

Mapping The Evolution Trends In E- Logistics: A Bibliometric Analysis

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ABSTRACT

The relevance of E- logistics has led to a notable increase in research work during the last few years. Bibliometric analysis helps to understand the development of knowledge on a specific subject and assess the scientific influence of research and sources. The study aims to map the evolution of publications trends in E- logistics between the year 1981 to 2022(till 26/5/2022), through a bibliometric analysis. A sample of 402 studies from the Scopus database was analyzed using the VOS viewer tool to distinguish research activity on E- logistics. The citations, publications, location, and network events are used to trace out the most prominent articles and authors. the highest number of publications is observed in 2021, with a total of 59 documents (14.67%). The subject of Computer Science is majorly depicted in the studies of E- logistics (21.91%), followed by Engineering (17.26%). Meanwhile, the subjects of Business, Management, and Accounting (10.36%), Decision Science (8.50%), and Mathematics (7.04%) contributed to the total publication of E-Logistics. The five most productive countries were China, the USA, India, South Korea, and Italy. The findings of this study could prove useful for studies in E- logistics, as they show a global evolution trend and from there, propose future research initiatives.

Keywords: E-logistics, bibliometric analysis, Scopus, Vos viewer.

INTRODUCTION

Over the years, the module of e-commerce business has evolved. Not only did it have an impact on the economy, but it also helped the logistics industry to open up to new dimensions. Thus, Logistics can be defined as an operational process that includes inputting, storing, transporting, and distributing physical goods (Stratton, 2001). E-Logistics is an Internet-enabled logistics value chain designed to offer competitive logistics services including public warehousing, contract warehousing, transportation management, distribution management, and freight consolidation (Gunasekaran A. a., 2003). Minimal research has been done on the global evolution trends in E- logistics. Therefore, highlights on the E- logistics analysis are carried out with the recommendations on the directions of future research. With the growth and importance of E- logistics, it's vital to determine its research trends and progression. According, this study aims to assess the evolution

of publication trends in E-logistics between the year 1981- 2022(till 26/5/2022) through a bibliometric analysis which is viewed through the Scopus database.

LITERATURE REVIEW

With the rise of the digital economy, a new sort of logistics, known as e-logistics, has emerged as a "must-have" in the worldwide logistics business. The needs for an efficient and effective logistics system that can deploy appropriate levels of inventory, speed completed orders to consumers, and manage the speed with which purchases and returns are placed over the Internet and other technologies. (Yu & Bae, 2009).

E-Commerce is the driving force behind the supply chain network. It is undeniable that E-Commerce has a significant impact on the efficiency of a logistics system. It transforms and redefines several classic logistics functions, such as cargo ordering, invoicing, worldwide cargo tracking, and

monitoring, among others. E-Logistics will grow exponentially in the future and this development will drastically affect pricing and charging schemes in the industry (Gunasekaran A. a., 2007). In addition, it is observed that several problems which arise in corporate logistics include delayed and inaccurate information, incomplete services, slow and inefficient operations, and high product damage rates. This emphasizes the need of reliable data exchange among various parties involved in the logistics value chain. Under such circumstances, the role of information technologies including the Internet, World Wide Web (WWW), and Electronic Data Interchange (EDI) in providing shared-information platforms for improving logistics performance is significant (Ngai, 2002). In light of this, a bibliometric analysis is conducted to explore the evolving trends in E-logistics.

Methods Research on E- Logistics

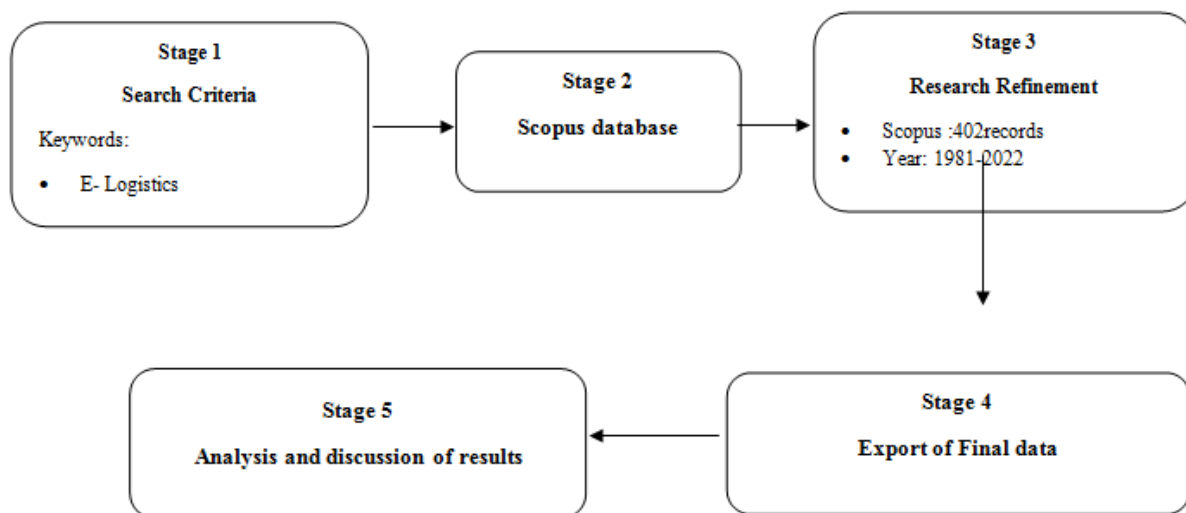


Figure 1. Five stages of bibliometric analysis.

Data of the current study were collected from the Scopus database as of 26th May 2022. A sample of 402 studies from the Scopus database was analyzed via the VOS viewer tool. The Scopus database is regarded as the "largest single abstract and indexing database ever developed" as well as the "largest searchable citation and abstract source of literature review." The query: TITLE " E-Logistics" was conducted with 402 search documents sought from the database. research on E- logistics is conducted to find the structure of research based on the bibliometric analysis. The structure and the central theme of a research area is depicted using the combination of social network analysis (Tunger & Eulerich, 2018) . The identification of current trends and future research avenues is made enabled by a bibliometric analysis (Li, Wu, & Wu, 2017). Figure 1 shows the conceptual framework used in this study

Results

1. Document and Source Types: Table 1 shows that the major documents type were obtained from

Articles (59.45%), and Conference Papers (33.33%)

Table1. Document Type

Document Type	No. of Publications	%	Document Type	No. of Publications	%
Article	239	59.45	Editorial	5	1.24
Conference Paper	134	33.33	Book	1	0.25
Book Chapter	9	2.24	Erratum	1	0.25
Review	7	1.74	Short Survey	1	0.25
Conference Review	5	1.24			

Table 2 summarises the source type published on E- Logistics consists majorly of Journals (59.95%),

followed by Conference Proceedings (30.10%) and Book Series (7.21%). The remaining were referred to Books and Trade Journals

Table 2. Source Type

Source Type	No. of Publications	%(N= 402)
Journal	241	59.95
Conference Proceeding	121	30.10
Book Series	29	7.21
Book	8	1.99
Trade Journal	3	0.75
Total	402	100.00

2. Year of Publications: The evolution of published studies in E- Logistics from 1981-to - 2022(till 26-5-2022) is shown in Figure 2. The

highest number of publications is observed in 2021, with a total of 59 documents (14.67%).

Documents by year

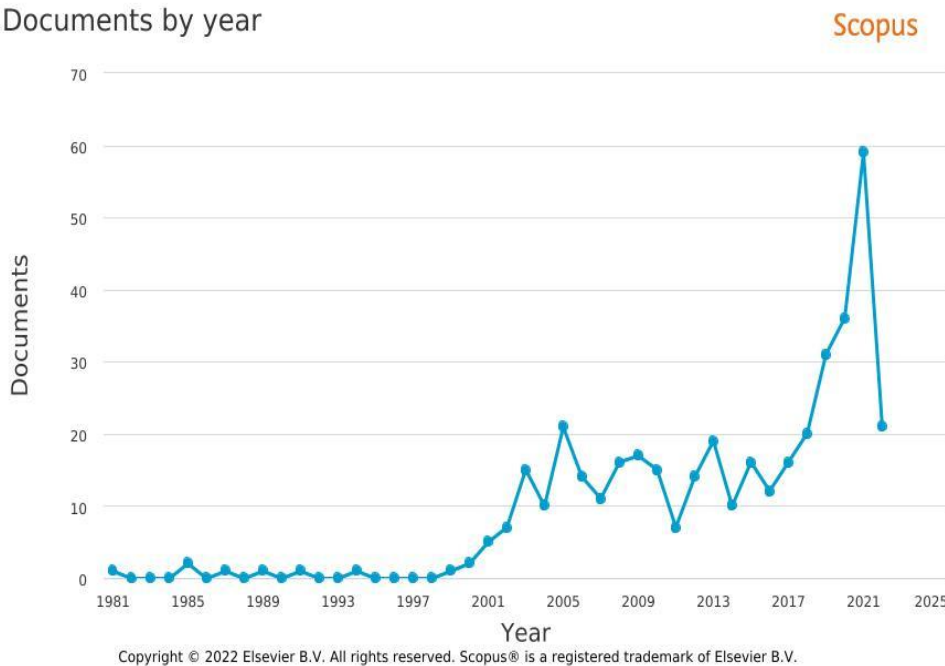


Figure 2, Documents by Year

3. Language of Documents: English language (95.02%) is globally the most preferred language used for publication. Table 3 represents it.

Table 3. language used for publications

Language	No. of Publications	%(N=402)
English	382	95.02
German	9	2.24
Chinese	3	0.75
French	2	0.50
Russian	2	0.50
Spanish	2	0.50
Moldavian	1	0.25
Romanian	1	0.25

Serbian	1	0.25
Undefined	1	0.25
Total	404	100.00

4. Subject Area: Table 4 shows that Computer Science (21.91%)and Engineering (17.26%) subjects areas are the most represented in the studies of E- Logistics, other than that Business,

Management and Accounting (10.36%), Decision Science (8.50%), and Mathematics (7.04%), also contribute to the subject area.

Table 4. Subject area

Subject Area	No. of Publications	%(N= 753)
Computer Science	165	21.91
Engineering	130	17.26
Business, Management and Accounting	78	10.36
Decision Sciences	64	8.50
Mathematics	53	7.04
Social Sciences	45	5.98
Medicine	41	5.44
Environmental Science	24	3.19
Economics, Econometrics and Finance	21	2.79
Agricultural and Biological Sciences	20	2.66
Earth and Planetary Sciences	16	2.12
Physics and Astronomy	16	2.12
Materials Science	13	1.73
Energy	12	1.59
Biochemistry, Genetics and Molecular Biology	10	1.33
Chemical Engineering	8	1.06
Multidisciplinary	6	0.80
Psychology	6	0.80
Arts and Humanities	4	0.53
Chemistry	4	0.53
Immunology and Microbiology	4	0.53
Pharmacology, Toxicology and Pharmaceutics	4	0.53
Health Professions	3	0.40
Neuroscience	2	0.27
Nursing	2	0.27
Veterinary	2	0.27
Total	753	100.00

5. Most Active Source Titles & Citation

Analysis: The most active publishing source titles are listed in table 5. Lecture Notes In Computer Science Including Subseries Lecture Notes In Artificial Intelligence And Lecture Notes In Bioinformatics with max publication of 8

documents, followed by Expert Systems With Applications and Journal Of Physics Conference Series. The data provides that little work has been done in the area of E- logistics ,which opens new avenue for future research as we are into e-commerce and digitalization.

Table 5. Top 20 active publishing

Source Title / Journals	No. of Publications	%
"Lecture Notes In Computer Science Including Subseries Lecture Notes In Artificial Intelligence And Lecture Notes In Bioinformatics"	8	4.71
"Expert Systems With Applications"	5	2.94
"Journal Of Physics Conference Series"	5	2.94
"IEEE Access"	4	2.35
"IFIP Advances In Information And Communication Technology"	4	2.35
"Logistik Fuer Unternehmen"	4	2.35
"Transportation Research Part E Logistics And Transportation Review"	4	2.35
"International Journal Of Supply Chain Management"	3	1.76
"Lecture Notes In Networks And Systems"	3	1.76
"Sustainability Switzerland"	3	1.76
"Uncertain Supply Chain Management"	3	1.76
"Aip Conference Proceedings"	2	1.18
"Applied Sciences Switzerland"	2	1.18
"BMC Medical Informatics And Decision Making"	2	1.18
"Catena"	2	1.18
"Computers In Industry"	2	1.18
"European Transport Research Review"	2	1.18
"IFAC Proceedings Volumes IFAC Papersonline"	2	1.18
"International Journal Of Business And Systems Research"	2	1.18
"International Journal Of Learning And Change"	2	1.18

Table 6 emphasizes the top journals on E-Logistics with their total publications, total citation ,cite score 2020,most cited article , the number of times it is been cited ,and the publisher. Lecture notes in computer science has a total publication of

2816,the total citation is 150358,cite score as on 2020 is 1.8, Adaptive Information Infrastructures for the e-Society as the most cited article in E-logistics and published by Springer

Table 6. Top 10 Journals with the most cited article

Sr.No.	Journal	TP	TC	Cite score 2020	The most cited article (reference)	Times cited	Publisher
1	Lecture Notes in Computer Science	2816	150358	1.8	Adaptive Information Infrastructures for the e-Society (Ulieru , 2004)	8	Springer
2	Expert Systems with Applications	1144	34460	12.7	Two-echelon logistics distribution region partitioning problem based on a hybrid particle swarm optimization–	65	Elsevier

					genetic algorithm (Wang, Ma, Xu, Liu, & Wang, 2015)		
3	Journal of Physics: Conference Series	4430	52411	0.7	Application of Computer Technology in Supply Chain Management of Electronic Logistics (Xing, 2021)	1	IOP publishing limited
4	IEEE Access	3671	201619	4.8	Cyber Threat Predictive Analytics for Improving Cyber Supply Chain Security	7	IEEE
5	IFIP Advances in Information and Communication Technology	193	3546	1	The Supply chain Perspective of e-business Evolution (Manthou., Vlachopoulou., & Folinas, 2003)	2	Springer Nature
6	International Journal of Supply Chain Management	555	1292	1	Determinants of e-logistic customer satisfaction: A mediating role of information and communication technology (ICT) (Hameed, Nadeem, Azeem, Aljumah, & Adeyemi, 2018)	33	Publisher:ExcelingTech Publishers
7	Uncertain Supply Chain Management	60	1017	5.5	Remedies of low performance among pakistani E-logistic companies: The role of firm's IT capability and information communication technology (ICT) (Hameed, Shabbir, Imran, Raza, & Salman, 2019)	45	growing science
8	European Transport Research Review	17	1087	5	Issues of eLogistics applications for varying stakeholders:	4	springer

					findings from an online survey (Islam & Zunder , 2013)		
9	IFAC- PapersOnLine	1651	18134	2.1	Design Principles of Web-based Services in Large-Scale e-Logistics Processes (Ldough, Kolski, & Seffah, 2010)	3	IFAC Secretaria
10	International Journal of Learning and Change	20	149	1.7	Consumer dissatisfaction structure - e-logistic perspective: Lithuania case (Consumer dissatisfaction structure - e-logistic perspective: Lithuania case, 2019)	3	Inderscience Publishers

TP: Total Publications; TC: Total citations

6. Keyword Analysis: The keyword analysis is important to indicate the author's document. The

keyword analysis provides the information related to research, primarily the topic. There were 15% times research on keyword, E- logistics shown in Table 6.

Table 6. Top keywords

Co - occurrence -All Key words	Frequency	%
e-logistics	94	14.69
electronic commerce	59	9.22
logistic regression	44	6.88
machine learning	40	6.25
decision trees	35	5.47
supply chain management	29	4.53
support vector machines	25	3.91
internet	20	3.13
information systems	18	2.81
learning algorithms	17	2.66
enterprise resource planning	15	2.34
artificial intelligence	14	2.19
neural networks	12	1.88
optimization	11	1.72
commerce	10	1.56
logistic models	10	1.56
customer satisfaction	9	1.41
deep learning	9	1.41

Fig 3 indicates the network visualization map to understand the keyword analysis related to E-logistics. The key words were extracted using VOS viewer tool. Cluster differences are seen as per the size of the bubble and the colour, the connection of link of co-occurrence representation

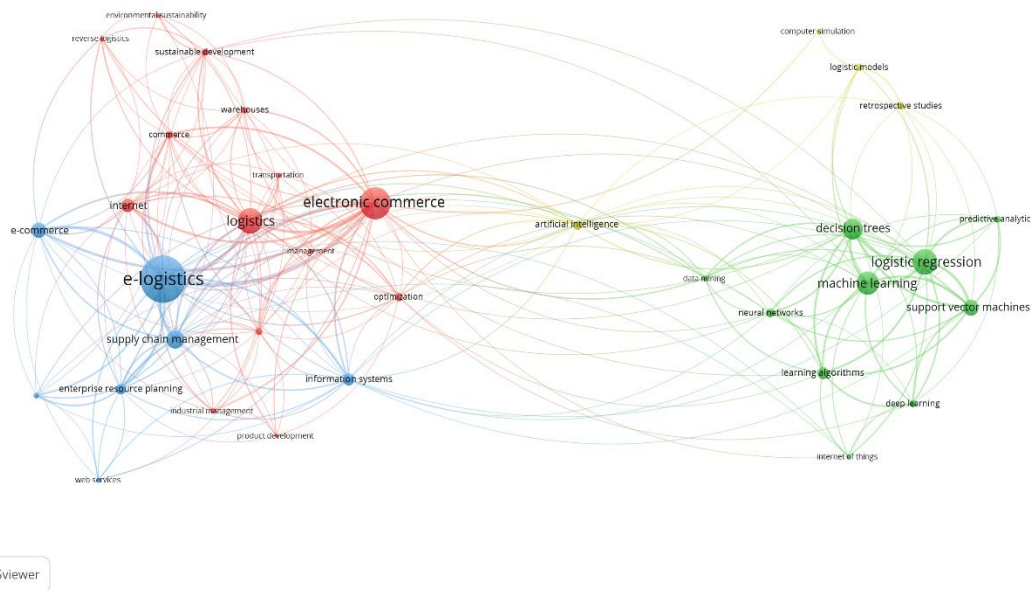


Fig 3. A screen shot of bibliometric map created based on All keywords co-occurrence with network visualization mode.

7. Geographical Distribution of Publications:

Figure 4 and table 7 shows the geographical distribution of publications globally. The 20 countries along with their publications are cited below. On the top is China with 84 publications, out of 493 publications. It is followed by USA with 62 publications. Meanwhile the third spot is occupied by India with 23 publications. the corresponding percentages are stated in the table.

between the two keywords. The bubble and font size is a relative measure of popularity of the key word .Electronic commerce, logistic regression, machine learning , decision trees and supply chain management are few keywords related to E-logistics .

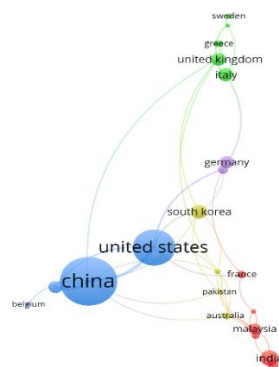
Fig 5 Shows the distribution of countries as per region. the closer the two countries the stronger their relatedness and their linkages. Result of co-authorship showed that China was the most affiliated country, linked to 27 countries, followed by USA with 21 link strength, next comes Hongkong with 13 links. Canada, Saudi Arabia and United Kingdom with a link strength of 9. Other countries were seen with a limited link strength .In addition, Croatia and Indonesia was seen to has no affiliation with any other country.



Fig 4 Top 20 countries contributed to the publications

Table 7. Top 20 countries contributed to the publications

Country	No. of Publications	%(N=493)	Country	No. of Publications	%(N=493)
China	84	17.04	Canada	12	2.43
United States	62	12.58	Indonesia	12	2.43
India	23	4.67	France	10	2.03
South Korea	20	4.06	Poland	9	1.83
Italy	19	3.85	Australia	8	1.62
United Kingdom	18	3.65	Greece	8	1.62
Germany	17	3.45	Sweden	7	1.42
Hong Kong	17	3.45	Netherlands	6	1.22
Malaysia	15	3.04	Saudi Arabia	6	1.22
Taiwan	13	2.64	Turkey	6	1.22



VOSviewer

Figure 5. A screenshot of bibliometric map created on co-authorship with network visualisation mode.

8. Authorship & Citation Analysis: Table 8 shows the most active 15 authors in the area of E – Logistics. The first author is Groznic, Aleš its **Table 8.** Top 15 Authors in the area of E-Logistics

Scopus ID, the 1st year of publication is 1995 with a total of publications, an h index of 9, 404 times cited his current affiliation, and the country. Sarkis, Joseph has a maximum of 453 publications with 38439 times cited , 100 as h index.

Sr. No	Author	Scopus ID	Year of 1st publication*	TP	h index	TC	Current affiliation	Country
1	Groznik, Aleš	6506146533	1995 ^b	47	9	404	Univerza v Ljubljani.	Slovenia
2	Jazairy, Amer	57193718385	2017 ^a	5	4	68	Hogskolan i Gavle, Gavle.	Swedan
3	Kim, Kwanghoon Pio	35748853400	1998 ^a	112	15	644	Kyonggi University, Suwon.	South Korea
4	Ma, Jian	7406202838	1993 ^a	160	34	4623	City University of Hong Kong, College of Business.	Hongkong
5	Wang, Gang	57219101790	2006 ^a	50	14	1604	Hefei University of Technology, Hefei.	China
6	Folinas, Dimitris K	6506784509	2003 ^a	58	10	595	International Hellenic University, Thermi.	Greece
7	Kim, Kwanghoon Pio	35748853400	1998 ^a	112	15	644	Kyonggi University, Suwon.	South Korea
8	Pu, Xiaodie	57193138406	2016 ^a	17	5	139	University of Nottingham Ningbo China, Ningbo.	China
9	Sarkis, Joseph	57194726123	1992 ^a	453	100	38439	Worcester Polytechnic Institute, Worcester.	USA
10	Sebastian, Hans Jürgen	7004913792	1985 ^b	52	9	275	Rheinisch-Westfälische Technische Hochschule Aachen, Aachen.	Germany
11	Voß, Stefan	55785313900	1990 ^b	307	43	6982	Universität Hamburg, Hamburg.	Germany
12	von Haartman, Robin	25936850500	2009 ^b	23	10	273	Hogskolan i Gavle.	Swedan
13	Al Majzoub, Mohamad	57226436675	2021 ^a	2	0	0	Vilniaus Gedimino Technikos Universitetas, Vilnius.	Lithuania
14	Apostol, Elena Simona	55365937600	2011 ^a	46	5	83	University Politehnica of Bucharest.	Bucureslena
15	Bruzzone, Agostino G	7003901555	1996 ^c	309	21	1678	Università degli Studi di Genova, Genoa.	Italy

*Role in co-authorship, superscript

^c Last author^a First author^b Co-author**DISCUSSION**

This study assessed the evolution trends in E-logistics between the year of 1981-to -2022(till 26-5-2022) through a bibliometric analysis which is viewed through Scopus database. The highest number of publications is observed in 2021. There were 402 studies in the field of E-logistics were retrieved from the SCOPUS database then VOS viewer software was utilised for further analysis. Articles are the top document type with 239 publications, equivalent to 59.45%. The year 2021 recorded the highest number of publications with 59, equivalent to 14.67%. However, the number of publications increased from the year 2018 as e-commerce industry boomed. English was the most common written language used for publications, equivalent to 95%.

Computer Science is the major subject depicted on the studies of E-Logistics with 165 publications, equivalent to 21.9%. The article titled Two-echelon logistics distribution region

partitioning problem based on a hybrid particle swarm optimization–genetic algorithm was cited 65 times.

CONCLUSION

In a nutshell, the total retrieve data of 402 documents will keep on increasing with the increase in the e-commerce business. This study is focused only on the Scopus database, whereas other sources can also be considered for future research. Other studies such as e-commerce and e-logistics, e-logistics, and customer satisfaction can also be considered for future research.

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