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DRY PORTS 2018-2022: BIBLIOMETRIC ANALYSIS

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Abstract
Dry ports, often referred to as inland ports or intermodal terminals, are locations that act as transportation hubs for the quick movement of cargo between ships, trucks, and trains. In order to provide more access to regional markets and ease congestion in urban areas, they are typically situated away from regular seaports or airports. Typical services provided by dry ports include warehousing, cargo handling, customs clearance, and logistics administration. By promoting more eco-friendly and effective transportation options, they play a significant part in facilitating global trade, fostering economic growth, and lowering the environmental impact of transportation.

Keywords: Inland ports, Intermodal transportation, Logistics hubs, Container terminals, Freight consolidation, Supply chain management, Transshipment, Cargo handling, Customs clearance, Multimodal transport, Rail freight, Road haulage, Warehousing, Containerization, Port-centric logistics.

Introduction

Growth in Global Trade has been increasing due to increased manufacturing and agriculture production, new marketing techniques, and efficient logistics services. The concept of Sea Port & Airport is familiar to everyone, but the concept of Dry Ports is an incognizant among everyone. Inland Internodal Facility or the Dry Ports has gained much more significance as it has the potential to make the transport facility efficient and meet all the supply chain requirements. Dry ports are developed to facilitate cargo movement and reduce the workload of documentation and custom clearance, increase efficiency of logistics, and provide temporary storage of containers. They play a major role in the containerization and transportation of goods.

The concept of Dry Ports came into existence in the 1980s and are used for Loading and Unloading of goods other than the Seaports or airports. They are a cluster of Inland Port, Inland Terminal, Inland Hub, Inland Logistics Centre, and Freight Village. They facilitate the Cargo Handling and allow several functions such as Cargo Consolidation and distribution, temporary storage of containers, and Customs clearance. (Erica Varese D. S., 2020)

The Inland Container Depots and Container Freight Stations (ICDs) are Dry ports that facilitate the Import Export of Goods and Customs clearance of the goods before the reach to the main port for the Export process. According to Ministry of Commerce and Industry (MoCI) guidelines, an ICD/CFS is a common user facility with public authority status equipped with fixed installations and offering services for handling and temporary storage of import/export laden and empty containers.

The main aim of the ICDs and CFSs is to containerization of the bulk cargo and vice versa. Both are connected through the rail routes and the CFSs are mainly connected or through the Mother Port and often not connected to the Railways. Container Freight Stations (CFSs) are located at the seaport and perform consolidation and segregation of cargo, while Inland Container Depots (ICDS) are located far from the main ports and are used for storing and moving shipping containers before transporting them to the main Sea Port. ICDs are important as they help settle down cargos at the dry ports and complete the process with efficiency and without creating

problems. CFSs are ports that consolidate and de-consolidate goods to avoid congestion at Indian ports. They are available at both import and export and have gained importance in the field of Import and Export. ((ICDs AND CFSs IN INDIA: AN OVERVIEW , 2018)

Literature Review

Dry ports and sea ports complement each other to ensure efficient flow of supply chain. **(Erica Varese D. S., 2020).** Dry port characteristics such as location, capacity, distance from sea port, intermodal connection, traffic generated, and competition are important for success.

(Lam Canh Nguyena, 2021). Government agencies should consider the characteristics of both sea ports and dry ports when developing a plan. **(Nguyen & Notteboom,2019).**

The authors identified 6 factors that contribute to the decision of dry ports, including cost, location, installation and infrastructure, accessibility, operational, social and policy, and environmental factors. **(Thiago de Almeida Rodrigues, 2022).** The research found that sea port competitiveness can increase through enhancing performance, increasing storage capacity, variety of services, and improving clearance infrastructure. **(Jagan Jeevan, 2018)**

Dry ports offer cheap custom clearance storage, logistic solutions, and good occupancy, but lack network infrastructure and custom procedure. **(Rodrigues, Mota, & Dweiri, 2020).** The DPD has disrupted the development of dry ports in India, leading to unsustainable growth. **(Rosmaizura Mohd Zain, et al., (2022)).**

Dry ports can increase efficiency of supply chain process, but port authorities must design hinterland with cost-effective, sustainability, quality, and risk-solving potential. **Marta Gonzalez-Aregall & Rickard Bergqvist (2019).**

The success of dry ports in the container sea port system depends on five major components: transportation infrastructure, container planning, competition, location and externalities. Rail and the road freight system are the major components of the supply chain process.

J. JEEVAN, et., (2017). This paper evaluates the location of dry ports based on environmental, economic, and socially sustainable criteria to find the best solution. **Snezana Tadi´c, et., (2020).** Dry ports are essential for intermodal transportation, helping to generate economic growth and reduce environmental impacts. **Alena Khaslavskaya & Violeta Roso (2020).**

Freight villages should be intermodal and have open access to the road and rail ways for economic sustainability. **Judit Oláh, et., (2017).** Dry ports are essential for landlocked areas to increase economic, environment and social benefit, and should have good infrastructure and a good transportation network. **Ayush Srivastava (2017)**

The research paper "Relationship Between Dry Ports and Regional Economy: Evidence from Yangtze River Economic Belt" found that dry ports positively correlated with the trade volume, and that if a city has a dry port, their trade volume will increase by 0.099 times.

Yan Feng LIU, et., (2021)

The authors identified 12 factors that affect dry port operations in Malaysia, such as sufficient information sharing, accurate freight forecasting, customs clearance, value-added services, adequate highway infrastructure, implementation of public-private partnerships, seaport and short sea shipping policy, road connectivity, and the location of dry ports.

Jagan Jeevan, et., (2017)

The author has conducted research on Dry port-Sea port system development and has used product life cycle theory to focus on the decline phase. They suggest proper development and value-added services to enhance operations. **Bentaleb Fatimazahra, et., (2016).**

PPP model for development of dry port in Vietnam focused on contracting out, inland terminal concession, field concession and privatised ownership. **Lam Canh Nguyen & Theo Notteboom (2017)**. The study found that inland ports are undervalued in the supply chain process, but have a vital role in enhancing logistics and economic growth. **Patrick Witte, et., (2018)**. Dry ports are essential for efficient supply chain process, providing services to manage cost and time. **Alena Khaslavskaya and Violeta Roso (2019).**

Bibliometric Analysis

Bibliometric analysis has gained immense popularity in business research in recent years (Donthu et al., 2020b, Donthu, Kumar, Pattnaik, & Lim, 2021, Khan et al., 2021), and its popularity can be attributed to (1) the advancement, availability, and accessibility of bibliometric software such as Gephi, Leximancer, VOSviewer, and scientific databases such as Scopus and Web of Science, and (2) the cross-disciplinary pollination of the bibliometric methodology from information science to business research. More importantly, the popularity of bibliometric analysis in business research is not a fad but rather a reflection of its utility for (1) handling large volumes of scientific data, and (2) producing high research impact.

Notwithstanding its merits, bibliometric analysis remains relatively new in business research, and in many instances, its deployment does not make full use of its potential. This occurs when bibliometric studies rely on a limited set of bibliometric data and techniques and provide only a piecemeal understanding of the field under study (e.g., performance analysis without science mapping—e.g., Brown, Park, & Pitt, 2020).

Methodology

One of the topics that is debated the most in literature is the concept of dry ports, although the bibliometric component of this approach is still not sufficiently covered. Exploratory study was therefore conducted to fill the gap found by the literature review. Also, this research will aid in updating our knowledge of this concept.

Even while dry ports have garnered a lot of attention in the literature, bibliometric studies on this tactic are still rare. An exploratory research study that aims to close this knowledge gap included a bibliometric survey of the current state of research on dry ports.

The findings of this study will help researchers and professionals comprehend dry ports and their effects on supply chain management. They will also increase the corpus of information previously known about the subject.

Research Objectives

By giving the new information, the study aimed to advance understanding of dry ports and associated subjects.

- To determine which journals on "Dry Ports" in Scopus are the most important.
- To locate the Scopus writers who are most pertinent to "Dry Ports."
- To be aware of the yearly research papers on "Dry Ports" that are published in Scopus.

Data Collection

The published Scopus database was used in the study. The best database for high-quality research articles in the discipline of management is Scopus. The study makes use of the Scopus database because it was discovered that several well-known sources, like Google Scholar, lacked its high-quality research. The initial search was done using the phrase "Dry Ports" in the Scopus database.

The study also discovered 86 articles for additional analysis based on the exclusion of the subject area, document title, source title, and language. Import of the final 86 articles CSV file into VOSviewer. The relationship between authors, nations, author citations, journals, sponsors, and popular keywords is further examined.

Analysis and Result:

Table 1 overview of the data

Particulars	Result
Total Articles	86
Total Authors	200
Time Frame	10 years
Organization	166
Countries	37
Reference	3429
Cited Sources	1556
Cited Authors	3827

Year Wise Publication

There are in total 86 articles out of which 56 articles in the dataset, which represents the number of papers published over a five-year period, from 2018 to 2022.

9 publications were published in 2018, the dataset's first year, accounting for 16.07% of all articles. A total of 10 articles were published in 2019, accounting for 17.85% of the total. The number of papers published the next year, in 2020, with 10 pieces making up 17.85% of the total.

The number of papers increased in 2021, with 17 articles accounting for 10.36% of the total. The number of papers published fell slightly in 2022, with 10 articles accounting for 17.85% of the total.

Table 2 year wise publication and average

Year	Articles	% (N=56)
2018	9	16.07142857
2019	10	17.85714286
2020	10	17.85714286
2021	17	30.35714286
2022	10	17.85714286

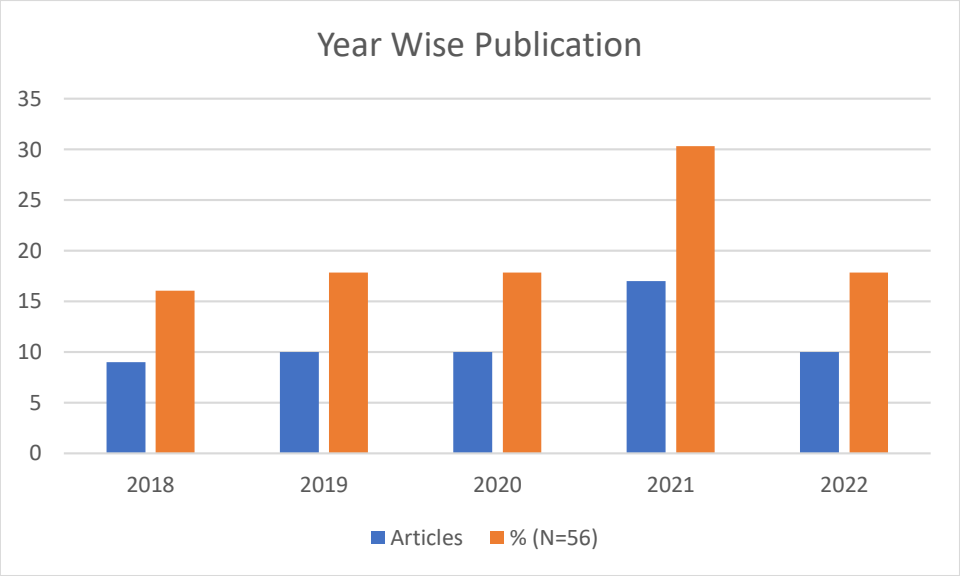

chart 1 year wise publication and average

Research Overview

Table 3 keyword analysis

keyword	occurrences
carbon emission	4
container terminal	5
containers	5
decision making	7
dry port	33
dry ports	18
hinterland	6
inland port	4
intermodal transport	6
logistics	6
malaysia	4
optimization	4
port	4
port operation	8
ports and harbors	7
roads and streets	4
seaport	5
seaports	4

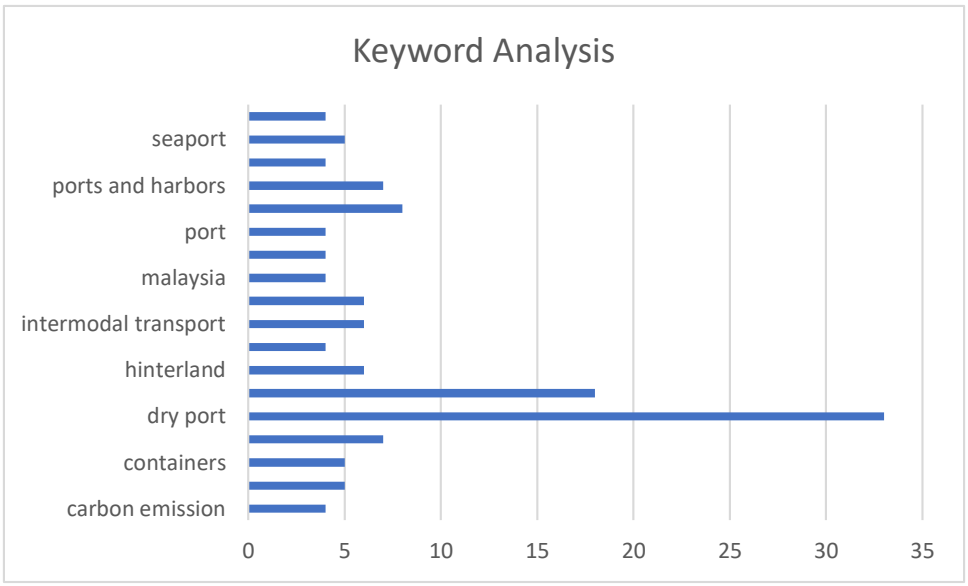

chart 2 keyword analysis

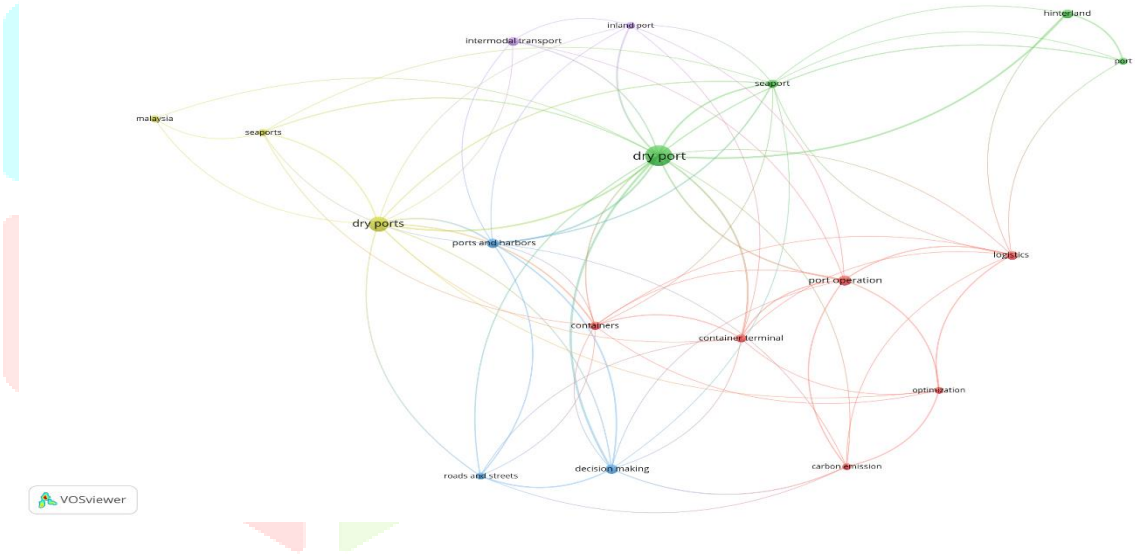

fig 1. keyword co-occurrence network

In the given context, dry port is the term that is most frequently stated and connected since it has the highest total link strength. Together with seaport and container terminal, other prominent keywords include ports and harbours and containers. Some noteworthy keywords with strong connection profiles include decision-making, optimization, and logistics.

These terms are associated with logistics and transportation, with a focus on ports, terminals, and other infrastructure in the sector. This data set emphasises optimization and decision-making procedures together with multimodal transport, dry ports, and hinterlands. Interest in Malaysia and carbon emissions may indicate that the data relates to a particular area or industry.

The offered list displays a selection of keywords together with instances of each in an unidentified context. The logistics and transportation sectors, particularly port operations and the movement of products, appear to be connected to these keywords.

Additional terms that appear to be connected to the logistics of moving commodities from one location to another include "container terminal," "intermodal transport," "hinterland," and "seaport."

Generally, the inclusion of these keywords indicates that the article is probably discussing some part of the logistics and transportation sector, perhaps concentrating on methods for carbon emission reduction or the optimization of transportation networks.

Organization Analysis

Table 4 organization wise analysis

ORGANIZATION	DOCUMENTS	CITATIONS
Antwerp Maritime Academy, Belgium	2	156
Department Of International Logistics, College of Business and Economics, Chung-Ang University, Seoul, South Korea	1	26
Department of Supply Chain Management, Asper School of Business, University of Manitoba, Winnipeg, Mb, Canada	1	26
Eindhoven University of Technology, School Of Industrial Engineering, Eindhoven, Netherlands	1	20
Faculty Of Applied Economics, University of Antwerp, Belgium	1	89
Faculty Of Economics, Vietnam Maritime University, 484 Lach Tray St, Kenh Duong, Le Chan, Hai Phong, Viet Nam	1	1
Ghent University, Belgium	1	67
Han University of Applied Sciences, Netherlands	2	0
International Business and Marketing School, University Of Economics Ho Chi Minh City, 59c Nguyen Dinh Chieu St, District 3, Ho Chi Minh, Viet Nam	1	1
International School of Education, Vietnam Maritime University, 484 Lach Tray St, Kenh Duong, Le Chan, Hai Phong, Viet Nam	1	1
Kuehne Logistics University, Department of Logistics, Hamburg, Germany	1	20
Liverpool Business School, Liverpool John Moores University, Liverpool, United Kingdom	1	26
Liverpool Logistics, Offshore and Marine (Loom) Research Institute, Liverpool John Moores University, Liverpool, United Kingdom	1	26
Management Department, Binus Business School Undergraduate Program, Bina Nusantara University, Jakarta, Indonesia	2	0
Maritime Institute, Faculty of Law, Ghent University, Belgium	1	89
Newcastle University, Business School, Newcastle, United Kingdom	1	20
School Of Accounting, Information Systems and Supply Chain, Rmit University, 124 La Trobe St, Melbourne, Victoria 3000, Australia	1	1
School Of Business and Management, Rmit University Vietnam, 702 Nguyen Van Linh, Tan Hung, District 7, Ho Chi Minh, Viet Nam	1	1

Transport Institute, University of Manitoba, Winnipeg, Mb, Canada	1	26
Transport Management College, Dalian Maritime University, Dalian, China	1	26
Transportation Management College, Dalian Maritime University, China	1	89
University Of Antwerp, Belgium	1	67
University Of Economics Ho Chi Minh City, 59c Nguyen Dinh Chieu St, District 3, Ho Chi Minh, Viet Nam	1	1
University Of Groningen, Faculty of Economics And Business, Groningen, Netherlands	1	20
Vietnam Maritime University, Viet Nam	1	67

It appears that the chart is a directory of numerous academic institutions and departments involved in logistics and supply chain management. The figure shows the number of documents related with each university or department as well as the number of citations such documents have received.

The term "documents" most likely refers to the quantity of scholarly works, books, or other publications written by or in collaboration with researchers employed by the specified organisation or division. The number of citations shows how frequently these works have been referenced in other research papers, demonstrating their standing and significance in the area.

In conclusion, this chart may be helpful to someone looking to locate organisations or departments that are engaged in logistics and supply chain management research and have contributed to the subject.

Country Analysis

Table 5 country analysis

Country	Documents	Citations
Australia	4	96
Belgium	4	223
Brazil	3	4
Germany	3	405
Hong Kong	6	46
Indonesia	9	107
Italy	3	13
Malaysia	4	30
Morocco	4	9
Netherlands	10	22
Russian Federation	3	226
South Korea	4	55
Sweden	5	98
Taiwan	3	89
Thailand	3	80
United Kingdom	10	47
United States	6	261

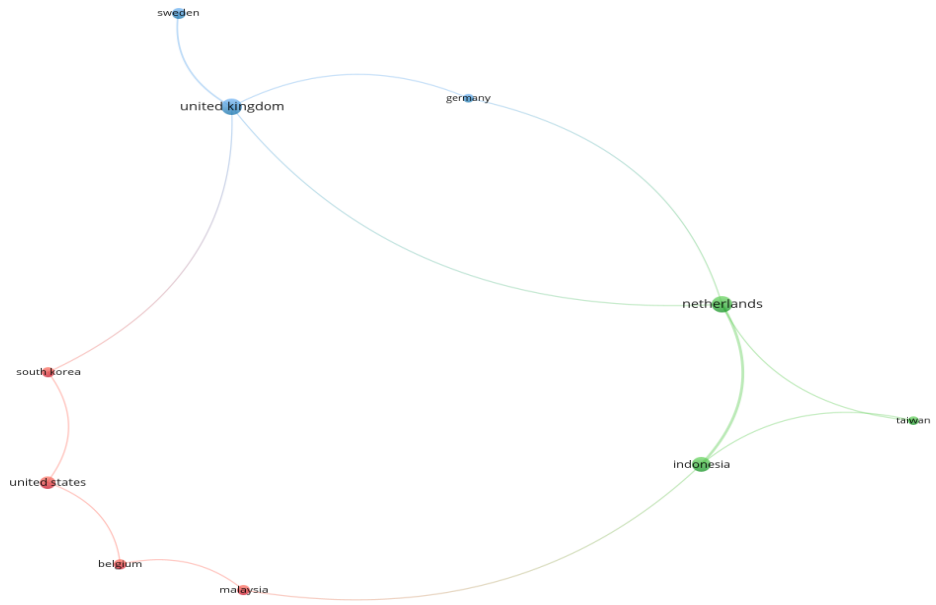

fig 2. country co-occurrence network

The number of documents and citations for each nation in a specific field, such academic research, are displayed in the table. The term "number of documents" refers to the total number of papers or other works that academics from that nation have produced in the relevant fields, whereas the term "number of citations" refers to the total number of times that these works have been cited by other researchers.
The table shows the number of documents and citations for each country in a particular field, like academic research. In contrast to the word "number of citations," which refers to the total number of times that these works have been cited by other researchers, the term "number of documents" refers to the overall number of papers or other works that academics from that country have produced in the pertinent subjects.
With an average citation rate of 55.75, Notteboom T. leads Yang Z., who comes in second, and Chen S.-L., who comes in third. For their writings, Herlina M.G., Kuncoro E.A., and Moeke D. have no citations.

Author Analysis

Table 6 author analysis

Author	Documents	Citation	Average Citation
Cahoon S.	11	259	23.5
Chen S.-L.	3	95	31.7
Herlina M.G.	2	2	1
Jeevan J.	6	104	17.33
Kuncoro E.A.	2	0	0
Moeke D.	3	0	0
Mohd Salleh N.H.	2	1	0.5
Ng M.	2	47	23.5
Notteboom T.	4	223	55.75
Othman M.R.	2	9	4.5
Peng Y.	2	45	22.5
Rodrigues T.A.	2	2	1
Saroso H.	5	3	0.6

Sudrajat D.	4	1	0.25
Syahchari D.H.	4	3	0.75
Talley W.K.	2	47	23.5
Wang W.	2	45	22.5
Yang Z.	2	115	57.5
Zhang J.	2	61	30.5
Zhang Q.	2	45	22.5

This table lists the writers' total number of documents and citations. The number of papers and citations linked to each author is shown by a row, while the number of documents is represented by a column.
The number of documents or publications the author has created is displayed in the "documents" column. The number of times those papers have been mentioned by other researchers is displayed in the "citations" column.
Based on the quantity of articles they have created and the number of times their work has been cited, the table enables us to compare the productivity and influence of various authors. The average number of citations per document, a gauge of an author's citation effect or h-index, can also be determined using this formula.

Sources Analysis

Table 7 sources analysis

Source	Documents	Citations	Average Citation
Asian Journal of Shipping and Logistics	8	203	25.375
Handbook Of Research on Recent Perspectives on Management, International Trade, And Logistics	1	0	0
International Journal of Applied Management Science	1	9	9
International Journal of Logistics Management	2	2	1
International Journal of Logistics Research and Applications	1	0	0
International Journal of Logistics Systems and Management	3	21	7
International Journal of Physical Distribution and Logistics Management	1	26	26
International Journal of Process Management and Benchmarking	1	5	5
International Journal of Production Economics	2	45	22.5
International Journal of Shipping and Transport Logistics	3	30	10
International Journal of Supply Chain Management	1	3	3
Journal Of Cleaner Production	3	62	20.67
Logistics	1	0	0
Management And Production Engineering Review	1	6	6
Maritime Business Review	3	8	2.67
Maritime Economics and Logistics	9	423	47

Proceedings Of the International Conference on Industrial Engineering and Operations Management	4	2	0.5
Research In Transportation Business and Management	7	182	26
Research In Transportation Economics	2	22	11
Supply Chain Forum	1	13	13
Transportation Research Part E: Logistics and Transportation Review	10	377	37.7
Uncertain Supply Chain Management	1	2	2

The term "number of documents" refers to the total number of articles, papers, or other documents that were published in each journal or conference, whereas the term "number of citations" refers to the total number of times that those documents were used as references by other academics.

The journal "Maritime Economics and Logistics" looks to have the most documents and citations, indicating that it is a well-recognised and significant publication in the field, according to the table. "Transportation Research Part E: Logistics and Transportation Review" and "Research in Transportation Business and Management" are two more publications having a substantial number of citations.

It's important to keep in mind that a number of variables, including the size of the research community in the subject, the standing of the journal or conference, and the significance of the research, might affect the quantity of documents and citations. Yet, the chart offers some insight into the acceptance and influence of numerous scholarly works in the logistics and transportation industry.

Findings

These graphs and tables provide information on a variety of subjects, including the significance of dry ports, seaports, and optimization in the logistics sector, the number of academic institutions, authors, and documents cited in relation to logistics research, and the number of journals cited in relation to the logistics and transportation industry. Also, the descriptions shed light on the importance and applicability of the numerous words and phrases that are frequently used in the charts and tables. The text's overall goal is to offer knowledge and insight about logistics, transportation, and the different issues that affect these industries.

Information about the importance of dry ports, port operations, intermodal transportation, carbon emissions, optimization, ports and harbours, seaports, decision-making, academic institutions and departments engaged in logistics and supply chain management research, writers' total number of documents and citations, and the number of articles published in each journal or conference are all included in the charts and tables.

Conclusion:

Dry port implementation and development still encounter difficulties due to a lack of appropriate policies and regulations, technological advancements, the availability of infrastructure, and the business and investment climates. Yet, dry ports can provide significant advantages to those involved in hinterland transportation, including better distribution systems, lower logistics costs, a boost to regional development, and a reduction in vehicle emissions (Khaslavskaya and Roso 2020). As a result, scholars and researchers have paid much more attention to dry port studies in recent years.

According to the review of dry port research from the previous years conducted in this paper, academics have been paying attention to dry port research development from various angles, as evidenced by the numerous articles that have been published in refereed journals to reflect the current state of research. According to the findings of this study, academic interest in dry port studies has increased over the past ten years more than it did the decade before, peaking in 2017 with 17 articles. The rise in publications on dry ports can be related to the advantages that industry might reap and how that might impact the nation's economic development, logistics competitiveness, and connectivity.

Yet, only a small number of the nearly 200 authors who have published articles in different publications have works that are frequently cited by academics. Early-stage studies that have the most influence tend to focus on the dry port's costs, theories and concepts, and supply chain. According to the research, the keywords "dry port" and "intermodal transport" are strongly related to location, logistics, and ports, whereas "dry port" and "intermodal transport" are related to inland terminal and optimization. This correlation demonstrates the enthusiasm of academics for dry port-related research projects. Many academics are interacting with colleagues abroad and involve numerous institutions all around the world. Due to their extensive expertise

and knowledge in the maritime and logistics sectors, experts from European and American nations are currently leading the research.

The systematic review based on research themes used in this study adds to the body of knowledge on dry ports, but it has shortcomings that need to be addressed in subsequent work. This analysis only contains English-language literature, thus other significant discoveries from journals published in other languages may not be highlighted. Furthermore, the outcome is limited to papers based on a Scopus database that is currently accessible. So that a more complete result may be produced, it is advised that future studies utilise additional databases like Web of Science or Google Scholar. Based on the results of earlier research, this study then takes keywords into account.

Other keywords from outside the scope of this research are recommended to be included in future studies because the generalisation and objective of this study may have omitted or neglected other keywords. Also, two members of the research team who manually categorised and selected literature reviews based on those categories evaluated the qualitative analysis in this study. It is strongly advised to include team members or develop a different system for analysing materials. We also recommend that the subsequent study include other techniques that could improve the validity and reliability of its findings.

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