A bibliometric analysis of selection of third-party logistics providers.

Alvaro Salazar Palmet

Escuela Internacional de Ciencias Económicas y Administrativas, Universidad de La Sabana, autopista norte de Bogotá, D.C., Chía (Cundinamarca), Colombia. Email: alvarosalpa@unisabana.edu.co

Abstract:

Purpose – To carry out a bibliometric review of third-party logistics service (3PLS) provider selection and identify the current stream of the field.

Design/methodology/approach – Begins by setting the keywords for the search query to properly set the limit and scope of the research. The input selected for the study are papers, conference papers. Key indicators like publication productivity, citation, conceptual mapping, and research front are presented and discussed. The tools used for gathering the output were Rstudio and VosViewer.

Findings: 3PLS provider selection is a topic studied mainly by surveys, case studies, and mathematical models' application. The selection decision is a multicriteria decision-making process and is mainly guided by quantitative models.

Future research: 3PLS provider selection should include additional financial performance analysis. Last-mile distribution or collaborative distribution (covid19 as the main driver) and selection models applied to e-commerce could be developed.

Practical implications: Managers could adapt the available publications and their models to their industry. Scholars can apply the model to different industries to set more robustness to the current conceptual and theoretical framework.

Originality/value: The contribution of this research is to the available 3PLS provider selection to consolidate available research, practices, and models to improve the company's logistics operations performance and present insights to scholars to guide future research. To present the relationship between countries' productivity and LPI. To present a table with applied cases in different business sectors.

Keywords: Third-party logistics, bibliometric, supply-chain, outsourcing, provider selection.

1. Introduction

Research regarding providers' selection of third-party logistics services (3PLS) presents a prominent topic for research. The need for outsourced business activities, the transformation of technology application, and the rise in competition fosters the interest of scholars and logistics practitioners.

When a third party executes logistics activities instead of buyer and seller, 3PLS takes place (McGinnis & Ackerman, 1995). Those activities include but are not limited to transportation and warehousing (Skjoett-Larsen, 2000), order fulfillment, and cargo consolidation (Ding, F. Y. & Stoner, A., 2004).

Firms gain benefits by selecting a 3PLS provider. Including 3PLS providers in supply chain operations aim to add value to the customers. Firms that properly select and handle relationships with 3PLS providers outperform competitors that exclude them from operations (Jayaram, J., & Tan, K. C., 2010). Additionally, some firms involve 3PLS providers to focus on their core activities, reduce costs, achieve a competitive advantage, and to diminish risk in operations (Ngonela, Mwaniki, & Namusonge, 2014; Gunasekaran et al, 2015; Gupta & Walton, 2016).

Likewise, complexity in operations leads firms to integrate operations with 3PLS providers. Boston Consulting Group (2016) presents 6 trends in logistics affecting main segments of road transportation freight forwarding and contract logistics. This transformation of the logistics business environment presents insights for future business opportunities in 3PLS. McKinsey (2015) states seven major trends in the transportation and logistics business, and what strategies can lead to value creation. According to these reports, complexity in 3PLS might rise in the coming years.

As 3PL practitioners face complex decision-making processes to select providers accurate to their current necessities the purpose of this research aims this problem for managers as well as scholars to gain an overview of currently available literature on the topic. Differently from other bibliometric publications on third party logistics, my analysis considers a broader time extension, emphasizes on selection of 3PLS providers in supply chain management, and lastly, its main contributions 1) delights the business sectors where the selection process or models are applied to and 2) presents the relationship between the most productive countries and its Logistics Performance Index (LPI).

To fulfill these objectives this bibliometric analysis traces data from publications at the Scopus database. The analysis of articles on 3PLS provider selection dates from 1995 to 2020 because the first published article on this topic steps out in 1995. This paper's structure then proceeds with the methodology, followed by data analysis and discussion to finally proceed with the findings.

2. Methodology

Bibliometric analysis is the application of statistical methods to analyze books, articles, or other publications using data like numbers, authors, citations (OECD, 2013). This analysis allows identification of the global overview of a specific topic of interest (Kostoff, Shlesinger & Malpohl, 2004), easing the awareness among scholars and managers in the field of 3PL provider selection. This bibliometric analysis is about 3PL provider selection. The unit of analysis is articles and conference papers whose emphasis is on the selection of providers for

3PL. The selected search engine to use is Scopus as it is the largest reviewed literature database (Scopus, 2019). The publications' timeframe is between 1995 and 2020. The data processing, analysis, and evaluation is adopted from Albort & Ribeiro (2016) and presents the following steps: 1) selection of keywords, 2) initial search results analysis, 3) data analysis. The tools Rstudio and VosViewer grant the output to gather and analyze the required information to achieve the objectives of this examination.

2.1 Selection of key words

I apply a three-level keyword search query string to ensure a proper filter of publications and obtain a sturdy and reliable range of publications on this topic. Table 1 presents the structure of the search query: TITLE-ABS-KEY (("third party logistics" OR "TPL" OR "3pl" OR "logistics outsourcing" OR "third party supply chain management") AND (select OR selection OR choice OR choosing OR election) AND (provide OR provider OR supply OR supplier)). The first level is the context of this research, the main concept is third-party logistics, level 2 constitutes keywords for selection and level 3 involves related supplier keywords. This structure is constructed by considering the frequent keywords at level 2 and level 3 from available publications of the field and synonyms of common usage. Related keywords attain at a broader level to cover a robust reach of words that are used in articles' titles, abstracts, authors, and indexed keywords. As an example, "supplier" is used instead of "provider".

Table 1. Search query structure

1st Level	("third party logistics" OR “TPL” OR "3pl" OR "logistics outsourcing" OR "third party supply chain management")
AND 2nd Level	(select OR selection OR choice OR choosing OR election)
AND 3rd Level	(provide OR provider OR supply OR supplier)

Source: elaborated based on (Fahimnia, Tang, Davarzani, & Sarkis, 2015)

2.2 Initial results analysis

The search string presents 358 available publications in the Scopus database as of July 20th, 2020. The scope of research of this document has limitations. First, this search query process is adapted from Qaiser et. al (2017). Second, the exclusion limits the document type to articles and conference papers, and third, the language of publications is limited to English as it contains most publications available. Previous limitations enable an amount of 326 available articles to examine.

Given the fact that a document might be categorized under different subject areas, Table 2 depicts the number of documents available per subject area. Because a single article may be concurrently assigned to multiple areas and the main target of this study is the selection of 3PL providers, I analyzed available abstracts and publications' content to reduce bias in the selection of the articles and to verify that the unit of analysis aims to the purpose of the research. Hence, the number of papers comes in 244 documents.

Table 2. Documents subject area

Subject area	Available documents
Business, Management and Accounting	161
Engineering	134
Computer Science	116
Decision Sciences	99
Social Sciences	40
Mathematics	32
Economics, Econometrics and Finance	15
Environmental Science	9
Physics and Astronomy	8
Materials Science	7
Chemistry	6
Energy	4
Earth and Planetary Sciences	3
Multidisciplinary	3
Biochemistry, Genetics and Molecular Biology	2
Chemical Engineering	2
Medicine	2
Arts and Humanities	1
Health Professions	1
Pharmacology, Toxicology and Pharmaceutics	1
Psychology	1

Source: Elaborated from Scopus database (2020)

2.3 Data analysis

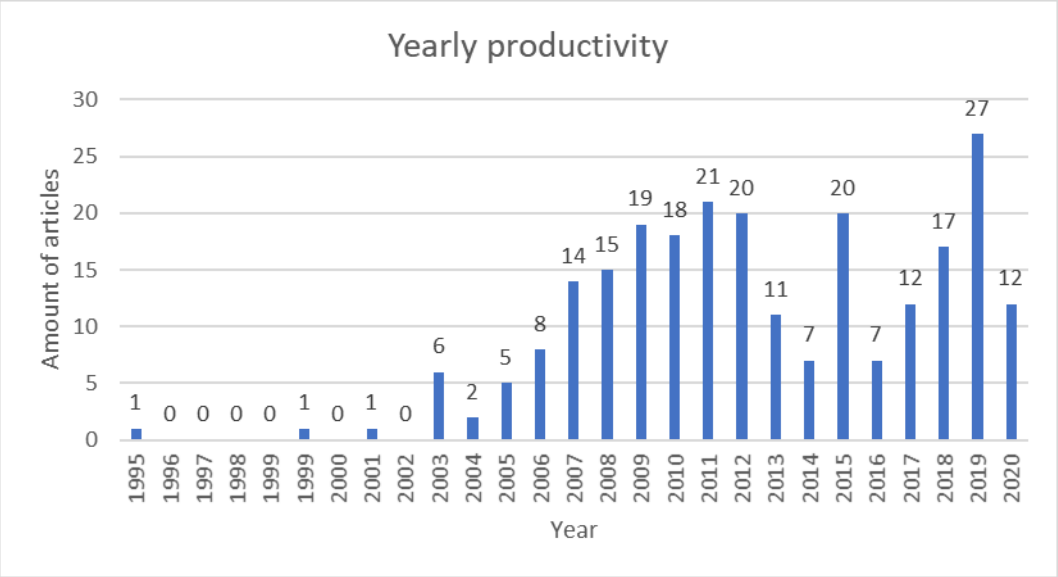
This research contains a quantitative and qualitative analysis. The first part contains a study of publication data as a trend in the number of papers published per year, papers per journal, list of prominent authors, and geography of publications. The latter focuses on the quality of the publications in terms of citation, co-citation analysis and to measure their impact. Additionally, this study presents business sectors where publications are applied to. Most of the previous metrics are applied in similar studies in supply chain management such as the research by Arunachalam, Kumar & Kawalek (2018), Taticchi et. al (2015) and Chen et. al (2017).

3. Results

To present and analyze findings, I selected VosViewer and Rstudio to process statistical data provided by Scopus. The aim is to obtain diagrammatic visualization and proceed with the discussion. VosViewer was used to get the co-citation mapping and countries coupling diagram. Rstudio was used with the bibliometrix r package to get data for tables.

3.1. Yearly productivity

Diagram 1. Yearly productivity



Source: Elaborated from Scopus database (2020)

During the first decade, the production of papers is low in comparison with the following years and set some insights about the topic. Based on a survey, McGinnis M.A., Kochunny & Ackerman (1995) set the starting point and present selection criteria applied by American companies. Meade & Sarkis (2002) develop the first conceptual model for evaluation and selection of providers in reverse logistics. Yan, Chaudhry, & Chaudhry (2003), evaluate the theoretical results against practical methods to develop a 3PL provider selection model. Finishing this period includes the first national studies like Singapore (Bhatnagar, Sohal & Millen, 1999), Malaysia (Sohail & Sohal, 2003), Turkey (Aktas & Ulengin, 2005), and Saudi Arabia (Sohail & Al-Abdali, 2005). In terms of e-commerce, the case study on grocers about operations and marketing concludes that quality of services, products, and e-business raises the probability of customers re-purchase (Boyer & Hult, 2005).

Between 2006 and 2012 the first peak of productivity takes place. First, qualitative models for provider selection are the main contribution to the amount of publication. Main methods include analytic network process (ANP), Analytic Hierarchy Process (AHP), Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS), interpretive structural modeling (ISM) and some combinations of the preceding ones (Bottani & Rizzi, 2006, Jharkharia & Shankar, 2007, Işiklar, Alptekin, & Büyüközkan, 2007, Qureshi, Kumar, D & Kumar P, 2008, Saen, 2009, Liu & Wang, 2009, Perçin, 2009, Govindan, Palaniappan, Zhu & Kannan, 2012). Globalization pressures and global competitiveness are also drivers for this growth phase in publications (Bajec & Jakomin, 2010, Miyashita, 2009, Kannan, Vinay & Koh, 2009, Bansal, Karimi & Srinivasan, 2008), Wong, 2012). Lastly, sustainability and the concern for the environment contribute to this phase (Efendigil, Önüt & Kongar, 2008, Wolf & Seuring, 2010, Govindan, Grigore & Kannan, 2010, Ge, 2010, Lieb R. & Lieb K, 2010)

The strong orientation to qualitative models seems to generate a lack of creativity and leads to a fall in productivity during 2013 and 2014. Due to an approach for industries' and

economic sectors' studies, amount of publications presents raises in 2015, but still apply or adjust the quantitative models of the first growing phase (Li, 2015, Chen L. and Chen N. 2015, Liu, 2015, Bali, Gümüş, & Kaya, 2015, Šrámková, Niko, Kolář, & Huňak, 2015, Sahu, Datta & Mahapatra, 2015, Sabtu, Saibani, Ramli & Ab Rahman, 2015)

From 2015 until nowadays, quantity publications presented a second growth phase. A new orientation on fourth-party logistics (4PL), the revision of reverse logistics, and industrial studies of cold chain exert influence in this phase. (Liao et. al, 2020, Raut, Gardas, Narwane, & Narkhede, 2019, Chang, Liao, & Zhang, 2019, Wu, Yazdani, & Zavadskas, 2020, Liao, et. al, 2020)

Additionally, the appearance of new quantitative methods like intuitionistic fuzzy sets (IFSs), Additive Ratio Assessment (ARAS), hybrid multi-criteria decision-making (HMCDM), Principal component analysis (PCA), and nonadditive fuzzy integral approach are the main driver for this growing trend. Previous models demand more data management, artificial intelligence, or machine learning to forecast scenarios and optimize decision making. (Aguezzoul, & Pires, 2019, Paciarotti et. al, 2019, Ju & Jing, 2019, Bali, Gümüş & Kaya, 2015, Yadav, Garg, & Luthra, 2020, Hwang & Shen, 2015, Oeser, 2020).

3.2. Top productive sources

To define the top productive sources, the number of articles per source ware divided by the total amount of 244 articles. After each source got an individual percentage, they were grouped to form the top 20 sources according to their productivity. As many sources published only 1 article to create the top list, sources with more available articles are presented in tiers, where the tier has a percentage from the total available articles. It is important to highlight this list is presented according to their productivity and not for the relevance a source may have in the field or other rankings.

In terms of sources, 3 tiers are gathered (Table 3). Where tier 1 produces around 18% of currently available articles from the top 5 journals, to mention in productivity order: International Journal Of Logistics Systems and Management (13 articles), International Journal Of Physical Distribution and Logistics Management, and International Journal Of Production Economics (9 articles each), Benchmarking (8 articles), Supply Chain Management (5 articles). Tier 2 produces from 3 to 4 articles (16.4%), with an average of 3 articles per source. Tier 3 holds around 2,5% of publications with the lowest productivity rate of 2 articles in the study's timeframe scope.

In research interval from 1995 to 2020, only two conferences present publications, 4 articles at the International Conference on Logistics Systems and Intelligent Management (ICLSIM) 2010 and 2 articles at the International Conference On E-Business and E-Government (ICEE) 2011.

Table 3. Top 20 most productive sources

Top	Articles	Sources
1	13	International Journal Of Logistics Systems And Management
2	9	International Journal Of Physical Distribution And Logistics Management
3	9	International Journal Of Production Economics
4	8	Benchmarking
5	5	Supply Chain Management
6	4	2010 International Conference On Logistics Systems And Intelligent Management Iclsim 2010
7	4	Industrial Management And Data Systems
8	4	International Journal Of Enterprise Network Management
9	4	International Journal Of Services And Operations Management
10	3	Iclem 2010: Logistics For Sustained Economic Development - Infrastructure Information Integration - Proceedings Of The 2010 International Conference Of Logistics Engineering And Management
11	3	Ieee International Conference On Industrial Engineering And Engineering Management
12	3	International Journal Of Business Excellence
13	3	International Journal Of Integrated Supply Management
14	3	International Journal Of Logistics Research And Applications
15	3	International Journal Of Production Research
16	3	Journal Of Global Operations And Strategic Sourcing
17	3	Journal of Modelling In Management
18	2	2011 International Conference On E-Business And E-Government Icee2011 - Proceedings
19	2	Asian Journal Of Shipping And Logistics
20	2	Canadian Journal Of Administrative Sciences

Source: Elaborated from Scopus database (2020)

3.3.Most prolific authors

The following measures (C, P, C/P) generate a better categorization of the productivity and relevancy of available publications. Additionally, by comparing these measures I can diminish the bias to elaborate the top list in table 4, table 5, and table 6.

Table 4 present the most relevant authors, where "P" is the number of published articles by an author, "C" is the number of citations of an author by the time data was gathered and "C/P" is the ratio of citations per article that an author has.

Kumar P & Kumar D have the majority publications (9 and 7 papers respectively), followed by Ganesh K, Pugazhendhi S, Rajesh R, and Raut R with 5 papers each. Gardas B, Kharat M, Narkhede B, and Qureshi M present 4 documents each. Regarding the influence of the authors, measured by using H-Index and citations count (Clarivate Analytics, 2020), a higher h-index does not guarantee the highest number of citations.

Table 4. Most prolific authors

Top authors				
Author	**H-Index**	**P**	**C**	**C/P**
Kumar P	7	9	230	25,6
Kumar D	6	7	206	29,4
Ganesh K	4	5	36	7,2
Pugazhendhi S	4	5	36	7,2
Rajesh R	4	5	36	7,2
Raut R.	3	5	14	2,8
Gardas B.	2	4	13	3,3
Kharat M.	3	4	19	4,8
Narkhede B.	2	4	24	6,0
Qureshi M.	4	4	164	41,0

Source: Elaborated from Scopus database (2020)

In contrast to the number of publications by author and h-index, the number of citations changes the distribution of the top 10 most influencing authors (see Table 5). This implies the fact that the impact of publications in this field is not directly related to the number of published papers. Shankar R (454 citations) and Jharkharia S (435 citations) are the top-cited authors. Furthermore, 6 out of 10 authors publish only 1 article but have more than 200 citations. Finally, Kumar D and Kumar P remain in tables 4 and 5, suggesting a substantial contribution and influence in the field.

Table 5. Most influential authors

Top authors				
Author	**H-Index**	**P**	**C**	**C/P**
Shankar R	7	3	454	151,3
Jharkharia S	6	1	435	435,0
Govindan K	4	3	298	99,3
Kumar P	4	9	230	25,6
Kannan D	4	1	224	224,0
Palaniappan M	3	1	224	224,0
Zhu Q	2	1	224	224,0
Meade L	3	1	215	215,0
Sarkis J	2	1	215	215,0
Kumar D	4	7	206	29,4

Source: Elaborated from Scopus database (2020)

3.4.Productivity per country

Table 6 present the top 10 most productive countries, where "P" is the number of published articles by an author, "C" is the number of citations of a single country by the time data was gathered and "C/P" is the ratio of citations per article that a country has.

Table 6. Top 10 most productive countries

Most productive countries			
Country	**C/P**	**P**	**C**
Turkey	35,1	7	246
Italy	25,3	12	303
USA	15,1	47	710
Australia	12,7	17	216
India	10,4	89	929
China	7,4	64	476
Canada	6,6	9	59
UK	3,0	7	21
Iran	2,6	12	31
Brazil	2,3	9	21

Source: Elaborated from Scopus database (2020)

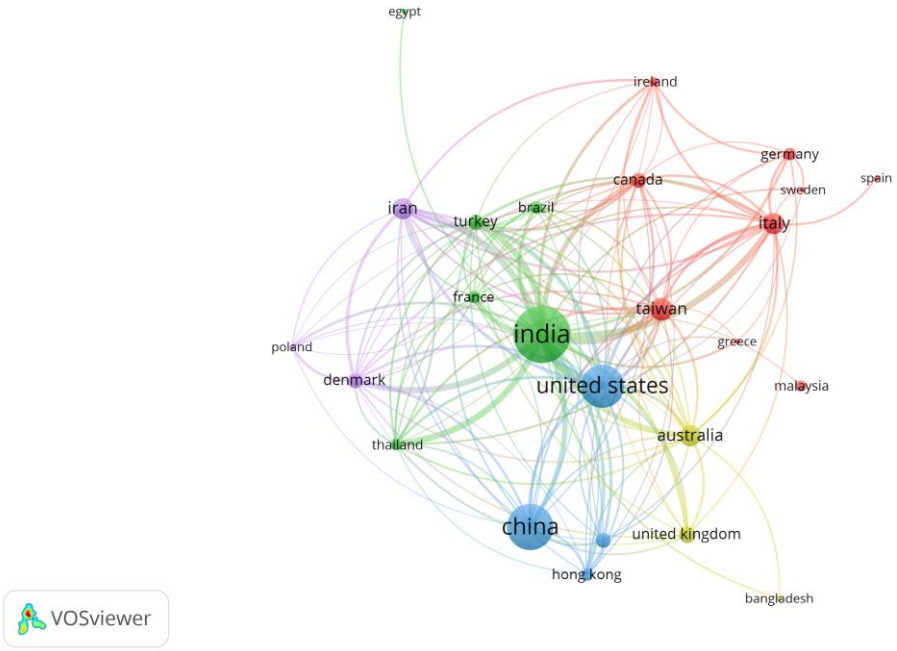
India leads the top producing country by far (89 publications), followed by China (64) and the USA (47). The second tier of productive countries is Australia, Iran, and Italy. The last tier, with less than 10 publications, is Brazil, Canada, Turkey, and the United Kingdom. The previous results indicate that these countries generate knowledge regarding 3PLS provider selection. In terms of citation, India contains the highest amount (929) followed by the USA with 710. However, Turkey has the highest average of citations per publication (35,1) followed by Italy (25,3). Although Italy has 11 publications, it presents the fourth largest amount of citations (303).

By considering the ratio of C/P, it provides a change in the measure of productivity and relevancy of the countries. Here Turkey is the leading country (35,1), followed by Italy (25,3) and in third place the USA (15,1). Top producing countries India and China are now in the fifth and forth place respectively.

Additionally, the country coupling (Diagram 2) is following the country production. This allows identifying, in terms of international collaboration, which countries usually tend to work along in research for the selection of third-party logistics providers.

The leading countries, India, China, and the United States are the most collaborative countries producing papers in this field of research. The bigger the dot, the more productive a country is in terms of papers. The colors indicate (green, blue, red, yellow, and purple) the tendency of those countries to work together to publish articles about 3PLS provider selection.

Diagram 2. Countries coupling



Source: Elaborated from Scopus database (2020)

3.5.Most productive affiliations

In terms of published articles related to 3PLS provider selection, the National Institute of Industrial Engineering (NITIE) is the leading institution with 21 publications. Islamic Azad University in Iran and the Indian Institute of Technology occupy second and third place with 10 and 7 publications respectively. The National Institute of Technology of India is in fourth place with 6 publications. Annamalai University, National Institute of Technology and Noorul Islam University from India, and the National University of Singapore rank as five with 5 publications each. Delhi Technological University (India), the University of Southern Denmark, and the University of Wollongong (Australia) present 4 published articles each by the time this study was done. This result is consistent with the countries coupling and country productivity, where India stills having a high contribution to this field of research.

Table 7. Top 10 most productive affiliations

Top 10 affiliations		
Affiliations	**Articles**	**Country**
National Institute Of Industrial Engineering (Nitie)	21	India
Islamic Azad University	10	Iran
Indian Institute Of Technology	7	India
National Institute Of Technology	6	India
Annamalai University	5	India
National University Of Singapore	5	Singapure
Noorul Islam University	5	India
Delhi Technological University	4	India
University Of Southern Denmark	4	Denmark
University Of Wollongong	4	Australia

Source: Elaborated from Scopus database (2020)

3.6. Co-citation analysis

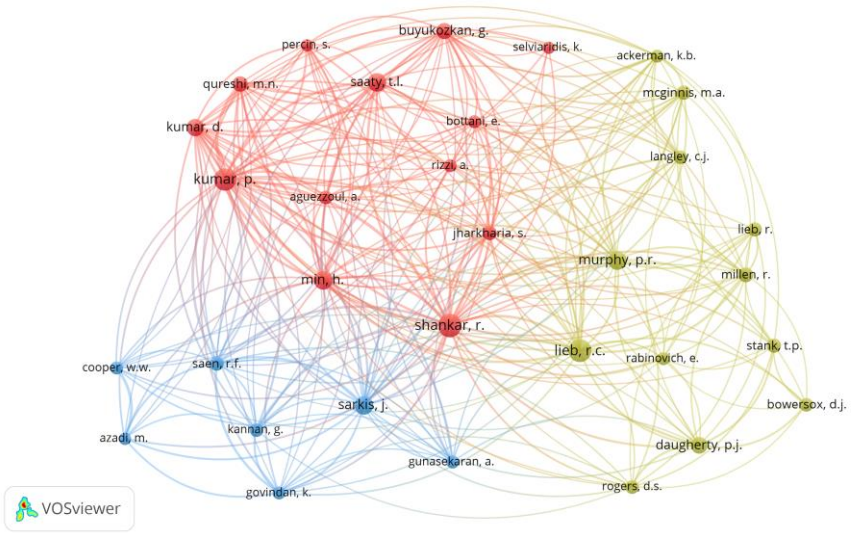
The co-citation mapping allows visualization of which authors are cited together in a third publication. The closer the authors' location to one another, the more both authors are cited together, and the bigger the circle the more citations publications and authors have. This is also a sign that authors have a semantic relationship or have publications on similar topics or methodologies. The bigger the circle the more citations and author has.

Authors in the blue cluster like Kannan (2009), discuss a conceptual approach of 3PLS in India and Govindan (2012, 2016 & 2019) works on providers selection using methodologies like ISM, ELECTRE I and SMAA (for reverse logistics) and DEMATEL, the latter includes provider evaluation. Meanwhile. Sarkis (2002) presents research about reverse logistics and its conceptual model to select and evaluate providers.

The red cluster is oriented to multicriteria models, where Botanni (2006) discusses fuzzy TOPSIS methodology to select and rank a 3PLs provider. Here the most influencing authors are located. Shankar (2006, 2007) is associated with providers selection using the ANP approach and their allocating using mathematical model of multiple objective programming. Qureshi, Kumar D and Kumar P (2006, 2007, 2008, 2010) analyze publications about assigning potential providers using TOPSIS, modeling 3PLS providers selection criteria using AHP approach (including Graph Theory) ISM and FMICMAC analysis.

Meanwhile, the yellow cluster represents studies based on surveys to firms and managers regarding the usage of 3PLS. I consider it as the foundation cluster., Lieb R. (2008) presents studies about 3PLS in North America. Mcginnis (1995), which is the starter of this field of research, presents in its study the results of survey oriented to the decision to use 3PLS. Millen (1999) identifies determinants for the usage of 3PLS in Singapore.

Diagram 3. Authors’ co-citation mapping



Source: Elaborated from Scopus database (2020)

4. Business sectors with applicable selection models.

With aims to contribute to the community, table 8 presents models that are applied to different business sectors. The list of publication depicts studies that are carried under real business conditions. Models contain their variables and methodology of the business or company. Hence the list is a feasible tool for practitioners involved in those business sectors to apply 3PL provider selection models.

Table 8. Applied models to business sectors

Applied Study Cases	
Business sector	**Works**
High tech and electronics	Hwang, B. and Chen, M.(2013 , 2015) , Cochran, J. K., and Ramanujam, B. (2006) , Jayant, A., Gupta, P., Garg, S. K., and Khan, M. (2014) , Cheng, Y. and Lee, F. (2010) , Hwang, B. , Chen, T. and Lin, J. T. (2016) , Tsai, M. , Wen, C. and Chen, C. (2007).
E-commerce	Boyer, K. K., and Hult, G. T. M. (2005) , Nuengphasuk, M., and Samanchuen, T. (2019) , Tan, X., and Xu, M. (2011) , Huang, Y., and Yin, K. (2014) , Xu, W., and Li, B. (2017) , Ma, L., Jin, C., and Huo, Y. (2019).
Food and agriculture	Kumar, M., Vrat, P., and Shankar, R. (2006) , Paciarotti, C. et all (2019) , Raut, R. D., Gardas, B. B., Narwane, V. S., and Narkhede, B. E. (2019) , Yadav, S., Garg, D., and Luthra, S. (2020).
Automobile and automotive parts	Gl, H., and Catay, B. (2007), Schittekat, P., and Sörensen, K. (2009) , Liu, J. (2015).
Recycling	Sabtu, M. I., Saibani, N., Ramli, R., and Ab Rahman, M. N. (2015) , Liu, Y., and Zhang, Y. (2018) , Liu, A., Ji, X., Xu, L., & Lu, H. (2019).
Chemicals	Bansal, M., Karimi, I. A., and Srinivasan, R. (2008) , Vazifehdan, M. N., & Darestani, S. A. (2019).
Pharma	Azzi, A., Persona, A., Sgarbossa, F., & Bonin, M. (2013) , Vazifehdan, M. N., and Darestani, S. A. (2019).
Other manufacturing activities	W. M., and Zhang, Q. M. (2013) , Plastic - Mavi, R. K., Goh, M., and Zarbakhshnia, N. (2017) , Cement - Bulgurcu, B., and Nakiboglu, G. (2018).

Source: Own made

5. The relationship between countries' productivity and its Logistics Performance Index (LPI).

The Logistics Performance Index (LPI) is an index that presents the countries performance on trade logistics (World Bank, 2020). Values of this index vary from 1 (Lowest performance) to 5 (highest performance). The expected relationship between the LPI and countries' publication productivity would be that the more publications towards a concrete topic a country has, the higher the performance this country would have. To validate this statement, Table 9 summarizes the LPI score of the top 10 most productive countries (data of Table 6) versus the average of the LPI score of the same countries (World Bank, 2020). An important note to highlight is the fact that in the year 2014 the LPI database did not provide the score of the country Iran.

As the Pearson correlation obtained is -0.07, which is close to zero, it leads to conclude that the publications of articles related to 3PLS providers selections have no impact on the country's logistics competitiveness.

Table 9. Correlation of countries productivity

Most productive countries		LPI Score						
Country	**P**	2007	2010	2012	2014	2016	2018	Average
India	89	3,07	3,12	3,08	3,08	3,42	3,18	3,16
China	64	3,32	3,49	3,52	3,53	3,66	3,61	3,52
USA	47	3,84	3,86	3,93	3,92	3,99	3,89	3,91
Australia	17	3,79	3,84	3,73	3,81	3,79	3,75	3,79
Iran	12	2,51	2,57	2,49		2,6	2,85	2,60
Italy	12	3,58	3,64	3,67	3,69	3,76	3,74	3,68
Brazil	9	2,75	3,2	3,13	2,94	3,09	2,99	3,02
Canada	9	3,92	3,87	3,85	3,86	3,93	3,73	3,86
Turkey	7	3,15	3,22	3,51	3,5	3,42	3,15	3,33
UK	7	3,99	3,95	3,9	4,01	4,07	3,99	3,99

Coefficient of correlation
-0,07

Source: Own made with data from LPI scores of World Bank (2020).

4. Conclusions

This research is a bibliometric analysis of the 3PL selection using the Scopus database. Papers and conference papers are selected for quantitative and qualitative analysis. India, the United States, and China are the main producing countries as well as the most collaborative ones on this topic. During the first decade, this topic has produced in different ranges of subtopics like selection criteria, framework, and decision-making models using surveys or case studies in the methodology. The period between 2006 and 2015 contains the most mathematical models for selection and evaluation of providers contributing. This stage also shapes the style of publications in this research field. The 3PLS provider selection could gain more productivity in the following years as there are opportunities to develop research about last-mile distribution, apply case studies of e-commerce businesses.

Additional research might be expected after the covid19 pandemic, those publications could be oriented to collaborative distribution networks. Another open discussion is to study the relationship between financial performance and the provider selection, as few financial involvements in the process are mentioned.

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