

**Outsourcing in supply chain: A bibliometric analysis****Munip Suharmono<sup>a</sup>, Mohammad Benny Alexandri<sup>\*</sup>, R. Widya Setiabudi Sumadinata<sup>a</sup> and Herwan Abdul Muhyi<sup>a</sup>**<sup>a</sup>*Faculty of Social and Political Sciences, Universitas Padjadjaran, Indonesia***ABSTRACT***Article history:*

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The purpose of this paper is to conduct a bibliometric analysis to analyze trends and patterns of outsourcing and supply chain research results using statistical and co-word analysis. The search results in the Scopus database yielded 787 relevant documents with the keywords outsourcing and supply chain from 1997 to early 2022. The results of the bibliometric analysis resulted in the number of publications, citations, subject areas, country, keywords, and topic clusters. The trend of outsourcing and supply chain research tends to increase every year although it had a significant decline in 2011. The documents with the most citations are related to supplier selection using analytical network processes, optimization of outsourcing partners, and ICT in the supply chain. The four fields that dominate the research area are business management, engineering, decision science, and computer science. The United States of America is the most productive country with the most citations. There are four cluster topics formed: the importance of supply chain management in outsourcing in industry and ICT in company activities, the impact of supply chain on business performance and outsourcing decisions, logistics outsourcing decisions to third parties and their effectiveness, lastly the benefit costs of outsourcing and the implications for product management. This paper provides an additional updated overview of the outsourcing and supply chain research map.

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**1. Introduction**

Supply chain management is an essential thing in business that can affect the success or failure of a supply chain design (Dubey & Gunasekaran, 2016). It requires careful management to minimize losses and errors in deciding the supply source. The increasingly fierce business competition makes companies continue to compete to implement new strategies to win the competition. One of the strategies undertaken by the company is outsourcing. Outsourcing is done so that a company can focus on its core business (Isaksson & Lantz, 2015; Gupta et al., 2010). Almost all companies use outsourcing, this trend is not only found in labor-intensive companies but also high-tech companies to large/small distribution companies.

The development of outsourcing and supply chain research continues to be carried out by various academic institutions and companies to gain the latest understanding both locally and globally. This study conducted a bibliometric analysis to obtain an overview and mapping of research in outsourcing and supply chain from 1997 to mid-2022 using data processing and co-word analysis in the Scopus publication database. The items presented in the study are related to the number of publications, citations, publication sources, country affiliations, keywords, and topic groups. The resulting analysis is in publications, citations, subject areas, countries, keywords, and cluster topics.

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## 2. Literature Review

### 2.1 Scopus

The electronic database used in this study is Scopus, an international scientific article with a high reputation, such as Thomson Reuter. Scopus is a comprehensive research database of papers in science, technology, health, social sciences, arts, and humanities (Thaha et al., 2021; Sadi-Nezhad, 2021). The Scopus database includes journals, conference proceedings, reviews, and book chapters. Scopus can visualize, analyze, and track research results based on searching for information sought. Scopus can also help map research results found in the field of study, author, publisher, location, and keywords.

### 2.2 Bibliometric

Bibliometric research can indicate document usage patterns, academic development, and information sources in a topic area in information science. There are two sorts of studies in bibliometrics: descriptive studies and evaluative studies. Descriptive studies examine authorship patterns such as author gender, types of author's works, cooperation levels, author productivity, author connections, and article subjects to determine the productivity of articles, books, and other forms. Evaluative studies examine how people use literature by counting the number of references or cites in articles, books, and other formats (Pattah, 2013).

The bibliometric application, according to Nicolai (2010), is separated into two parts: 1) bibliometric computation (performance) of indicators at various levels of behaviour; 2) analysis and display of bibliometric networks. Descriptive bibliometrics and evaluative bibliometrics are two types of bibliometrics. Descriptive bibliometrics is a top-down technique to gain a large picture of a country's research output in multiple subjects, the proportion of different fields, and variations over time. Furthermore, the evaluative bibliometric is a tool for measuring the performance of smaller units, such as research groups or people, utilizing a bottom-up method, in which all relevant publications from each unit are collected.

### 2.3 Co-word analysis

Co-word analysis, according to He (1999), can determine the amount of keywords from a research document that appears in the article under consideration at the same time. In most research papers, the author specifies keywords. The stronger the association between documents is the more keywords that occur in the collection of studied documents. A map based on a keyword co-occurrence analysis is based on the co-occurrence of important or unique terms in the article and can only be viewed by looking at the title or abstract. A notion is represented by the phrases produced from the subject analysis. The inclusion of non-standardized keywords will result in a wide range of terms. A thesaurus and words that reflect concepts called descriptors are employed to standardize it. Using a thesaurus to standardize keywords ensures that they are utilized consistently. For concepts that are represented by multiple texts but have the same meaning, just one phrase is used.

## 3. Method

This study carried out a bibliometric analysis with a predetermined procedure in Figure 1, following similar previous studies (Thaha et al., 2021). This study used VOSviewer and spreadsheet applications to analyze and synthesize the collected documents. The search from the Scopus database related to outsourcing and supply chain with the string "outsourcing" AND "supply chain" resulted in 2,625 documents. The search results were then filtered by document type, English, and stage publication, resulting in 1,367 documents, followed by manual screening (title, abstract, and keywords), resulting in 787 relevant documents from 1997 to early 2022. The statistical and co-word analysis results were divided into four categories: 1) Publication and citation; 2) Subject area; 4) Countries; 5) Keywords and topic groups. The results of the following four categories are synthesized to obtain trends, patterns, and insights.

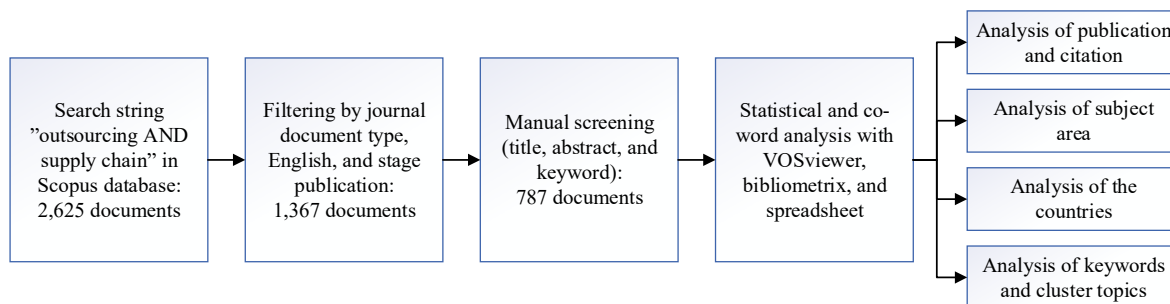
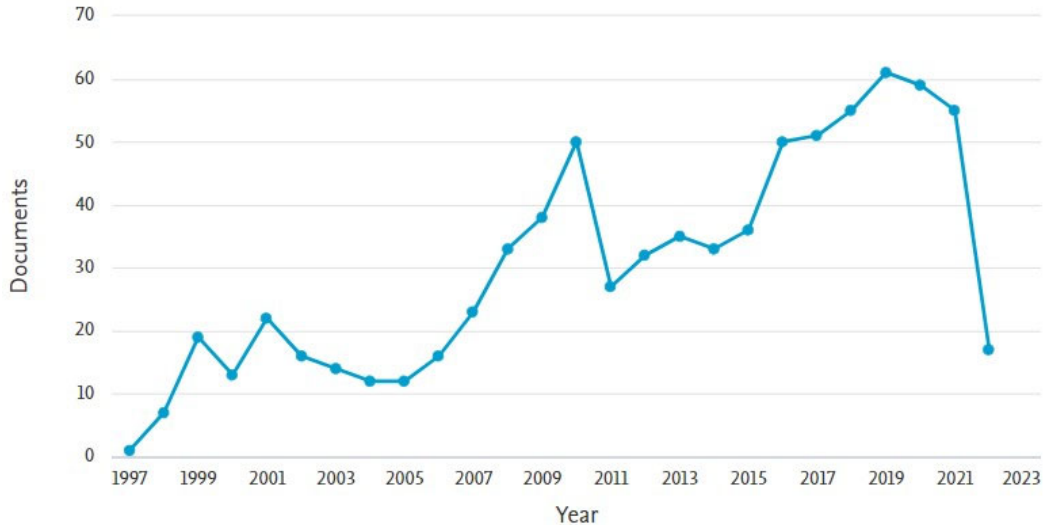


Fig. 1. The Procedure of Document Collection and Analysis

## 4. Result and Discussion

### 4.1 Analysis of the Publications and Citations

Fig. 2 illustrates the number of publications each year on Scopus. In general, publications related to outsourcing and supply chain continued to increase every year starting in 1997, although it had dropped quite a lot in 2011. The highest number of publications occurred in 2019 with 62 articles.



**Fig. 2.** Outsourcing and Supply Chain Publications From 1977 to Mid-2022 in the Scopus Database

Table 1 shows that 2009 was the year with the most citations of 1906 citations with the highest contribution of three citations related to supplier selection using analytic network processes, optimizing outsourcing partners, and ICT in the supply chain.

**Table 1**

Outsourcing and Supply Chain Publications From 1997 to Mid-2022 in the Scopus Database

Year	Doc.	Citation	Country	Doc.	Citation
2022	17	28	2009	38	1906
2021	55	128	2008	33	1783
2020	59	449	2007	23	1534
2019	61	858	2006	16	878
2018	55	919	2005	12	908
2017	51	1143	2004	12	460
2016	50	1349	2003	14	867
2015	36	700	2002	16	1045
2014	33	760	2001	22	1413
2013	35	972	2000	13	1299
2012	32	1075	1999	19	1696
2011	27	1092	1998	7	613
2010	50	1679	1997	1	49

### 4.2 Analysis of Subject Area

Sources of publications come from various fields of research. Fig. 3 shows publications related to outsourcing and supply chain dominated by four areas, namely business management (23.2%), engineering (22.7%), decision science (16.3%), and computer science (13.6%). These four areas account for more than 75% of the shares related to outsourcing and supply chain themes at Scopus. In addition to the four fields above, there are fields of mathematics, social science, economics, environmental science, energy, material science, and others.

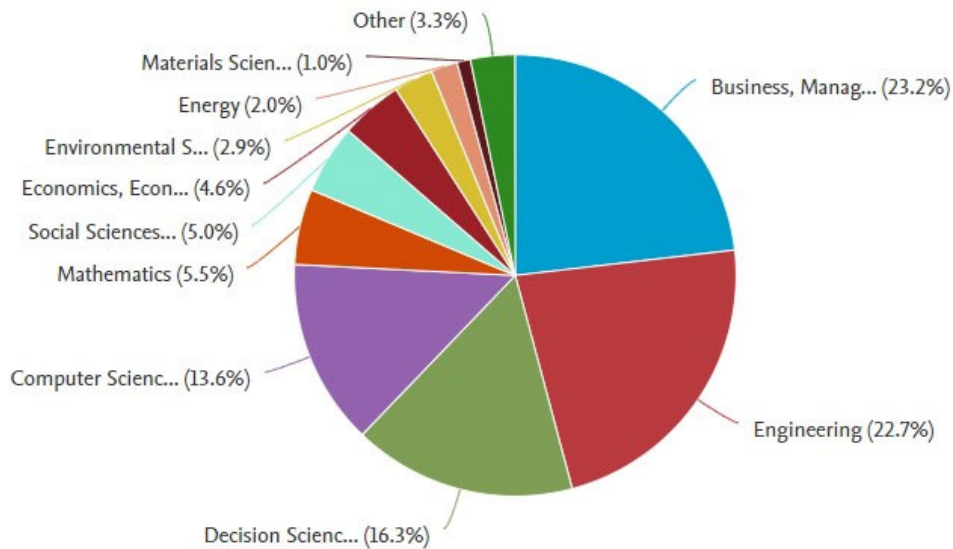


Fig. 3. Subject Area From 1997 to Mid-2022 in the Scopus Database

4.3 Analysis of the Countries

A total of 61 countries contributed to research in outsourcing and supply chains. Various countries fill research in outsourcing and supply chain, both developed and developing countries. Table 2 describes the ten countries with the most publications starting with the United States, China, United Kingdom, India, Taiwan, Hong Kong, Canada, Iran, Italy, and Australia. The United States has the highest number of 12,459 citations compared to other countries. The data show that the United States is the most influential country in outsourcing and supply chain research.

Table 2  
Ten Countries With the Most Documents and Citations

Num.	Country	Doc.	Citation	Num.	Country	Doc.	Citation
1	United States	222	12,459	6	Hong Kong	43	1,839
2	China	159	2,969	7	Canada	42	1,337
3	United Kingdom	68	1,911	8	Iran	38	564
4	India	45	1,117	9	Italy	30	914
5	Taiwan	44	1,653	10	Australia	29	769

4.4 Analysis of Keywords and Cluster Topics

Processing of document data with VOSviewer produces 3566 keywords.

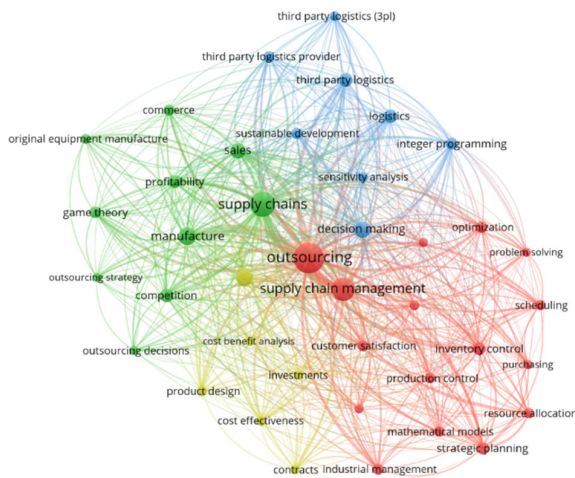


Fig. 4. Network Visualization of Author Keyword Articles

The order of the most keywords is marketing, academic library, library marketing and library. In addition to the main keywords outsourcing and supply chain, the most popular keywords appear: manufacture, costs, decision-making, sales, third party logistics, and competition. Furthermore, a co-word analysis of keywords with a minimum of 20 occurrences is carried out by looking at the cluster, occurrence, and link strength in Table 3 and the relationship between keywords shown in Fig. 4. The analysis results produce 40 keywords with four topic clusters from which each cluster contains six to sixteen keywords.

**Table 3**

Keyword Cluster

Num.	Keyword	Occurrences	Total Link Strength
<b>Cluster 1</b>			
1	Outsourcing	565	3746
2	Supply Chain Management	260	1746
3	Inventory Control	56	430
4	Strategic Planning	49	368
5	Optimization	38	301
6	Industrial Management	36	285
7	Customer Satisfaction	34	291
8	Resource Allocation	32	265
9	Scheduling	32	246
10	Mathematical Models	31	224
11	Production Control	30	229
12	Electronic Commerce	25	188
13	Information Technology	22	145
14	Purchasing	21	174
15	Problem Solving	20	152
16	Risk Management	20	140
<b>Cluster 2</b>			
1	Supply Chains	335	2291
2	Manufacture	122	928
3	Sales	83	642
4	Competition	58	456
5	Profitability	55	453
6	Game Theory	42	289
7	Commerce	35	274
8	Original Equipment Manufacturers	25	199
9	Outsourcing Decisions	23	167
10	Outsourcing Strategy	21	146
<b>Cluster 3</b>			
1	Decision Making	90	658
2	Third Party Logistics	63	491
3	Logistics	60	445
4	Integer Programming	42	360
5	Third Party Logistics Providers	35	282
6	Sustainable Development	34	330
7	Third Party Logistics (3pl)	25	224
8	Sensitivity Analysis	24	215
<b>Cluster 4</b>			
1	Costs	110	863
2	Product Design	29	210
3	Cost Effectiveness	25	187
4	Contracts	23	158
5	Investments	22	177
6	Cost Benefit Analysis	21	181

Fig. 4 visualizes keyword occurrence, interrelationships between keywords and keyword clusters of the same color. The first cluster is red, the second cluster is green, the third cluster is blue, and the fourth cluster is yellow.

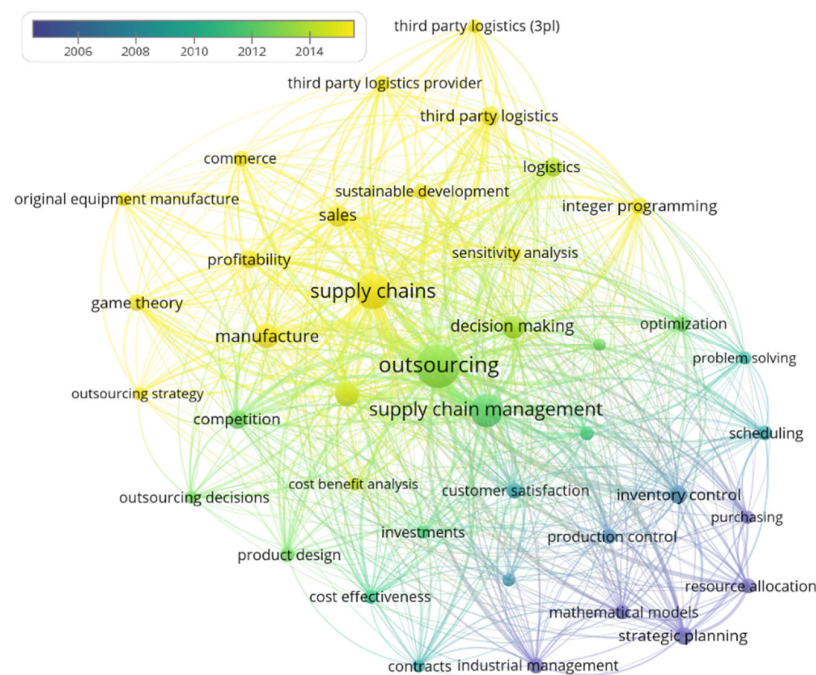
The first cluster contains the keywords outsourcing, supply chain management, inventory control, strategic planning, optimization, industrial management, customer satisfaction, resource allocation, scheduling, mathematical models, production control, electronic commerce, information technology, purchasing, problem-solving, and risk management. This cluster topic discusses the importance of supply chain management related to outsourcing in the industry and how the control of company activities is supported by ICT in dealing with various risks and problems within the company. According to Shen

& Chen (2020), the importance of identifying quality visibility, contract and relationship management, and supply chain integration in improving product and process quality in outsourced fashion supply chains. The company's internal quality control is a component of supply chain quality management, and external quality control in the outsourced supply chain is a shared task of the channel. Outsourcing decisions are related to asset specificity, core proximity, and supply chain complexity (Hsiao et al., 2010). Outsourcing decisions can run better with the existence of information systems for companies and suppliers.

The second cluster contains the keywords supply chains, manufacture, sales, competition, profitability, game theory, commerce, original equipment manufacturers, outsourcing decisions, and outsourcing strategy. This cluster topic discusses the supply chain that can affect business performance and company decisions to use outsourcing. The impact of measuring retail performance broadly can also be seen in the various dimensions of the supply chain linking other sectors such as the growth of the transportation industry, IT advancements, inventory management, and warehousing. Broader application, a holistic research approach and better categorization of indicators will benefit organizations in better measuring the performance of their supply chains (Anand & Grover, 2015). Companies can outsource some production to avoid overstocking costs, even at higher prices. This way there are no product hoarding costs and it is possible to offer buyers further flexibility. Companies can combine their outsourcing strategy with flexible ordering policies to avoid additional costs (Heydari et al., 2020; Hsu & Hu, 2009).

The third cluster contains the keywords decision-making, third-party logistics, logistics, integer programming, third-party logistics providers, sustainable development, third-party logistics (3pl), and sensitivity analysis. This cluster topic highlights the decision to outsource logistics to third parties and analyzes the effectiveness of using third parties for logistics. Third-party logistics service providers have become essential partners in many supply chain industries today because they can effectively reduce operating costs, improve service quality, and increase customer satisfaction as long as the functional response at each level of the chain reaches a sizable magnitude. Any disruption in material flow can critically affect a company's activities and profitability (Giri & Sarker, 2017). The commitment of resources by outsourcing logistics is critical to its relationship with the manufacturer's trading partners and its ability to achieve the best possible performance (Sinkovics et al., 2018).

The fourth cluster contains the keywords costs, product design, cost-effectiveness, contracts, investments, and cost-benefit analysis. This cluster topic discusses the benefit costs of using outsourcing in companies and the impact on product management. Organizations believe that costs can be reduced by outsourcing functions such as payroll. Economies of scale can be achieved when providers specializing in providing benefits administration concentrate on one area and provide this service to many companies (Belcourt, 2006). A key challenge for outsourcing vendors is to develop strategies that facilitate low-cost and high-value contracts without incurring additional risk. From the client-side, identifying and assessing the risks of different outsourcing models helps organizations make better choices during the decision-making process when selecting vendors (Gunasekaran & Irani, 2010).



**Fig. 5.** Overlay Visualization of Author Keyword Articles

Fig. 5 visualizes the keywords that have been researched from time to time. The color of the keyword nodes indicates the period when a lot of research was done with that keyword. Keywords related to third party logistics, sustainable development, commerce, original equipment manufacturer, game theory, integer programming, and outsourcing strategy mainly were researched in 2014. Meanwhile, resource allocation, strategic planning, mathematical models, industrial management, and purchasing are keywords that are primarily used in 2008 and below. From the changes in keywords that emerged, it can be concluded that outsourcing and supply chain publications have evolved from the topic of industrial management to the topic of outsourcing and third-party strategies and more complex measurement analysis.

## 5. Conclusion

Bibliometric analysis on outsourcing and supply chain research trends and publication patterns in the Scopus database from 1997 to mid-2022. The analysis results show that outsourcing and supply chain research trends tend to increase every year even though they fell significantly in 2011. The document with the most citations is related to supplier selection. Using analytical network processes, optimizing outsourcing partners, and supply chain ICTs. The four fields that dominate the research area are business management, engineering, decision science, and computer science. The four fields cover more than 75% of the relevant documents. The United States of America is the most productive country with the most citations, followed by China and the United Kingdom. There are four cluster topics formed: the importance of supply chain management in outsourcing in industry and ICT in company activities, the impact of the supply chain on business performance and outsourcing decisions, logistics outsourcing decisions to third parties and their effectiveness, and finally, the benefit costs of outsourcing and the impact on product management.

The implication of this research is to describe the trend and pattern of outsourcing and supply chain in the Scopus database globally. The limitation of the study is that it does not discuss details related to indicators related to outsourcing and supply chain. Future research is expected to complement other publication databases and discuss indicators and frameworks for outsourcing and supply chain.

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