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Sustainable Supply Chain Management:

A Conceptual Review From Past to Present

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Abstract

Sustainable supply chain management refers to an approach that aims to improve the long-term performance of businesses by integrating their social, environmental and economic objectives. In this context, the aim of this study is to evaluate the researches conducted in the field of sustainable supply chain management from past to present within the framework of keywords and to analyse the development process for the inclusion of these keywords in the studies. This study aims to provide a basis for shedding light on future research directions and identifying study gaps in the field of sustainable supply chain management. For this purpose, a bibliometric analysis was carried out and a total of 418 articles were analysed in the Scopus database between 2006 and 2023. According to the findings, there has been a significant increase in the number of publications in recent years. The most frequent publications were published in India and United Kingdom, and the most articles were published by S. Seuring. Business, Management and Accounting is the field with the highest number of publications. Journal of Cleaner Production is the journal with the highest number of articles. In the analyses made for keywords, the keyword Sustainable Supply Chain Management has the highest trend in recent years. In the analyses made for the future, it is expected that words such as sustainability, circular economy, innovation and industry 4.0 will take place more frequently and it is thought that the field will develop in the focus of these keywords.

Keywords

Supply Chain Management, Sustainable Supply Chain Management, Sustainability, Sustainable Development, Sustainable Supply Chains

INTRODUCTION

Supply chain management (SCM) has been widely recognised worldwide in both research and practice since the 1990s (Fang, Fang, Hu, & Wan, 2022, p. 1). SCM is the process of sourcing, transporting and storing raw materials and merchandise between locations and businesses (Yazdinejad, Rabieinejad, Hasani, & Srivastava, 2023, p. 3389). With SCM, an operation management model that aims to obtain the highest benefit by incurring the least cost of business activities is preferred (Zhang, Yu, & Zhang, 2021, p. 427). When the recent years are examined, SCM systems have started to attract more attention than in the past periods with the increase in demands from consumers and the need to offer good products at lower costs. From a general point of view, SCM focuses on meeting the increasing demand and reducing costs through capacity increases in order to meet customer needs effectively (Mishra, Ratnesh, Tongkachok, Alanya-Beltran, & Kapila, 2023, pp. 2080-2081). SCM uses strategic, tactical and operational decision-making processes to achieve the highest performance. In strategic level applications, supply networks are determined. While plans are made at the tactical level, plans are implemented at the operational level (Fox, Barbuceanu, & Teigen, 2000, p. 165).

SCM implementation and strategy face significant pressures not only to make the system work but also to ensure its sustainability. Recently, some authors have argued that sustainability issues need to be integrated into many aspects of SCM (Beske & Seuring, 2014, p. 322). At the same time, it can be said that there is a significant growing interest in the sustainability-oriented activities of SCM practices in organisations and how they address sustainability (Walker & Jones, 2012, p. 15). The sustainability of supply chain management has an impact on the sustainability goals of corporate organisations (Zhang, Yu, & Zhang, 2021, p. 429). Sustainability has emerged as an important issue, especially across industries, and the United Nations has given great importance to sustainability and set various targets for the sustainability

of businesses at this point (Nisar, et al., 2022, p. 5901). The Brundtland Report (Our Common Future Report) (1987), prepared in this context, emphasised the necessity of sustainable development and drew attention to the necessity of meeting current needs and ensuring that future generations can meet their own needs. For this reason, it is very important to ensure social, environmental and economic balance in terms of organisation (Afghah, Sajadi, Razavi, & Taghizadeh-Yazdi, 2023, p. 5045).

More than one methodology has emerged to integrate sustainability issues with SCM. One of the most prominent terms used to achieve this integration is green supply chain management and the other is SSCM (Ahi, Searcy, & Jaber, 2016, p. 2). The concept of green supply chain management (GSCM) primarily emphasises how SCM can be improved with an environmental focus (Zhu & Sarkis, 2004; Hervani, Helms, & Sarkis, 2005; Diabat & Govindan, 2011). Sustainable supply chain management (SSCM) makes the scope of the concept more comprehensive in terms of economic, social and environmental aspects and addresses the issue from a broader perspective (Gupta & Palsule-Desai, 2011; Wang & Sarkis, 2013; Saberi, Kouhizadeh, Sarkis, & Shen, 2019). At this point, sustainability requires a practice that focuses on the triple responsibility approach (Elkington, 1998), which ensures that a balance of environmental, social and economic dimensions is achieved in the supply chain management process. SSCM consists of the integration of sustainable development with supply chain management, and sustainable development generally influences business strategy and company practices in economic, social and environmental aspects (Adwiyah, Syaukat, Indrawan, & Mulyati, 2023, p. 5).

In SSCM, members in the supply chain are expected to fulfil environmental and social criteria in order not to leave the supply chain and to gain competitive advantage by meeting customer needs and related economic criteria while fulfilling them (Seuring, Sarkis, Müller, & Rao, 2008, p. 1545). By definition, SSCM is defined as "pursuing sustainability goals through the procurement and supply process by combining social, environmental and economic factors". According to this definition, SSCM is defined as minimising the negative impacts of companies in their supply chains and orienting towards environmental and green practices in their activities. In addition, it also requires focusing on social issues such as ensuring that suppliers work under the most favourable conditions and paying attention to the ethical and fair supply of goods in the supply chain process (Walker & Jones, 2012, p. 15). In this respect, SSCM takes into account social dimensions as well as environmental dimensions as a focal point and enables the supply chain to have a more generalisable and holistic perspective (Saberi, Kouhizadeh, Sarkis, & Shen, 2019, p. 2122).

In the light of this information on SSCM, the main purpose of this study is to systematically evaluate the literature in the field of SSCM within the framework of keywords and to analyse the usage and development processes of these keywords over time in detail. This analysis aims to provide a framework for understanding how keywords have been used in research from the past to the present, what conceptual changes have occurred, and what research trends these changes are reflected in. Furthermore, this study aims to provide a guiding resource for researchers by helping to identify future research areas and identifying knowledge gaps in the field of SSCM. For this purpose, some bibliometric analysis techniques were used in the study.

In the literature review on SSCM, although it was found that there are some bibliometric analysis type studies on this subject (Srivastava, 2007; Seuring & Müller, 2008; Fang, Fang, Hu, & Wan, 2022), no study with up-to-date data was found. In addition, the fact that there is no clear data for the determination of future trends based on keywords, which is the focus of this study, reveals the necessity of this study. When bibliometric analysis studies in the field are examined; GSCM (Fahimnia, Sarkis, & Davarzani, 2015; Maditati, Munim, Schramm, & Kummer, 2018), SSCM under big data (Zhang, Yu, & Zhang, 2021), inventory models in SSCM (Salas-Navarro, Serrano-Pájaro, Ospina-Mateus, & Zamora-Musa, 2022), green technologies and SSCM (Yu, et al., 2022) and corporate social responsibility and SCM (Feng, Zhu, & Lai, 2017). For this reason, this study, which includes data on developments in the field of SSCM, current situation and future forecasts, is considered to be an original study with the potential to make significant contributions to the field.

MATERIALS AND METHODS

The aim of this study is to evaluate the researches conducted in the field of SSCM from past to present within the framework of keywords and to analyse the development process for the inclusion of these keywords in the studies. This study aims to provide a basis for shedding light on future research directions and identifying study gaps in the field of SSCM. In line with this purpose, some research questions were sought to be answered within the scope of the study. These research questions are:

RQ1: What are the past and current trends of articles published on SSCM in terms of publication years, countries, authors, subject area and source title?

RQ2: What are the past and current trends of keywords in the articles about SSCM and the identified research gaps?

In order to answer these questions, bibliometric analysis method was used in the study. Bibliometric analysis is a method that involves the use of quantitative tools and techniques to make sense of bibliometric data. Even though it belongs to library sciences as a methodology, it is a method that finds application in various fields of study (Donthu, Kumar, Pandey, & Lim, 2021, p. 2). When the researches are examined, corporate digital responsibility (Bednárová & Serpeninova, 2023), sustainable manufacturing (Bhatt, Ghuman, & Dhir, 2020), Green human resource management (Fachada, Rebelo, Lourenço, Dimas, & Martins, 2022; Choudhary & Datta, 2024), innovation (Chigori, Chinyamurindi, & Rungani, 2024), social media research (Leung, Sun, & Bai, 2017), social sustainability (Contreras & Abid, 2022) corporate social

responsibility and corporate reputation (Li, 2020). Scopus database, which is accepted as one of the most comprehensive and reputable databases, was used to carry out these analyses. This database offers a wide coverage of journals in multiple disciplines and high quality standards (Pham, et al., 2024, p. 3) and peer-reviewed research content (Anglada-Tort & Sanfilippo, 2019, p. 3).

The data search for the analysis was determined by the keywords TITLE ("sustainable supply chain management") AND (EXCLUDE (PUBYEAR, 2024)) AND (LIMIT-TO (DOCTYPE, "article") AND (LIMIT-TO (LANGUAGE, "English") AND (LIMIT-TO (SRCTYPE, "journal")) in the Scopus database. The reason for applying these criteria in the study is to reach a clearer information. Due to these analysis criteria, the data are between the years 2006-2023, and since the analysis was carried out on 25/05/2024, the year 2024 was excluded from the limit, considering the fact that the year does not have the potential to provide complete data. In addition, only the article type was selected, and only articles published in English were included in the analysis dataset. In the last criterion, only journal articles were selected from the articles. After the selection of the criteria, 418 articles related to the subject formed the data set. The data obtained were examined and analysed using Excel, Vosviewer (version 1.6.20) (Van Eck & Waltman, 2010) and R-based "bibliometrix" software (Aria & Cuccurullo, 2017). These software were chosen for their user-friendly interface and attractive visual presentation of the results (Faheem, Nawaz, Ahmed, Haddad, & Al-Ramahi, 2023, p. 5).

RESULTS

The data on SSCM were analysed with two focal points and two research questions. In this context, firstly, the articles were analysed in terms of publication years, countries, authors, subject area and source title in order to answer the question "What are the past and current trends of articles published on SSCM in terms of publication years, countries, authors, subject area and source title?".

In the analyses on SSCM, the distribution of publications by years contains important data to understand the past and current situation. As a result of the analyses, the distribution of 418 studies in total between 2006-2023 according to years is presented in Figure 1. When Figure 1 is analysed, it is observed that there is an upward trend from the past to the current situation. Except for the downward trend in 2015, it can be said that more publications have been reached in all years than the previous year. In addition, while 20 articles were published in total from 2006 to 2011 when the first article was published, 117 articles were published between 2012-2017 and 281 articles were published between 2018-2023. This data indicates that there has been an intensive study on the subject in the last 6 years.

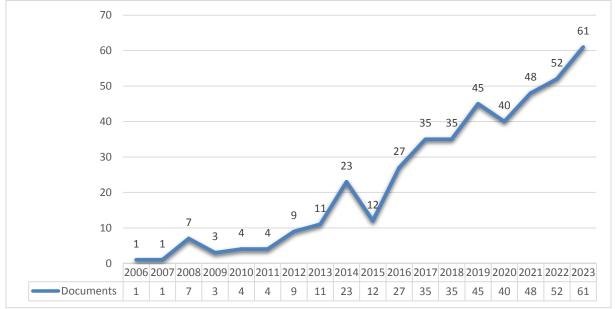


Fig. 1 Number of Articles by Years

Another analysis on the subject is the analysis of the studies based on country, author, subject area and source title. The data obtained from this analysis are given in Table 1.

The findings regarding the data obtained as a result of the analysis of publication trends in the field of SSCM are presented in Table 2. When the country-based distribution of the studies within the scope of the analysis is analysed according to the number of publications, it is determined that the most publications are in India (71), followed by the United Kingdom (57) and China (56). When the number of publications related to the authors was analysed, the author who published the most was identified as S. Seuring. This author has published a total of 13 articles related to the field. M.L. Tseng ranked second with 9 articles, and B. Sarkar and M.K. Lim ranked third with 8 articles each. These authors are recognised as leading researchers in SSCM. Another finding obtained from the same analysis is related to subject areas. According to the results of the analysis for subject areas, it was determined that the highest number of publications was in the field of business, management and accounting (255 articles). Following this finding, environmental sciences ranked second with 143 articles, while 142 articles were published in the field of engineering. According to these findings, SSCM is of great interest among various disciplines and requires a multidimensional approach. The last data

obtained from the same analysis shows the journals in which the articles were published. When these data were analysed, it was determined that the most publications were published in the Journal of Cleaner Production (41 articles). It was found that 36 articles were published in Sustainability Switzerland, 14 articles in Journal of Supply Chain Management and 13 articles in International Journal of Supply Chain Management. These journals can be expressed as an important platform for SSCM research.

Table 2 Top 10 Number of Articles by Variables

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	India	71
Country	United Kingdom	57
	China	56
	United States	54
	Germany	39
	Taiwan	28
	Iran	23
	Malaysia	19
	South Korea	17
	Indonesia	16
Authors	Seuring, S.	13
	Tseng, M.L.	9
	Sarkar, B.	8
	Lim, M.K.	7
	Sarkis, J.	7
	Gold, S.	5
	Krause, D.	5
	Luthra, S.	5
	Pagell, M.	5
	Raut, R.D.	5
Subject Area	Business, Management and Accounting	255
	Environmental Science	143
	Engineering	142
	Decision Sciences	104
	Social Sciences	101
	Energy	96
	Computer Science	86
	Economics, Econometrics and Finance	64
	Mathematics Arts and Humanities	18 9
	Journal Of Cleaner Production	41
Source Title		36
	Sustainability Switzerland Journal Of Supply Chain Management	14
	International Journal Of Supply Chain Management	13
	International Journal Of Supply Chain Management International Journal Of Production Economics	12
	International Journal Of Supply Chain Management	10
	Supply Chain Management	10
	Business Strategy And The Environment	9
	International Journal Of Logistics Research And Applications	
	Resources Conservation And Recycling	6
<u>C</u>	a: Scopus Databasa	

Source: Scopus Database

After analysing the data on SSCM in terms of publication year, countries, authors, subject area and source title, the second research question, "What are the past and current trends of the keywords in the articles about SSCM and the identified research gaps?" In order to answer the question, past and current trends were determined by different analyses such as trends among keywords, co-occurrence analyses of keywords in different periods and keyword analyses by time, and future trends were tried to be determined by using the findings obtained.

The first analysis performed for the keywords used by the articles prepared in the field of SSCM is to determine the trend directions from past to present. In this context, the findings obtained through the Bibliometrix programme are given in Figure 2.

Trend Topics

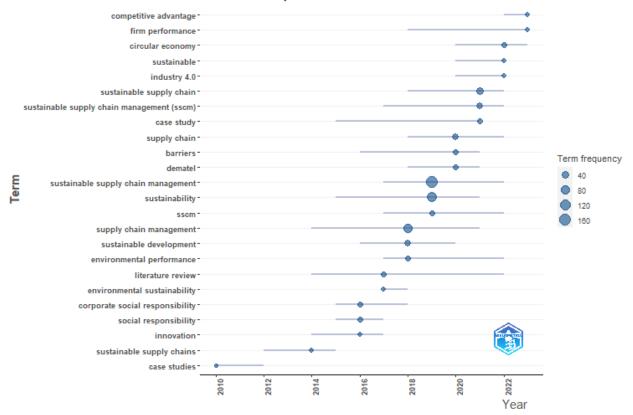


Fig. 2 Trend Topics on Sustainable Supply Chain Management (*Source*: Bibliometrix programme)

When Figure 2 is analysed, the trend lines of keywords over time can be identified. In this context, in terms of the change of the most frequently used words over time, it was determined that while there was an interest in words such as Case studies and Sustainable supply chains in the 2010s, the interest in the words innovation, social responsibility, corporate social responsibility sustainable development and supply chain management has shifted since 2014. Since 2018, interest has shifted to the words environmental sustainability, sustainable supply chain management, SSCM, supply chain. When the years 2020-2022 and beyond are analysed, it is determined that the interest is directed towards the words industry 4.0, sustainable, circular economy, firm performance and competitive advantage. When the same figure is analysed in terms of intensity, it is determined that the most intensively used word between 2017-2022 is the word sustainable supply chain management. The word circular economy is one of the fastest growing terms and its prevalence has increased rapidly, especially since 2020. This finding shows that circular economy is of great interest in the field of sustainability. The term Industry 4.0 has also been identified as a term that has gained popularity since 2020, just like the term circular economy. This finding emphasises the relationship between supply chain and digitalisation and automation. In addition, the term supply chain management has become widespread steadily over time. However, the fact that sustainability-oriented supply chain management has gained a remarkable momentum.

Another analysis is to determine the frequency of the words over time. The findings obtained in this context are presented in Figure 3.

When Figure 3 is examined, the frequency of keywords between 2007 and 2023 is visualised. In this context, the keyword SSCM presents a continuously increasing trend from 2007 to 2023. The keyword sustainability also shows a continuously increasing trend from 2007 to 2023, with a faster increase from 2016, and the keyword circular economy similarly shows a faster increase after 2018. Although the keyword supply chain management shows an increase until 2021, it presents a limited increase in the recent period.

Another analysis of the keywords used by the articles prepared in the field of SSCM was carried out through the Voswiever programme to determine the co-occurrence of keywords. The findings obtained from this analysis are presented in Figure 4.

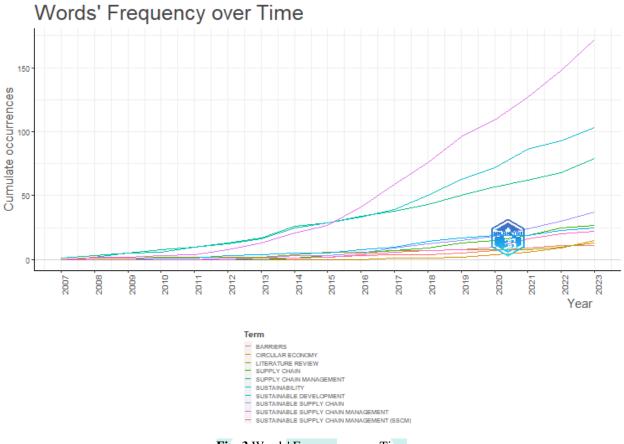


Fig. 3 Words' Frequency over Time

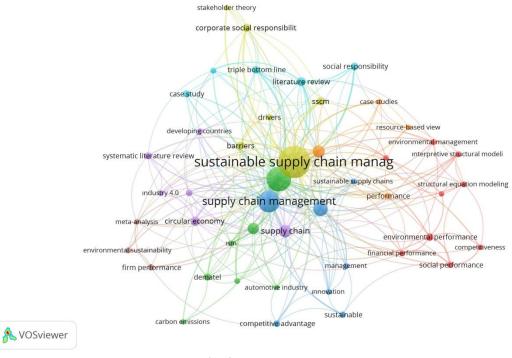


Fig. 4 Co-occurence Author Keywords

Figure 4 data consists of 47 keywords that co-occur in at least 5 different places out of 1132 keywords. In this context, the keywords with the highest number of co-occurrences are sustainability (162), sustainable supply chain management (156), supply chain management (113) and supply shain (48). The data obtained indicate that these keywords are intensively included in the studies. The density map created using the same data is also presented in Figure 5.

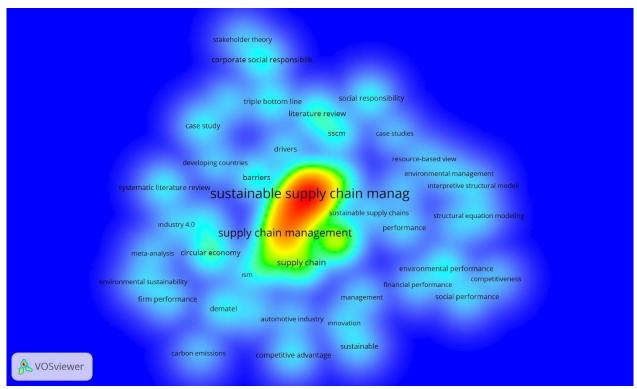


Fig. 5 Density Visualization of Keywords

In the density map presented in Figure 5, the areas shown in blue indicate the areas with very low interest, the areas shown in green indicate the areas with some interest, the areas shown in yellow indicate the areas with a higher interest, and the areas shown in red indicate the areas with the highest interest. In the light of this information, the keywords sustainable supply chain management and supply chain management are in the area with the highest interest. In addition to these keywords, it has been determined that more sustainability-oriented words such as circular economy, firm performance, environmental sustainability, triple bottom line, coreporate social responsibility are words of moderate interest.

Future Directions and Trends in Sustainable Supply Chain Management

Recently, businesses have been focusing more on their environmental and social responsibilities. In this context, SSCM is at the centre of businesses' efforts to integrate sustainability goals into their supply chain processes. The findings obtained from the analyses contain important data on identifying important future directions and trends in the field of SSCM. In the light of the data obtained from the analyses conducted in this context, the importance of the terms and time periods frequently used in the first analysis was emphasised. The findings obtained from the analyses show that the concept of SSCM has gained significant popularity in recent years and its frequency of use has increased. Similarly, the term sustainability has also been increasingly emphasised. The increased use of these terms indicates a focus on the increasing efforts of businesses to reduce environmental and social impacts. In the continuation of the analysis, the usage trends of the terms related to SSCM over time were analysed. The analyses revealed that the concept of SSCM and other sustainability-oriented terms show a continuously increasing trend over time. This situation shows that the interest of enterprises in sustainability issues has increased and they are making more efforts in this field. Within the scope of the same analysis, time trend analyses for keywords conducted to identify future trends in the field indicate that sustainability-oriented approaches and circular economy practices are expected to gain more importance in the field of SSCM in the coming years. Circular economy, as a concept that leads industrial systems to become a restorative structure, is seen as an important development in gaining competitive advantage (Genovese, Acquaye, Figueroa, & Koh, 2017, p. 344). The promotion of innovation and the integration of Industry 4.0-oriented digital technologies into supply chain management are also among the important future trends. It can be said that innovation and Industry 4.0 development are effective in the field of SSCM in terms of developments such as the positive effects of Industry 4.0 applications on sustainability goals and product life cycle, applications to make the product life cycle more transparent, and increasing the level of information sharing throughout the supply chain (Esmaeilian, Sarkis, Lewis, & Behdad, 2020, p. 7).

In conclusion, for future success in the field of SSCM, it is important to adopt sustainability-oriented approaches, disseminate circular economy practices, encourage innovation and use digital technologies effectively. This information is considered as a finding with important emphases that can help businesses achieve both environmental and economic sustainability goals.

DISCUSSION

Within the framework of the aim of the study, the findings obtained as a result of bibliometric analyses present past and current trends in the field of SSCM, trends in the use of keywords and future directions. The analysis of the obtained data

shows that sustainability-oriented supply chain management is gaining more and more importance and there is an increasing interest of enterprises in this field. In the first of the analyses, an analysis was carried out in terms of publication years, countries, authors, subject areas and journals. As a result of this analysis, it is observed that there is an increasing trend in SSCM. Analyses in some studies in the literature similarly confirm that studies on supply chain management have increased in recent years and have become an area of interest (Ahi, Searcy, & Jaber, 2016; Fang, Fang, Hu, & Wan, 2022). The increase in the number of publications over the years emphasises the importance and impact of research in this field. When analysed on the basis of countries, it is seen that countries such as India, the United Kingdom and China stand out. According to the results of the study conducted by Zhang et al. (2021), while the dominance of the USA in the field is emphasised, it is stated that Asian countries are also moving towards a considerable dominance in the field. These findings partially support the results of the analysis. While this situation of Asian countries shows the importance and support they give to sustainability-oriented studies, it also shows that they contribute to the development of this issue on a global scale. When the studies within the scope of the analysis are analysed in terms of authors, it is determined that names such as S. Seuring, M.L. Tseng and B. Sarkar are the leading researchers in the field of SSCM. The studies of these researchers play an important role in shaping the developments in the field. S. Seuring is an influential author in the field with 55 h-index levels and 18,301 citations. The most highly cited study is his article "from a literature review to a conceptual framework for SSCM". In the analysis made according to subject areas, it is seen that fields such as business administration, management and accounting stand out in sustainability-oriented research. This shows that the concept of sustainability is widely accepted in the business world and is researched in various disciplines. When analysed on the basis of journals, it is observed that journals such as Journal of Cleaner Production, Sustainability Switzerland and Journal of Supply Chain Management provide an important platform for SSCM, this result is supported by the literature and expresses similar results (Orioli & Veríssimo, 2023). These journals contribute to the publication of new findings and research in the field.

The second analysis of the field of SSCM was conducted to examine the past and current trends of keywords. When the usage trends of keywords over time are analysed, it is seen that topics such as sustainability, circular economy, innovation and industry 4.0 have become increasingly important. In particular, the increasing popularity of the terms SSCM and circular economy reflects the increasing focus of businesses on environmental and economic sustainability goals. Within the same analysis, future directions and trends were identified. The findings from the analyses show that circular economy practices and industry 4.0 technologies will become more important in the field of SSCM in the coming years. Encouraging innovation and effective use of digital technologies will help businesses to achieve their sustainability goals.

In conclusion, this study reveals past and current trends in the field of SSCM and sheds light on future directions. It is important to consider these findings in order for businesses to achieve their environmental and economic sustainability goals by developing sustainability-oriented strategies.

CONCLUSION

The aim of this study is to evaluate the researches conducted in the field of SSCM from past to present within the framework of keywords and to analyse the development process for the inclusion of these keywords in the studies. This study aims to provide a basis for shedding light on future research directions and identifying study gaps in the field of SSCM. In this context, the study analysed past and current trends in the field of SSCM and presented some important findings regarding future directions. The analyses reveal that sustainability-oriented supply chain management is becoming increasingly important and that businesses are showing an increasing interest in this area.

However, this study also has some limitations. The first of these limitations is the limited data set used. The data used in this study covers the period between 2006-2023 and includes only publications on SSCM. The fact that the study does not include a wider time period or different data sources is considered as an important limitation. Another limitation of the study is that the analysis method used in this study is only bibliometric analysis. In future studies, it is recommended to support the data obtained with different analysis methods by taking this constraint into consideration. The last limitation of the study is the limitations of this study to predict future trends and orientations based on the analyses made. In order to predict future developments, more comprehensive analyses are inevitable. It should be kept in mind that the findings obtained in this study are only a prediction and that businesses should adopt an approach based on multiple and diverse data when determining their future strategies.

In conclusion, this study analysed past and current trends in the field of SSCM and presented some important findings regarding future directions. The analyses reveal that sustainability-oriented supply chain management is becoming more and more important and businesses are showing an increasing interest in this area. Analyses conducted to identify future directions indicate that circular economy practices and industry 4.0 technologies will gain more importance in SSCM. Encouraging innovation and effective use of digital technologies will help businesses achieve their sustainability goals.

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DECLARATION OF CONFLICT

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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