**IJCRT.ORG** 

ISSN: 2320-2882



# INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

# A STUDY ON: IMPACT OF PACKAGING AND LABELING IN INTERNATIONAL TRADE: SPECIAL REFERENCE TO DANGEROUS GOODS

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#### **Abstract**

It is important to consider how packaging and labelling affect international trade, especially when it comes to the transfer of hazardous materials. The safekeeping of people and the environment, as well as enabling international trade, are greatly aided by the proper packaging and labelling of harmful items. The rules created by the International Maritime Organization and International Air Transport Association for the packaging and labelling of hazardous materials for sea and air transportation, respectively, are the main subject of this research. The study aims to explore which Scopus journals are crucial for hazardous commodities labelling and packaging and to determine the nation's contribution to Scopus on the packaging and labelling of hazardous commodities. The study also aims to shed light on the significance on networks of cooperation for hazardous commodities labelling and packaging. Overall, the study emphasizes the importance of complying with packaging and labelling journals for goods to ensure safe and efficient international trade.

**Keywords**: Packaging & Labelling, Packing, Dangerous Goods, Chemical Composition, and Labour Norms, VOSviewer.

#### Introduction

The goal of this study is to analyze the incidents and accidents in the field of transporting dangerous goods by any transport, identify key risks related to the transportation of supplies, and assess safety.

The problems faced by any Exporter in transporting such stuff fall into two categories:

- Danger posed to the public,
- Infrastructure objects and the environment, and incidents when oil products and other hazardous substances get into the environment.

The complexity of systems plays a major part in risk analyses, and detailed calculations take into account the frequency of releasing hazardous substances from containment accidents and the impact of damage mechanisms on land and demographic environments. The transportation of dangerous goods is a complex process that involves loading, packing, marking, documentation, acceptance and storage. To ensure the safety of the participants involved in the system of dangerous goods, the following factors should be taken into consideration: selection of alternative transport types, evaluation of routes, evaluation of the technological transportation process, assessment of transportation risk, and possibility of reducing accident risk to a mini-mum. The authors base risk calculations on the incident probability and comprehensive analysis of consequences. The risk assessment of hazardous substances depends on three factors: number of accidents, traffic intensity of one day and the density of populated areas; and length of the route. As for the transportation of dangerous goods, greater responsibility lies on stuff loading, packing, marking, documentation, acceptance and storage. The risk of an incident occurs in the entire logistic link. (Tomasoni, Garbolino, Rovatti, & Sacile, 2010) note that, in order to ensure the safety of transportation in choosing vehicles, it is necessary to explore the factors making an influence on transportation risk. Researchers have tried to generate quantitative indicators to improve working conditions and employment through training and stability.

The flow of risky items likewise grows as the demand for hazardous materials rises. After determining the harm that hazardous chemicals pose to the environment, people, and the whole transportation system, it is crucial to ensure the safety of these procedures. According to (Diernhofer, Kohl, & Hörhan, 2010) and (Chakrabarti & Parikh, 2011)), accidents happen more frequently as a result of human error in the production and transportation operations than as a result of the characteristics of hazardous chemicals. Risks have a role in mishaps while delivering dangerous goods, claim (Chakrabarti & Parikh, 2011). The authors use incident probability and thorough consequences analysis to calculate risk.

The release of packaged or containerized dangerous goods during transport can have serious consequences on board a ship, and this study focused on identifying factors contributing to these releases and investigating the contribution of dangerous goods accidents to overall container ship accident rates. Self-ignition or ignition of incorrectly declared dangerous goods was identified as a contributing factor for fatal accidents. Ensuring that dangerous goods are correctly prepared and documented for marine transport is important for preventing releases and improving on board safety.

#### **Literature Review**

This study aims to provide an inclusive risk picture in container shipping operations.

Knop, Krzyzstof found that 'Man and method are key elements in the field of labeling technology management in the studied enterprise for achieving quality and work safety objectives. The man and work method turned out to be the main causes of quality and work safety-related problems' (Knop, 2021) In an controlled experiment on packaging and labeling samples in Brazil in 2018 Dr Neha Khandpur who is an academic researcher from University of São Paulo. The author has contributed to research in topic(s): Population & Food group. Warning labels outperformed traffic light labels in improving consumer comprehension and perceptions, influencing purchase intentions, and conveying the need to consume ingredients in smaller, less frequent amounts. (Neha Khandpur, 28 May 2018) Additionally, Teresa Correa, Professor (Prof. titular), School of Communication, Univ. Diego Portales, Chile and her journal article with Camila Fierro, Marcela Reyes, Francesca R. Dillman Carpentier, Lindsey Smith Taillie & Camila Corvalan on "Responses to the Chilean law of food labeling and advertising: exploring knowledge, perceptions and behaviors of mothers of young children" They drew results and concluded that the current study advances knowledge of the various pathways involved in both positive and negative consumer responses, as well as how regulatory initiatives can change people's behavior. This kind of data proves essential for comprehending the effects of rules as well as for directing potential future adjustments or supplementary activities (Teresa Correa, 13 February 2019). By investigating firms Jung, P. H., identified that the proposed approach is a viable alternative for evaluating 3PL providers considering social sustainability. (Jung, 2017). Thompson Rivers University which is a public teaching and research university offering undergraduate and graduate degrees and vocational training. Its main campus is in Kamloops, British Columbia, Canada had publishes an journal article in which it has categorized these goods will help every exporter who is dealing with dangerous goods on regular basis (university, 2016). On other hand Entrepreneurs should pay attention to mounting goods and measures to prevent accidents, as well as procedures to reduce accident consequences (Nijolė Batarlienė, 2014). By investigating firms in Taiwan, identified that the thesis ranked a group of risk factors rather than identified the most important risk factor (Chang, 2013). On other hand, according to (Diernhofer, Kohl, & Hörhan, 2010) and (Chakrabarti & Parikh, 2011), incidents happen more frequently as a result of human error in the production and transportation operations than as a result of the characteristics of

hazardous substances. Risks have a role in mishaps when delivering dangerous goods, claim (Chakrabarti & Parikh, 2011). The authors' risk assessments are based on a thorough investigation of the implications and incidence likelihood. The authors formally consider a risk reduction by rationalizing the packaging and labeling of hazardous materials in their presentation. According to, the primary aim is to discover possibilities to reduce risk by taking into consideration crucial elements connected with each potential route while also taking into account the amounts of production and consumption at each site of the network (Kawprasert & Barkan, 2008). Furthermore, Faria, M. J., found out The label allows for the supply of an additional quality in equilibrium, which is the optimal label. The flow of unsafe items likewise increases as the demand for hazardous substances does. After determining the harm that hazardous substances pose to the environment, people, and the entire transportation infrastructure, it is crucial to ensure the safety of these procedures. (Faria, 2002)

The past related researches mainly focused on price and service quality when evaluating third-party logistics providers, not considering social sustainability related criteria such as labor or management policy issues.

#### **Bibliometric Analysis**

Bibliometric analysis evaluates and projects present and future research paths using statistical and other quantitative techniques (Yu, 2017). Hence, the study of employee turnover can be used to uncover trends using bibliometric. To analyze published data in terms of the text and information about the author, affiliation, cocitation, citations, and keywords utilized, a group of techniques known as "bibliometric" is used (Norton, 2000). By using bibliometric analysis as a method of evaluation, one can assess the impact of technology on an author's output and follow the development of research activity over time. Bibliometric maps can be made and viewed using a computer programme called VOSviewer. The scientific community can use Vosviewer without charge. Using this programme, author and journal maps are produced (Vosviewer, 2023).

# Methodology

Although the idea of packaging and labelling for dangerous goods is one that has been extensively discussed in the literature, the bibliometric perspective of this approach has not been adequately explored. In order to close the gap identified by the literature evaluation, exploratory research was therefore carried out. Moreover, research will aid to advance understanding of this idea.

# **Research Objectives:**

By giving the new information, the study aimed to bring knowledge to the field of packaging and labelling for dangerous goods and associated problems:.

• To be aware of the yearly research papers on packaging and labelling for dangerous goods that are published in Scopus.

- To determine which Scopus journals are the most important ones for packaging and labelling hazardous goods.
- To find the Scopus writers who have written the most about packaging and labelling for dangerous goods.
- To determine the country's contribution to Scopus on dangerous goods packaging and labelling.
- To investigate networks of collaboration on packaging and labelling for dangerous goods.

#### **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. When the term "Packaging and Labelling in Dangerous Goods" OR "Packaging and Labelling in DG" was entered in the Scopus database, 253 publications were discovered in the article title, abstract, and Keywords. 73 items were discovered with a second search using the title. Additionally, we limited our research to the years 2018 through 2023 and discovered 18 articles. The investigation also discovered 18 articles for additional analysis based on the exclusion of the subject area, document title, source title, and language. Nees Jan van Eck and Ludo Waltman from the Centre for Science and Technology Studies (CWTS) at Leiden University uploaded the final 18 articles' CSV file to VOSviewer for additional bibliometric analysis. The relationship between authors, nations, author citations, journals, sponsors, and popular keywords is further examined.

### **Analysis and Results**

#### Overview of the Data

A total of 18 articles written by 39 authors from 2018 to 2023 were used for the final analysis. Out of 18 documents 7 documents were cited at least once. The average citation per document is 2.5 per course.

Particulars	Result
Total Articles	18
Total Authors	39
Time Frame	5 Years
Organisations	92
Countries	35
Total Journals	32
Reference	2317
Cited Sources	1501
Cited Authors	3040

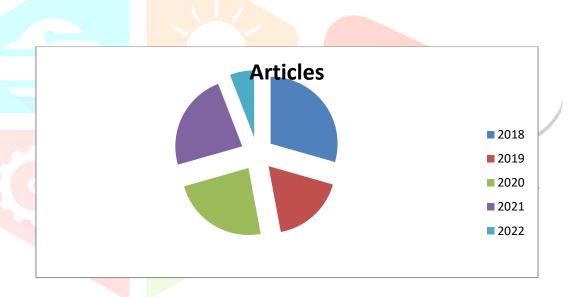
Table 1 Overview of the Data

#### Year wise Publication

Researchers have continued to favor publication growth during the past five years. There have been a few ups and downs, but nothing major. The field of marketing and international business study continues to be interested in packaging and labeling. The majority of the contributors either work in marketing, international business, or strategic management. The majority of the research was done in developed countries.

YEAR	Articles	% (N= 18)
2018	5	0.27
2019	3	0.16
2020	4	0.22
2021	4	0.22
2022	1	0.05

Table 2 Year wise Publication and Average



Graph 3 Year wise Publication and Average

# **Author Analysis**

Table 3 shows the researchers' research on "Packaging and Labeling" from 2018 to 2022 had more than 24 citations. ćanakçioÄŸlu M.(2021), Buzard K., Voon T., Upreti P.N. (2020), Ehmke M.D., Bonanno A., Boys K., and Smith T.G. are the top researchers in the field (2019). The authors mainly analyse the articles focusing on the International Commerce, Asymmetric Information, Consumer Demand, Labeling, and Phytosanitary Regulation. Due to their longevity compared to more recent publications, articles published in 2018 and 2019 received more citations. Table 3 showed the top authors with more citations, whereas Table 4 showed authors with more papers.

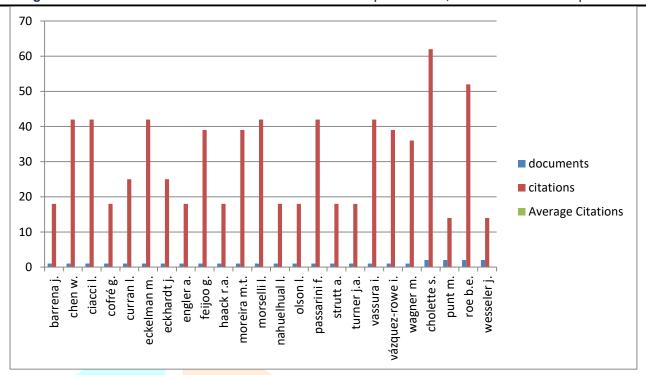
AUTHOR	CITATIONS
Barrena J.	18
Chen W.	42
Ciacci L.	42
Cofré G.	18
Curran L.	25
Eckelman M.	42
Eckhardt J.	25
Engler A.	18
Feijoo G.	39
Haack R.A.	18
M <mark>oreira</mark> M.T.	39
Morselli L.	42
N <mark>ahuelhual L.</mark>	18
Olson L.	18
Passarini F.	42
Strutt A.	18
Turner J.A.	18
Vassura I.	42
Vázquez-Rowe I.	39
Wagner M.	36
Cholette S.	62
Punt M.	14
Roe B.E.	52

Table 4 Top Authors based on Citation

Table 4 represented the number of articles published by the individual authors concentrating on "Packaging and Labeling". Authors such as Cholette Susan. ,Punt M., Roe B.E. are having more publication in the field of "Packaging and Labeling". Roe B.E, Cholette Susan. published highest 2 articles focusing on the "Packaging and Labeling". Susan Cholette is Professor of Decision Sciences in the Lam Family College of Business at San Francisco State University (SFSU) where she teaches graduate and undergraduate classes in operations, supply chain management and project management

AUTHOR	DOCUMENTS	CITATIONS
BARRENA J.	1	18
CHEN W.	1	42
CIACCI L.	1	42
COFRÉ G.	1	18
CURRAN L.	1	25
ECKELMAN M.	1	42
ECKHARDT J.	1	25
ENGLER A.	1	18
FEIJOO G.	1	39
HAACK R.A.	1	18
MOREIRA M.T.	1	39
MORSEL <mark>LI L.</mark>	1	42
NAHUELHUAL L.	1	18
OLSON L.	1	18
PASSARINI F.	1	42
STRUTT A.	1	18
TURNER J.A.	1	18
VASSURA I.	1	42
VÁZQUEZ-ROWE I.	1	39
WAGNER M.	1	36
CHOLETTE S.	2	62
PUNT M.	2	14
ROE B.E.	2	52

Table 5 Authors with Publications



Graph 2 Authors with Publications

# **Journal Analysis**

Table 5 represents the information related to journals that published maximum articles focusing on the "Packaging and Labeling". The journals from the Marketing, International Marketing, and International Business published the research papers. The Highest publication made by the International Marketing Review, ISSN: 0265 – 1335, Published by Emerald publication. Journal of business research, Print ISSN: 0148-2963, Online ISSN: 1873-7978, published by Elsevier Publications. All these journals are managed by top-class publication houses like emerald, Elsevier, Willey etc.

Source	Documents	Citations	Average Citations
Agricultural Economics (United Kingdom)	2	88	44
Food Policy	2	41	20.5
Global Trade And Customs Journal	2	2	1
Journal Of Agricultural And Food Industrial			
Organization	3	14	4.666667
Journal Of World Trade	2	2	1
Marine Policy	2	73	36.5
Agricultural Economics (Czech Republic)	1	7	7
Australian Journal Of Agricultural And			
Resource Economics	1	13	13
Food Policy	1	18	18
Forest Policy And Economics	1	18	18
Journal Of International Economic Law	1	14	14
Journal Of Wo <mark>rld Trade</mark>	1	1	1
Marine Po <mark>licy</mark>	1	39	39
Resources, Conservation And Recycling	1	42	42
Review Of International Political Economy	1	25	25
University Of Pennsylvania Journal Of			
International Law	1	36	36
World Trade Review	1	1	1

Table 6 Journals with number of Documents

The total number of citations for the journals is shown in Table 6. Journal of International Business Studies, International Marketing Review, Journal of Business Research, Journal of International Marketing, Journal of Consumer Research, and Journal of Marketing Research are the top journals with the most citations. These journals are distributed by reputable publishers like Emerald Willey and Elsevier, among others.

© 2023 IJCK I	Volume 11, Issue 3
AUTHOR	CITATIONS
Barrena J.	18
Chen W.	42
Ciacci L.	42
Cofré G.	18
Curran L.	25
Eckelman M.	42
Eckhardt J.	25
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Haack R.A.	18
Moreira M.T.	39
Morselli L.	42
Nahuelhual L.	18
Olson L.	18
Passarini F.	42
Strutt A.	18
Turner J.A.	18
Vassura I.	42
Vázquez-Rowe I.	39
Wagner M.	36
Cholette S.	62
Punt M.	14
Roe B.E.	52
Wesseler J.	14

Table 7 Journals with highest citation

The organizations listed in Table 7 are those that supported research in the "Packaging and Labeling" discipline. Leading supporters of research in the field of packaging and labelling include the School of Economics, University of Maine, Orono, United States; SFSU, San Francisco, United States; Ohio State University, Columbus, United States; and Georges Lemaitre Center For Earth And Climate Research, Earth And Life Institute, Université Catholique De Louvain, Place Louis Pasteur 3, Louvain-La-Neuve, 1348, Belgium.

Organization	Documents	Citations
College Of Business, San Francisco State University, San Francisco,		
Ca, United States	1	17
Departamento Economía Agraria, Facultad De Ciencias Agrarias,		
Universidad De Talca, 2 Norte 685, Talca, Chile	1	18
Department Of Agricultural, Environmental And Development		
Economics, Ohio State University, Columbus, Oh 43210, United States	1	43
Dept. Of Biodiversity And Environmental Management, University Of		
León, Avda. Astorga S/N, Ponferrada, León, Cp 24400, Spain	1	87
Escuela De Ingeniería Industrial, Universidad Diego Portales, Santiago,		
Chile	1	17
Family, Youth And Community Sciences, University Of Florida,		
Gainesvil <mark>le, Fl 3261</mark> 1, United States	1	79
Fish Lab, Department Of Veterinary Sciences, University Of Pisa,		
Viale Delle Piagge 2, Pisa, 56124, Italy	1	72
Food And Resource Economics Department, University Of Florida,		
Gainesvil <mark>le, Fl 32611, United Sta</mark> tes	1	79
Georges Lemaitre Center For Earth And Climate Research, Earth And		
Life Institute, Université Catholique De Louvain, Place Louis Pasteur		
3, Louvain-La-Neuve, 1348, Belgium	1	87
Horticultural Sciences Department, University Of Florida, Gainesville,	14	*
Fl 32611, United States	1	79
Industrial And Systems Engineering Department, Pontificia	<i>y</i>	
Universidad Católica De Chile, Santiago, Chile	1	17
Instituto De Economía Agraria, Facultad De Ciencias Agrarias,		
Universidad Austral, Valdivia, Chile	1	18
National Centre Of Epidemiology And Population Health, Research		
School Of Population Health, Australian National University, 62 Mills		
Road, Canberra, Act 2601, Australia	1	23
Physical Resource Theory, Chalmers University Of Technology,		
Göteborg, Sweden	1	87
School Of Economics, University Of Maine, Orono, Me 04469, United		
States	1	43
School Of Human Ecology, Sukhothai Thammathirat Open University,		
Chaengwattana Rd, Muang Thong Thani, Bangpood, Nonthaburi,	1	23

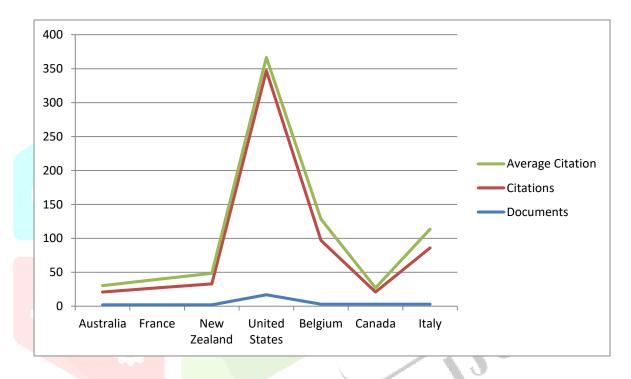
11120, Thailand		
Sfsu, San Francisco, Ca, United States	1	45
Stockholm Environment Institute (Sei), Postbox 24218, Stockholm,		
104 51, Sweden	1	87
Universidade Federal Do Rio Grande Do Sul, Centro De Estudos E		
Pesquisas Em Agronegócios (Cepan), Av. Bento Gonalves 7712 -		
Predio Da Agronomia - 1andar, Porto Alegre - Rs - Cep.: 91.540-000		
6586, Brazil	1	92
University Of West Of Santa Catarina, Unoesc, Joaaba, Brazil	1	92
Center For Industrial Ecology, Yale University, New Haven, Ct 06511,		
United States	1	42
Department Of Chemical Engineering, School Of Engineering,		
University Of Santiago De Compostela, 15782 - Santiago De		
Compostela, Spain	1	39
Department Of Civil And Environmental Engineering, Northeastern		
University, Boston, Ma 0211 <mark>5, United States</mark>	1	42
Department Of Industrial Chemistry And Materials, University Of		
Bologna, Bologna 40136, Italy	1	42
Department Of Law, University Of Miami School Of Law, United		
States	1	36
Toulouse Business School, Toulouse, France	1	25
University Of York, Department Of Politics, York, United Kingdom	1	25

Table 8 Organisation wise publications

The following table shows the most active/productive research territory/country in the field of Packaging and Labeling. The United States of America is the most active country in the field of Packaging and Labeling with 17 publications accounting for 53.25% of total research work done on the topic. It is followed by Belgium with a total of 9.37% publications.

Countries	Documents	Citations
Australia	2	19
France	2	25
New Zealand	2	31
United States	17	330
Belgium	3	94
Canada	3	18
Italy	3	83

Table 9 Country wise Publication



**Graph 3 Country wise Publication** 

## **Co-occurrence Analysis**

In this phase of the study, the co-occurrence network map for the keywords is looked at and analysed. The co-occurrence of keywords can effectively indicate the areas of disciplinary research that are most active. The research hotspots in the field are revealed by keyword co-occurrence. The network of keyword co-occurrence is built using the VOSviewer software. The network analysis of keywords results in the construction of nodes, and the size of the node represents the weight of the node. The relationship between the nodes is represented by the distance between them. The line drawn between two words implies that there is a stronger association between the words the closer they are to one another. The thickness of the line between the nodes indicates how frequently the keywords occur together. Nodes that belong to the same cluster are represented by the same colour. By using VOSviewer, the employee turnover keywords were grouped into clusters. The search word that appears the most commonly is "packing." Among those used frequently are "buyer market power," "chemical composition,"

"chloroplasts," and "labour norms." How frequently two keywords appear together tells us how powerful a link is. The link strength is a numerical statistic that shows the relationship between two nodes. Two clusters were created from the 44 words in the keyword network analysis.

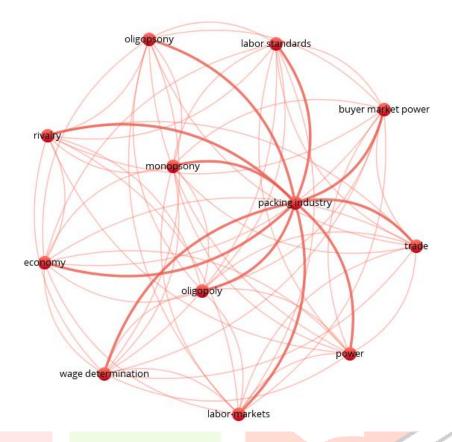


Figure 1 Keywords Co - occurrence network

Without any cooperation, conducting research on any subject becomes typically fairly difficult for an individual. As a result, many initiatives require collaboration and teamwork to finish the research. Hence, co-authorship analysis is essential when conducting bibliometric analysis to assess the current state of research in a certain field. Below is an analysis of nation co-authorship from the study. This co-authorship analysis was done using the programme VOSviewer. The level of communication between nations and those that significantly influence this field of study is revealed by looking at national co-authorship. Strong nations are represented by large densities. Without any cooperation, it is usually fairly challenging for an individual to conduct study on any subject. As a result, in order to complete various efforts, cooperation and teamwork are necessary. Hence, while performing bibliometric analysis & Bar Graph to evaluate the present level of research in a certain topic, co-authorship analysis is crucial. This is a breakdown of the study's national co-authorship. Using Vosviewer, this co-authorship analysis was carried out. Examining national co-authorship reveals the degree of communication between nations and those who have a substantial impact on this field of study. Dense populations are a sign of strong nations.

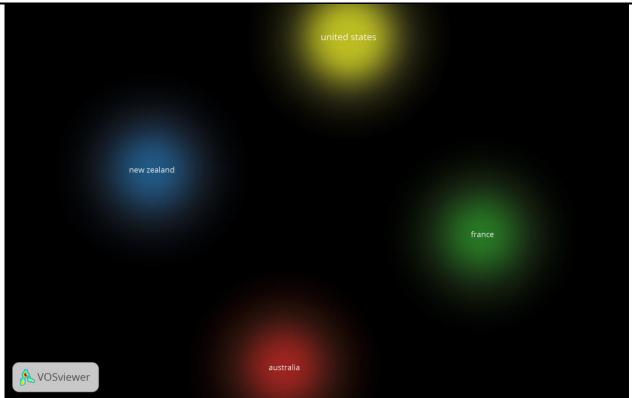
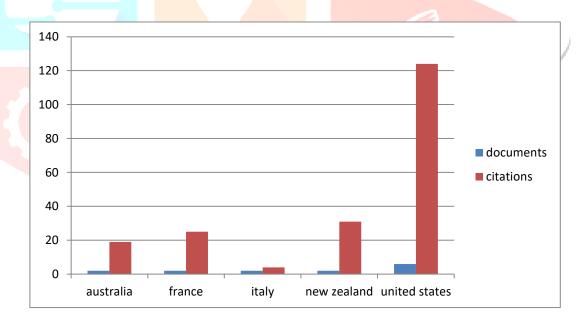


Figure 3 Keywords Co - occurrence network (Country wise)



Graph 4 Keywords Co - occurrence network (Country wise)

#### **Conclusion**

The findings of a bibliometric analysis of papers on packaging and labelling published between 2018 and 2023 and indexed in the Scopus database are presented in this study. Product labelling and packaging, international distribution, prestigious journals, academic institutions, and author-institution partnerships have all been studied. The co-occurrence of keywords has also been examined in the study. There were around 35 country-of-origin documents between 2018 and 2023 (till February 24, 2023). The number of writers and references has increased

over time. Two of the countries in this region with the fastest economic development are the United States and New Zealand. Over time, the United States of America held the top rank in terms of Total Publications. The Trademark Restrictions Under the TRIPS Agreement: The WTO Panel Findings on Australia's Tobacco Plain Packaging Law is the most fruitful journal in the discipline of Packaging and Labeling. International cooperation rates are quite high for both the institutions and the authors. The terms "Buyer Market Power," "Chemical Composition," and "Labor Standards" are used most frequently in the research paper. These words appear in the title, abstract, or keywords. This study may aid scholars in their quest to comprehend packaging and labelling from a broad standpoint. In order to determine present patterns and the growth of future trends in this sector, we intend to examine all published texts in the future.

### Limitation

The bibliometric analysis carried out in this study to analyse the material on packaging and labelling can provide information that is useful to academics and practitioners, despite the study's numerous shortcomings. While the top 5 journals stated here don't represent the entire body of the Packaging and Labeling research, future studies can choose a larger number of alternative journals, as well as conference proceedings and books from diverse disciplines, for example. The results might be enhanced by varying the time range in both directions. Future studies on packaging and labelling can examine the authorship of the article, as well as the impact the author has on the industry, as well as the implications of each problem and the theories used in those studies.

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