 |
| Environmental Sciences | 12 | 8.219 |
| Economics | 11 | 7.534 |
| | 10 | 6.849 |

As seen in the table above, 18 studies were published in the Engineering Electrical Electronic category, and these studies represent a size of 12.329% of the total. The Engineering Aerospace category is in second place. 17 studies were published in this category, and this proportionally constitutes a percentage of 11.644% of the total. Table 7 includes only the first eight studies. When all 25 studies included in the analysis are examined, it is noteworthy that 17 studies belong to the science categories and 8 categories belong to the social sciences.

When the figure above is examined, it is determined that the concepts of “development”, “aviation”, “problem”, “analysis”, and “model” are frequently used in the context of keywords addressed within the scope of sustainable logistics. According to the word cloud, six different clusters were formed. There are eight items in the first cluster. These items are aircraft, aviation logistic, industry, challenge, development, opportunity, process, and research. The second cluster consists of seven items. These items are airport logistic, algorithm, construction, model, order, paper, and problem.

The third cluster consists of six items. These items are air logistic, article, attention, technology, transportation, and vegetable. The fourth cluster consists of five items. These items are aviation logistic industry, China, competitive, study, and Zhengzhou. The fifth cluster consists of three items; these words are air, carbon, and carbon emission. There are three items in the sixth and last cluster. These items are analysis, feature, and new airport. When each cluster is examined separately, it gives us important clues about sustainable logistics research (see Figure 1).

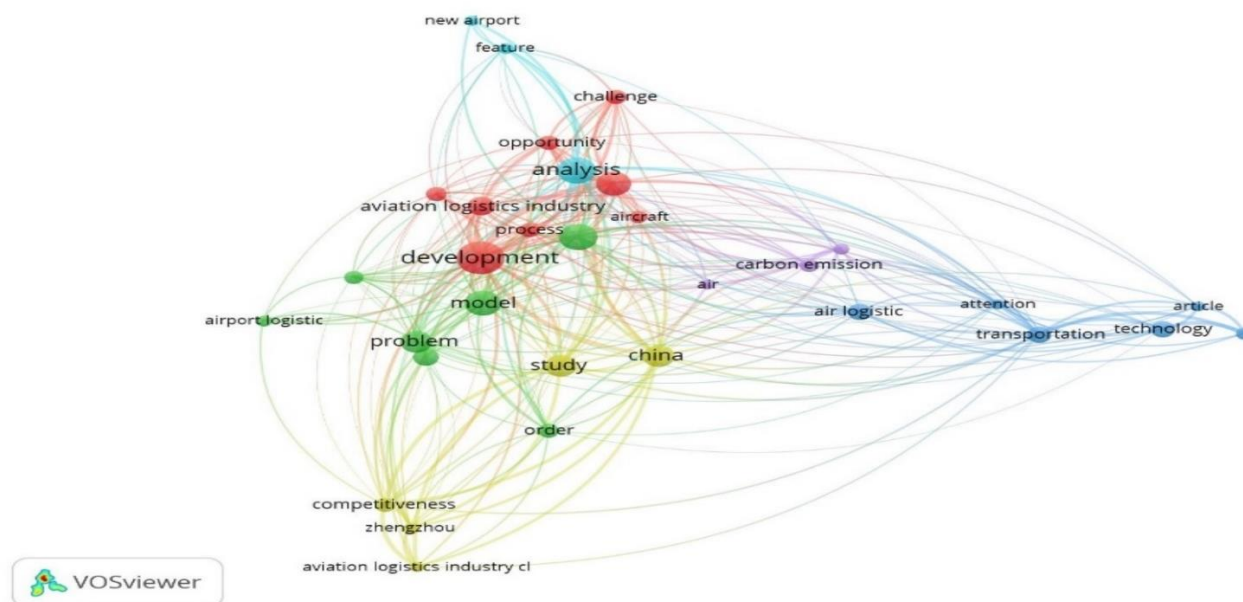


Figure 1. Word Cloud Based on Keyword Co-Occurrence in Air Logistics Sustainability Literature (1985–2024)

The author clustering seen in the figure above shows the authors who are linked within the scope of keywords. It was seen that a total of 374 authors contributed to the 146 studies examined. When we included the number of authors who contributed to a minimum study in the analysis and ran the

program, all authors were listed and 27 authors who had no connection were excluded from the analysis and the program was run again. A connection was established between 13 authors among the 347 authors who had at least one connection (see Figure 2).

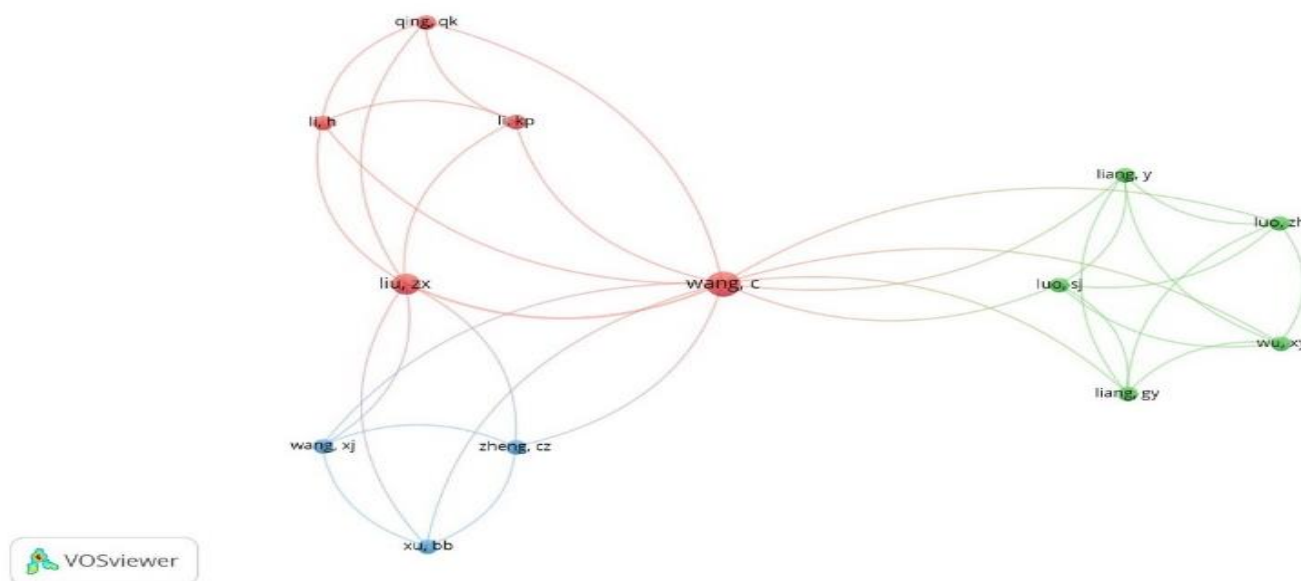


Figure 2. Author Co-authorship Network Based on Keyword-Linked Publications (1985–2024)

When the keywords (see Figure 3) are examined, it is seen that the keywords are gathered in four clusters. Cluster 1 (Blue Cluster) consists of the words air logistics, system, optimization, model. This cluster represents studies on air

logistics, systems and optimization models. This area shows the relationships between the research focusing on the improvement and optimization of air logistics processes.

Cluster 2 (Green Cluster) consists of the keyword's aviation logistics, design, competition, and impact.

This cluster includes studies on aviation logistics, design, competition and its effects. This area reveals the relationships between the research examining the effects of logistics design and competition in the aviation sector. Another cluster, Cluster

3 (Red Cluster), consists of the keyword's logistics, management, demand, airport, air cargo. This cluster includes studies on general logistics management, demand, airports and air cargo. In this area, the relationships between the research on air cargo management and airport logistics are shown.

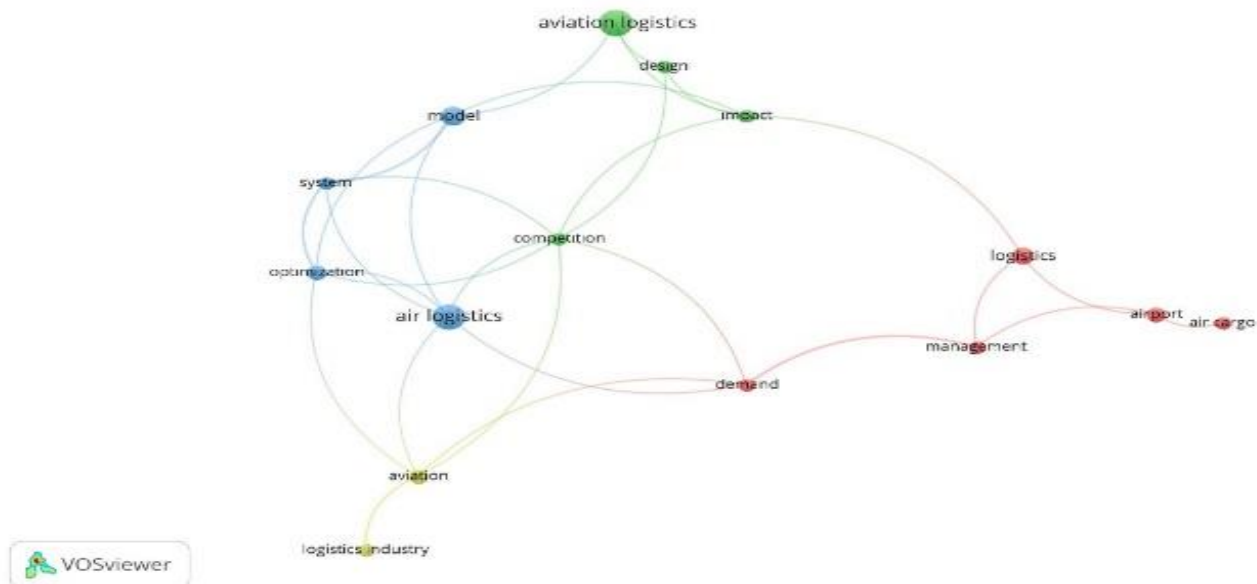


Figure 3. Keywords Co-occurrence Clusters in Sustainable Air Logistics Research

Finally, Cluster 4 (Yellow Cluster) consists of the keywords aviation and logistics industry. This cluster focuses on the general aviation and logistics industry. This area shows the relationships of studies that examine the general status and trends of the logistics industry in the aviation sector.

5. Conclusion

The main purpose of this research is to examine the sustainability of air logistics, which is an important part of the air transportation system in the aviation sector, by analyzing past research and by examining the direction of future research using the bibliometric analysis method. In other words, this research is also carried out with the aim of identifying the gap in literature based on past research on the sustainability of air logistics using the bibliometric analysis method and to guide new research to be conducted in this context. Accordingly, the bibliometric analysis technique, which is one of the quantitative research methods, was used in the research and the Web of Science database, which is frequently used in bibliometric research, was utilized.

A total of 146 studies published between 1985 and 2024(July) were identified using various keyword combinations related to air logistics and sustainability in the Web of Science database. The findings show that interest in this topic has grown significantly, especially after 2000, with a peak in publication volume in 2022. Most studies were published in English, with limited representation in other languages, suggesting a need for broader international engagement. Most publications were categorized under engineering and technical disciplines, with institutions such as the United States Department of Defense and the United States Air Force being the most prolific. This indicates a strong emphasis on military and operational aspects of air logistics sustainability.

Despite the increasing publication volume, research is still concentrated in certain domains. The dominance of proceeding papers and articles points to the field's ongoing development,

while the limited number of book chapters and review articles suggests an opportunity for more comprehensive and integrative works. Similarly, the clustering of keywords around technical themes such as optimization, modeling, and design highlights a gap in research exploring the managerial, regulatory, or policy dimensions of air logistics sustainability.

The analysis also revealed that 374 authors contributed to the body of literature, with only a small fraction engaging in collaborative networks, underlining the need for increased interdisciplinary and international cooperation. Furthermore, the underrepresentation of social sciences (30%) compared to engineering (70%) indicates that future research should more actively incorporate socio-economic, organizational, and environmental policy perspectives.

This study is limited by its reliance on a single academic database (Web of Science) and predefined keyword combinations. It did not include gray literature or publications in languages other than English, Chinese, and Russian. Additionally, the bibliometric approach focuses on quantitative metrics rather than in-depth content analysis, which could provide richer insights into thematic trends and knowledge gaps.

Future studies could adopt content analysis or systematic literature review methods to further explore the conceptual evolution of sustainable air logistics. In this context, researchers are encouraged to investigate a variety of emerging dimensions. These include case-specific or regional applications of sustainable logistics practices, the influence of environmental regulations and carbon emission targets on air logistics strategies, and the integration of human factors, digitalization, and resilience into sustainability frameworks. Moreover, fostering interdisciplinary collaborations among fields such as engineering, social sciences, and policy studies will be essential for developing more holistic and actionable approaches in the pursuit of sustainable air logistics. Such future directions would not only enrich the theoretical landscape but also offer practical insights for industry stakeholders and policymakers.

In conclusion, this study contributes to the field by identifying structural patterns and gaps in the literature, helping to close disciplinary divides, stimulate new lines of research, and offer a roadmap for advancing sustainability in global air logistics.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

References

- AlRyalat, S. A. S., Malkawi, L. W., & Momani, S. M. (2019). Comparing bibliometric analysis using pubmed, scopus, and web of science databases. *JoVE (Journal of Visualized Experiments)*, 152, e58494.
- Amrutha, V. N., & Geetha, S. N. (2020). A systematic review on green human resource management: implications for social sustainability. *Journal of Cleaner Production*, 247, 119131.
- Balogun, J. A. (2023). The fundamentals, misuse and abuses of bibliometrics. in *health research in nigeria: a bibliometric analysis* (pp. 11-56). Singapore: Springer Nature Singapore.
- Bateh, J., Heaton, C., Arbogast, G. W., & Broadbent, A. (2013). Defining sustainability in the business setting. *American Journal of Business Education*, 6(3), 397-400.
- Bota-Avram, C. (2023). Bibliometric analysis of sustainable business performance: where are we going? a science map of the field. *Economic Research-Ekonomska Istraživanja*, 36(1), 2137-2176.
- Broadus, R. N. (1987). Toward a definition of "bibliometrics". *Scientometrics*, 12, 373-379.
- Busch, T., Barnett, M. L., Burritt, R. L., Cashore, B. W., Freeman, R. E., Henriques, I., ... & York, J. (2024). Moving beyond "the" business case: how to make corporate sustainability work. *Business Strategy and The Environment*, 33(2), 776-787.
- Cabeza, L. F., Chàfer, M., & Mata, É. (2020). Comparative analysis of web of science and scopus on the energy efficiency and climate impact of buildings. *Energies*, 13(2), 409-432.
- Castillo-Vergara, M., Alvarez-Marin, A., & Placencio-Hidalgo, D. (2018). A bibliometric analysis of creativity in the field of business economics. *Journal of Business Research*, 85, 1-9.
- Cheng, T. Y., Ho, S. Y. C., Chien, T. W., & Chou, W. (2023). Global research trends in artificial intelligence for critical care with a focus on chord network charts: bibliometric analysis. *Medicine*, 102(38), e35082.
- CheshmehSohrabi, M., & Mashhadi, A. (2023). Using data mining, text mining, and bibliometric techniques to the research trends and gaps in the field of language and linguistics. *Journal of Psycholinguistic Research*, 52(2), 607-630.
- Chopra, R., Agrawal, A., Sharma, G. D., Kallmuenzer, A., & Vasa, L. (2024). Uncovering the organizational, environmental, and socio-economic sustainability of digitization: evidence from existing research. *Review of Managerial Science*, 18(2), 685-709.
- Cooper, M. C., Lambert, D. M., & Pagh, J. D. (1997). Supply chain management: more than a new name for logistics. *The International Journal of Logistics Management*, 8(1), 1-14.
- De Giacomo, M. R., & Bleischwitz, R. (2020). Business models for environmental sustainability: contemporary shortcomings and some perspectives. *Business Strategy and the Environment*, 29(8), 3352-3369.
- Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: an overview and guidelines. *Journal of Business Research*, 133, 285-296.
- Dyllick, T., & Hockerts, K. (2002). Beyond the business case for corporate sustainability. *Business Strategy and The Environment*, 11(2), 130-141.
- Erturgut, R., & Altinkurt, T. (2021). Air logistics: a bibliometric analysis. *Istanbul Gelisim University Journal of Social Sciences*, 8(2), 445-467.
- Ferencová, J., & Hurná, S. (2017). Logistics technologies in aviation. *Acta Logistica*, 4(2), 11-17.
- Gatto, M. (1995). Sustainability: is it a well defined concept?. *Ecological Applications*, 5(4), 1181-1183.
- Gazi, M. S. (2024). Optimizing regional business performance: leveraging business and data analytics in logistics & supply chain management for USA's sustainable growth. *Journal of Business and Management Studies*, 6(2), 144-152.
- González-Albo, B., & Bordons, M. (2011). Articles vs. proceedings papers: do they differ in research relevance and impact? a case study in the library and information science field. *Journal of Informetrics*, 5(3), 369-381.
- Gritsenko, S., & Karpun, O. (2020). Creation of aviation transport and logistic clusters network. *Intellectualization of Logistics and Supply Chain Management*, (2), 7-15.
- Hashmi, R. (2023). Business performance through government policies, green purchasing, and reverse logistics: business performance and green supply chain practices. *South Asian Journal of Operations and Logistics*, 2(1), 1-10.
- Hood, W. W., & Wilson, C. S. (2001). The literature of bibliometrics, scientometrics, and informetrics. *Scientometrics*, 52, 291-314.
- Hryhorak, M., & Šimák, L. (2020). Using the concept of supply chain management in aviation logistics. *Logistics and Transport*, 47, 59-67.
- Issa, A., & In'airat, M. (2024). From words to action: unpacking the real impact of sustainability initiatives on carbon emissions reduction. *Social Responsibility Journal*, 20(3), 585-604.
- Kanbur, E. (2023). Bibliometric analysis of postgraduate theses on civil aviation. *Journal of Aviation*, 7(3), 346-352.
- Kehinde, T. O., Chan, F. T., & Chung, S. H. (2023). Scientometric review and analysis of recent approaches to stock market forecasting: two decades survey. *Expert Systems with Applications*, 213, 119299.
- Knezevic Cvelbar, L., Grün, B., & Dolnicar, S. (2024). Do employees hold the key to environmental sustainability in tourism businesses? empirical evidence from a field study. *Journal of Sustainable Tourism*, 32(2), 245-258.
- Lim, W. M., & Kumar, S. (2024). Guidelines for interpreting the results of bibliometric analysis: a sensemaking approach. *Global Business and Organizational Excellence*, 43(2), 17-26.
- Liu, W., Yang, Y., Wang, S., & Bai, E. (2017). A scheduling model of logistics service supply chain based on the time windows of the flsp's operation and customer

- requirement. *Annals of Operations Research*, 257, 183-206.
- Lozano, R., & Barreiro-Gen, M. (2023). Organisations' contributions to sustainability. an analysis of impacts on the sustainable development goals. *Business Strategy and The Environment*, 32(6), 3371-3382.
- Mahanayak, B. (2024). Meaning and concept of sustainable development for the protection of environment and the role of India. *World Journal of Advanced Research and Reviews*, 22(3), 1460-1465.
- Mani, V., Jabbour, C. J. C., & Mani, K. T. (2020). Supply chain social sustainability in small and medium manufacturing enterprises and firms' performance: empirical evidence from an emerging asian economy. *International Journal of Production Economics*, 227, 107656.
- McBurney, M. K., & Novak, P. L. (2002, September). What is bibliometrics and why should you care?. In *proceedings. IEEE International Professional Communication Conference* (pp. 108-114). IEEE.
- Meuer, J., Koelbel, J., & Hoffmann, V. H. (2020). On the nature of corporate sustainability. *Organization & Environment*, 33(3), 319-341.
- Mızrak, F. (2024). Strategies for sustainable business growth in maritime logistics. In *Trends, Challenges, and Practices in Contemporary Strategic Management* (pp. 108-125). IGI Global.
- Nguyen, H. L., & Kanbach, D. K. (2024). Toward a view of integrating corporate sustainability into strategy: a systematic literature review. *Corporate Social Responsibility and Environmental Management*, 31(2), 962-976.
- Ortega, J. L., & Delgado-Quirós, L. (2024). The indexation of retracted literature in seven principal scholarly databases: a coverage comparison of dimensions, openalex, pubmed, scilit, scopus, the lens and web of science. *Scientometrics*, 1-17.
- Paraschi, E. P. (2022). Current aviation challenges and opportunities. *Journal of Airline Operations and Aviation Management*, 1(2), 7-14.
- Purnamawati, I. G. A., Yuniarta, G. A., & Jie, F. (2023). Strengthening the role of corporate social responsibility in the dimensions of sustainable village economic development. *Heliyon*, 9(4).
- Rahman, N. A. A., Melewar, T. C., Foroudi, P., & Gupta, S. (2024). The role of technology advancement in managing business and establishing corporate brand image: conception, challenges, and commendation in logistics and transport sector. In *Corporate Branding in Logistics and Transportation* (pp. 26-41). Routledge.
- Ruggerio, C. A. (2021). Sustainability and sustainable development: a review of principles and definitions. *Science of The Total Environment*, 786, 147481.
- Salinas-Ríos, K. (2022). Bibliometrics, a useful tool within the field of research. *Journal of Basic and Applied Psychology Research*, 3(6), 9-16.
- Ukpoju, E. A., Adefemi, A., Adegbite, A. O., Balogun, O. D., Obaedo, B. O., & Abatan, A. (2024). A review of sustainable environmental practices and their impact on US economic sustainability. *World Journal of Advanced Research and Reviews*, 21(1), 384-392.
- World Commission on Environment and Development (WCED) (1987) *Our common future*. Oslo, 1987.
- <https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf>
- Wu, P. J., & Yang, C. K. (2021). Sustainable development in aviation logistics: successful drivers and business strategies. *Business Strategy and the Environment*, 30(8), 3763-3771.

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