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Article

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OPERATIONS, INFORMATION & TECHNOLOGY | REVIEW ARTICLE

Research trends in humanitarian logistics and sustainable development: A bibliometric analysis

Muhammad Khan^{1*}, Gohar Saleem Parvaiz², Alisher Tohirovich Dedahanov¹, Muhammad Iqbal¹ and Bae Junghan^{3*}

Abstract: Sustainable development (SD) has become a prevalent topic in the logistics discipline. Hence, the attention of researchers to humanitarian logistics (HL) in SD has been increasing. Therefore, the study applied a literature review in a bibliometric methodology, and feasibly reached a total of 112 publications published in world-class journals from the chosen databases. The findings show an increasing trend in the number of studies in this area, and that most of the studies were published in the last three years. Humanitarian Organizations (HOs) have a responsibility to save victims and decrease the distress of persons for SD during difficult times through fast, fair, and safe HL, which is possible through an effective HL operation. This study offers the first bibliometric investigation in the field that could serve as a theoretical reference point for future investigations and as a managerial tool, recognizing the urgent need for a careful understanding of how sustainability can be integrated into HL.

Subjects: Development Studies; Regional Development; Business, Management and Accounting

Keywords: Humanitarian logistics; sustainable development; relief logistics; humanitarian supply chain; bibliometric literature review



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PUBLIC INTEREST STATEMENT

The strength and frequency of effects from calamity can vary among those affected, depending on people economic situation, the aid they receive, and the afflicts' prior disaster experience. One of the components essential to a successful relief mission is logistics. The logistics field has noticed a rise in the popularity of the concept of sustainability. As a result, experts have started paying more attention to HL in sustainability. Recognizing the critical need for a thorough understanding of how sustainability may be integrated into HL, this study presents the first bibliometric analysis in the sector that could serve as a theoretical reference point for subsequent investigations and as a managerial tool. This initial endeavor highlights the advancement in significant articles and advances the field by better illustrating the connections between significant superior studies. The present research used a methodology that offers a fresh interpretation of the subject and a fresh take on the available material.

1. Introduction

Owing to the growing number of calamities and their intensity, the resulting human misery has also grown. In the past several years, almost 20 million individuals in emerging countries have been impacted by disasters (Khan et al., 2019c). Due to natural calamities from 1998 to 2017, casualties reached almost 1.3 million, with around 4.4 billion people affected, and financial losses at nearly US\$2,908 billion (Teh & Khan, 2021). Likewise, around the world in 2018, 315 disasters were recorded. They killed 11,804 people, affected around 68 million individuals, and caused economic losses of US\$131.7 billion, more or less. Furthermore, the most severely affected continent was Asia (Kharb et al., 2022). Similarly, in 2019, 396 natural calamities were recorded; deaths reached 11,755 with 95 million people affected and financial losses at around US\$130 billion. The frequency of calamities in 2019 was greater than the average over the previous 10 years, in which 343 natural calamities a year, on average, were recorded in The Emergency Events Database (EM-DAT). Moreover, coronavirus disease 2019 (COVID-19) has caused serious concerns and is killing people worldwide. On 14 August 2021, a destructive earthquake struck Haiti, leaving more than 650,000 persons in need of urgent humanitarian assistance; it affected around 800,000 people, and killed and injured 2,246 and 12,763 people, respectively (UNICEF, 2021). Furthermore, between 1970 and 2010, almost 980,000 people in South Asia died due to natural disasters, and even more suffered severely, while financial losses reached US\$105 billion, more or less. More than 1,333 major calamities occurred, further increasing the casualties, asset losses, and other disruptions, resulting in harmful impacts on sustainable development (SD; Khan et al., 2022). The EM-DAT disaster database noted 187 natural disasters during the first half of 2022 in 79 different countries, resulting in 6,347 fatalities, 50 million people impacted, and more than 40 billion USD in total damage. This statistic will be updated in the future 2022 annual report. Millions of people have also been impacted by the floods that have hit Bangladesh, Pakistan, and India, each of which has seen over a thousand fatalities. In the past 30 years, Pakistan has had some of the worst and most extensive flooding (Crunch, 2022).

The intensity and number of impacts from disaster can vary among those afflicted, depending on a person's economic position, the assistance they get, and the victim's previous experience with disaster (Sawada & Takasaki, 2017). The intensity and frequency of damage must be managed more efficiently and effectively (Raschky & Chantarat, 2020). Hence, humanitarian logistics (HL) is an imperative activity following a calamity and performs a key role in the success of a disaster relief operation (DRO). Logistics is one of the elements imperative to successful DRO (Khan et al., 2022). HL is a system of planning, controlling, implementing, and effectively and efficiently managing the flow and storing of relief goods from source to the end point of consumption to meet victims' needs (Thomas & MIZUSHIMA, 2005). Importantly, HL is the activities and structures developed for mobilizing individuals, resources, skills, and experience to help the afflicted. So far, humanitarian organizations (HOs) have not yet acknowledged or characterized this fact (Bealt et al., 2016). HL sustains a minor position in HOs, in spite of being a process that might mean the success or failure of a relief operation (Khan et al., 2020a, 2019a, 2019b, 2019c; Nurmala et al., 2017). The development and cost of logistics is almost 80% of a DRO (Thomas, 2003).

The majority of organizations use sustainability to differentiate their organization from their rivals, to decrease costs, and enhance the quality and services for their customers (Guiffreda et al., 2011). For improving the image of the company, doing things properly attracts green customers and overcomes pressures from customers and competitors (Dey et al., 2011; Lieb & Lieb, 2010). Sustainable logistics means increasing capabilities and minimizing uncertainties and risks (Raut et al., 2021). Disaster mitigation and adaptation are important for a sustainable economy in a society. The many challenges prompt researchers and economic and political actors to study the needs of SD in their attempts to identify proper remedies to the natural, social, and technical difficulties in the increasingly complicated systems of a DRO (Remida,

2015). A successful HL process lessens the urgent requirements of the people with a sustainable decrease in their vulnerability; it quickly and economically (Cozzolino, 2012) reduces risks, reduces waste, enhances performance, and innovates by creating new, effective ideas that lead to SD (Gonzalez et al., 2015; Gunasekaran & SPALANZANI, 2012). On the other hand, sustainable HL is the set of skills that allows HOs to structure logistics to accomplish SD (Gimenez et al., 2012). Sustainability in physical asset management is of the uppermost significance for logistics management, because it can abolish energy-intensive storage, decrease travel times, and enhance truckload applications (Dey et al., 2011) that further decrease the number of casualties and can ease the suffering of people in the disaster area.

The term *sustainability* is commonly used and, since the 1990s, has attracted a great deal of attention in terms of the supply chain (SC; Rajeev et al., 2017). Bealt et al. (Bealt et al., 2016) stated that HL is strategic management of the planning, procurement, transportation, and storage of goods from the origin to the disaster area, even to the last-mile distribution, in order to efficiently help the victims. In this regard, for an organization to implement sustainable planning in the whole process, the HL function plays a key role (Mollenkopf et al., 2010). In accomplishing this, the manager must utilize assets fully, integrate the various SC elements, and confirm the social systems and ethics that contribute to effective HL and SD (Agarwal et al., 2020). As stated, effective HL decreases survivors' suffering, reduces deaths and asset losses, and lifts the social aspirations of the people affected; therefore, effective HL seems necessary and urgent for SD. In addition, it is now recognized that a proper HL process can lead to performance enhancement and cost reduction (Rossi et al., 2013). On the other hand, supply shortages and inequitable distribution (Cao et al., 2021) and transportation (JAEHN, 2016; Vega-Mejía et al., 2019) create undesirable influences on HL and, ultimately, on SD. Besides, waste and debris from a disaster can damage the environment (Hu & Sheu, 2013). The number of relief items, the total transportation distance, and the modes of transportation may seriously affect costs along with SD (Cao et al., 2021; JAEHN, 2016; Laguna-Salvadó et al., 2019; B. ZHANG et al., 2018). In short, multiple periods, inadequate and uncertain SC, and multiple hierarchies challenge SD. A great deal of consideration must be given to integrating such issues in HL for SD. In this article, SD is defined as the ability to encourage the coordinated evolution of a complete procedure with a better direction that is valuable to all stakeholders in the context of cultural, environmental, and financial objectives.

Although HL has received substantial attention recently, research concerning SD issues in HL is still in the early stages. In that vein, this study aims to contribute to the literature by examining the issues of HL for SD. Consequently, we realize this research gap and put the following research question. What is the current perspective, status and trend of the research on HL with SD? Thus, the objective of this investigation is to give a full picture of the research trend of HL and sustainability. To identify evolution, capacity, and scope of investigation on and will assist identify countries trailing behind in this field. To achieve these objectives, bibliometric analysis with VOSviewer package maybe helpful for researchers and practitioners involved in planning and identifying research gaps in the HL and sustainability research field, which is important for developing a proof informed study agenda. Outcomes of a bibliometric assessment are hard to attain by other research techniques like systematic or general reviews. Also, bibliometric analysis will offer thorough information on the quantity and frequency of publication on each in the field of study (Sweileh, 2018). Notably, this article focuses on the role of HL for SD through a complete overview and classification of the current research; it reviews and integrates the available literature on the theme and identifies essential trends. The key contribution of this article is to identify the basic trends, and to connect the two disciplines for future research. The study identifies gaps, current research paths, and wider discussions that may be better integrated with the theme, the aim being to aid researchers in their research endeavors.

The rest of the article is ordered as follows. Section 2 presents the research literature review. Section 3 explores the materials and methods. In Section 4, we discuss the study's findings. Lastly, we offer a conclusion and propose areas for further research.

2. Literature review

This literature review focuses on publications that discussed humanitarian logistics and sustainable development. The studies taken into consideration were from the areas of HL, humanitarian supply chains (HSCs), SD, and sustainability. Primarily, the literature was analyzed by focusing on the mechanisms and concerns over interrelationships with sustainability in HL. A brief literature review on bibliometric review was conducted to identify research gaps.

According to Malmir and Zobel (Malmir & ZOBEL, 2021), the goal of HL is to ensure all individuals receive a level of relief sufficient for the health and well-being of themselves and their families, especially following a disaster and for SD. The incorporation of sustainability in HL guarantees securing a living standard for the victims, applies donated funds properly, and finally, reduces the environmental impact of the DRO. Unfortunately, the frequent lack of effective HL and actual SD measurement instruments threatens progress toward SD. Kunz and Gold (Kunz & Gold, 2017) set out a study of sustainable HL and suggested that for SD, HL needs to be affiliated with logisticians, the long-term needs of the victims and the people as a whole, and socio-economic and contingency factors of the government. While Oloruntoba and Kovács (Oloruntoba & Kovács, 2015) focused on theoretical developments in the area of agility and sustainability in HL, Lai et al. (LAI et al., 2009) stated that to ensure the sustainability of HL, partnerships of local communities, HOs, governments, and the military are indispensable. Similarly, Khan et al. (Khan et al., 2020b) suggested that HL education in universities can foster SD by controlling the issues from a lack of experienced logisticians and the huge employee turnover in volunteers and experienced humanitarian logisticians.

Seifert et al. (Seifert et al., 2018) analyzed studies between 1989 and 2016 on HSC management (HSCM) and applied a structured content analysis method while stating that, to overcome the sustainability issues, HL needs to include local energy sources by reducing the dependency on fossil fuel. Schiffing and Piecyk (Schiffing & Piecyk, 2014) applied a conceptual model based on systematic literature on HSCM, stating that the ultimate aim of HL sustainability is to reduce suffering and decrease the number of casualties after a disaster. A successful DRO eases the urgent requirements of the people through a sustainable, quick, and economic reduction in their helplessness, and can ultimately help to make better decisions, improve SC efficiency, and achieve SD (Van Wassenhove & Pedraza Martinez, 2012). Oloruntoba and Gray (Oloruntoba et al., 2009) stated that HOs approaches to sustainable competitive advantage do not lie in variations of marketing mix strategies in the organizations, but instead, lie in enhancing customer service within HSCM and in additional services, like logistics and distribution.

Scholars have analyzed the role of logistics in boosting sustainable economic activities (Patil et al., 2021). Rossi et al. (Rossi et al., 2013) stated that outcomes will be highly sustainable when a value-added logistics process in itself becomes sustainable. Another study that applied a systematic literature review proposed dealing with the intensity, frequency, and complexity of calamities, and suggested that to deal with the growing need for more sustainable DROs, HOs need to collaborate with each other (Moshtari & Gonçalves, 2017). O'Sullivan (O'sullivan, 2015) stated that sustainable development requires human resource development. A review was offered in the field of SC under uncertainty (Govindan et al., 2017), noting that sustainable SC plays a vital role in maintaining natural resources for the coming generations. Those authors identified a list of barriers to sustainable HL. Haavisto and Kovács (Haavisto & Kovács, 2014) presented a study of HOs to identify how they focus on different expectations regarding sustainability. Moreover, other studies (Kunz & Gold, 2017) supported the integration of sustainable SC in the HSC literature. In particular, Kunz and Gold (Kunz & Gold, 2017) suggested a model for sustainable HL, and examined it through four case studies on disaster recovery. Similarly, Crum et al. (Crum et al., 2011) stated that long-term development is merely one side

of SD in the humanitarian context, while Li et al. (Li et al., 2019) stated that to save people, reduce individual suffering, and contribute to advancements, the philosophies of SD must be progressively combined with a decrease in disaster risks during all phases of disaster recovery, and assistance needs to be acknowledged and recognized. Wu et al. (Wu et al., 2017) highlighted how collaboration is a basic problem-solving aspect that helps energize relations, and that incremental actions generate sustainable, positive improvements toward SD.

3. Research methodology

In this section, the database, the method used in the selection of the chosen studies, and the procedures used for their examination are explained. Bibliometric analysis is a methodology generally applied to draw a vast picture (Porter et al., 2002) in a literature review. It starts with an explanation of queries to be answered, which comprise questions about who, what, where, when, and with whom (De-Miguel-Molina et al., 2015). *Who* denotes researchers, *what* refers to keywords, *where* to regions, *when* to periods of time defined, and *with whom* means who collaborated in the studies (researchers and/or associations).

3.1. Data collection

To better understand logistics and SD in the context of humanitarianism, this article reaches its objectives through a systematic review of the literature. This methodology assists in making a framework and providing directions for future research. Per the recommendations in (Kitchenham, 2004), this section clarifies the review protocol applied for data collection and evaluation. To collect related articles, Emerald, Science Direct, Springer, Taylor and Francis, Wiley, and MDPI online databases were searched for papers published up to September 2021 (See Table 1). Scopus and Dimensions were used to extract data for the bibliometric review, whereas due to no access, we did not extract data from Web of science, and remained this data base for future research. The databases are significant in terms of collections of publications for the various subjects comprising the social sciences (Khan et al., 2019c).

Some authors addressed how research on HL and relevant areas received more consideration after the tsunami in the Indian Ocean in 2004 (Abidi et al., 2014). Nevertheless, to increase the probability of finding relevant publications for this study, the time frame for this study was not limited to 2004 or later.

Inspired from keywords and Boolean searches used in previous articles (Bealt & Mansouri, 2017; Khan et al., 2019c; Humanitarian Logistics* OR Humanitarian Supply Chain*) OR (Humanitarian OR Relief Logistics) AND (Sustainability* OR Sustainable Development*) were used for this study, as shown in Table 2.

The results show that exploration of the field began to increase in 2006, with topics like humanitarian logistics, relief logistics, humanitarian supply chain, and humanitarian supply chain management. There was also a substantial relationship between US and UK research, although in last few years regarding themes, publications from the UK have been growing and attracting attention. JHLSCM is the leading journal. Lastly, study into HL seems to be ascending recently.

Snowballing was applied in order to search references in publications to find additional papers. Short articles, posters, seminars, and non-peer-reviewed articles were not included.

Two sets of keywords set the stage for the search. One set is related to humanitarian logistics; the other to sustainable development, as seen in Table 2. This resulted in 112 papers.

3.2. Inclusion and exclusion criteria

After the initial search, we found 175 articles were duplicates and excluded them. In a determination to find related publications, the inclusion criteria below were specified.

Table 1. Results from search strings per database

Database	Humanitarian Logistics		Sustainable Development	
	Total for search string	After elimination of duplicates per string	Total for search string	After elimination of duplicates per string
Emerald	410	375	516	445
Science Direct	481	203	973	226
Springer	498	82	315	28
Taylor and Francis	375	55	446	60
Wiley	290	196	222	136
MDPI	130	29	310	202
Total after elimination of duplicates	2184	940	2782	1097
				820
				429
				110
				115
				332
				231
				2037

Table 2. Keywords search

Focus Category					
AND, OR					
1	2	3	4	5	6
Humanitarian Logistics	Disaster Logistics	Relief Logistics	Sustainable Development and Humanitarian Logistics	Sustainable Development and Disaster Logistics	Sustainable Development and Relief Logistics
Humanitarian supply chain*; humanitarian* supply*; humanitarian* logistics*	Disaster*; humanitarian crisis; humanitarian operation	Response*; relief*; recovery*; prep*; mitigation*; community* resilience; vulnerability*	Sustainable development; or sustainability and HL	Sustainable development; or sustainability and disaster logistics	Sustainable development; or sustainability and relief logistics

The article must be related to the context of a DRO.

The article focuses on HL.

The article describes HL and sustainable development.

The article is peer reviewed.

The article can be accessed.

In order to find related articles, a preliminary title review was performed, resulting in the exclusion of 1,642 articles, after which 582 articles were eliminated because they were the wrong context (i.e. did not meet criteria 1), e.g., HL and SD; 195 were discarded because they did not refer to the HL process (i.e. did not meet criteria 2), e.g., papers on crisis management or business continuity plans to offer humanitarian and development assistance in low-resources situations; 715 were excluded because they did not use SD (i.e. did not fulfil criteria 3), e.g., a trans-shipment framework for distribution and supply relocation under uncertainty in a DRO; 68 were removed because they were not peer reviewed (i.e. did not fulfil criteria 4); and finally, 82 papers were discarded because they were inaccessible.

We obtained 220 articles in total for abstract review. The rest of the articles were subject to the inclusion criteria on the basis of evaluation of the abstract. Forty studies were removed because they did not meet criteria 1. Similarly, 15 articles were removed because they did not meet criteria 2, and 27 articles were discarded after not fulfilling criteria 3. In addition, eight articles were removed for not fulfilling criteria 4, and seven papers were eliminated for not meeting criteria 5. A total of 103 papers remained. After a full-paper review, nine more were found through snowballing. Among the papers that fulfilled the inclusion criteria, six were found via Google Scholar, offering support for applying this database to add extensively recognized research databases (see, Figure 1). Finally, the review stage resulted in 112 papers.

3.3. Data analysis

The first step of the study was selection of the sample, applying bibliometric analysis adopted from (Elkington, 1999). The screening criteria applied to the mentioned databases for the final filter in this procedure returned a sample of 112 publications. In addition, all publications from the searches found in the Emerald, Science Direct, Springer, Taylor and Francis, Wiley, and MDPI databases are also listed in the Scopus and Dimensions databases.

Figure 1. Material selection algorithm.

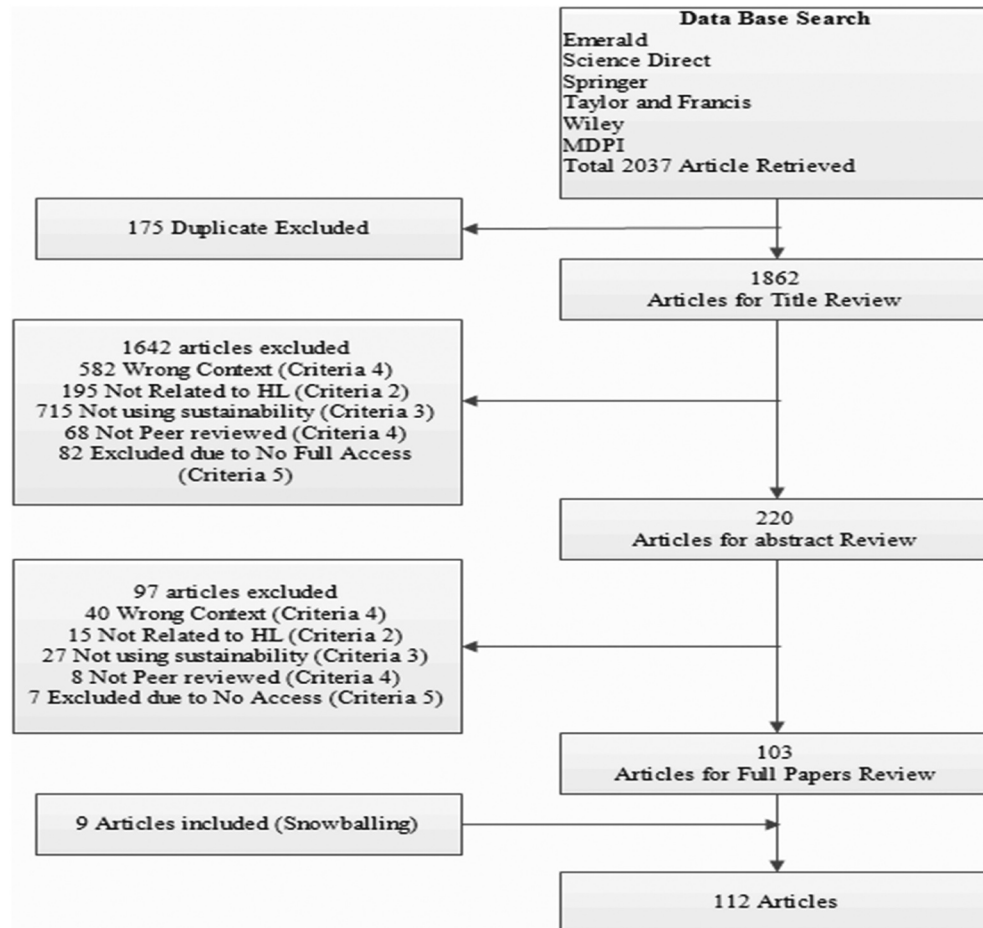
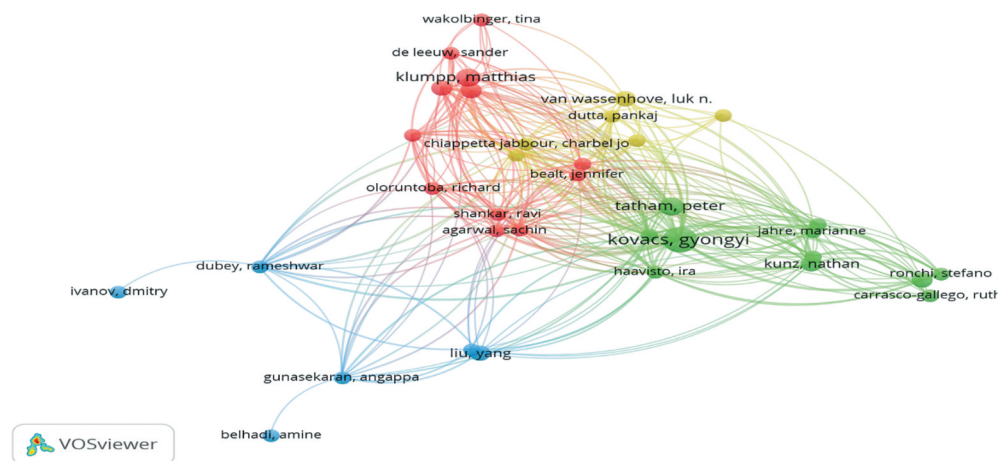


Figure 2. Authors with the most papers, citations, and links.



After identifying the relevant documents, we investigated information about the publications, recording indicators such as the number of studies per year, the country, bibliographic coupling, authors, documents, organizations, citations, co-authorships, and cited authors. This area of investigation, which seeks to evaluate the study, the scholar, or even the organization, is criticized. The criticisms in (PEREIRA et al., 2021) suggest that a paper published in a journal of higher importance ought to have a greater value than one published in a lower-level journal, although

this is a challenge because each study, regardless of where it is published, will be given equal value. These databases, attempting to work around these complications, have three systems of measurement (depending on the citations received) to allocate quantifiable values, whether to the researcher, the study, the journal, or the organization.

Because automatic citations are problematic for the metrics, this may be considered when the complete number of citations is measured as a metric. In this case, when dealing with previously hypothesized research, this problem tends to be less important, as it is likely that esteemed papers are cited more often. Sometimes, the number of some citations is much greater than the number of papers (PEREIRA et al., 2021) because they are included as references. Herewith, the number of citations may be considered for the purpose of measuring the impact of an organization, scholar, or journal (PEREIRA et al., 2021). However, there can be oversights, e.g., high-quality research just published might have not yet become well known, or a study might have been carried out in a very particular scientific area.

In spite of the criticisms, this procedure is beneficial and appropriate in academia; hence, it is suited to the scope of the present study as a criterion to assess the relevance of the research, scholar, journal, or organization. Furthermore, with the support of the VOSviewer package, documented investigations were made to find the interrelationships among year, country of publication, bibliographic coupling, authors, documents, organizations, citations, co-authorships, co-citations, cited references, and cited authors in the HL and SD context. The VOSviewer package permits correlation and construction between publications in the specific time frame.

4. Discussion

In this section, the info from the samples, beginning with a sequential reading of the progress of the studies in the years explored, is analyzed and discussed. We decided to concentrate on publications per year, per country, per journal, and on specific sign-transparency perspectives. The criteria were also adapted to other systematic reviews (Abidi et al., 2014; Leiras et al., 2014). The key purpose of these assessments was to organize the research in energetic perspectives of the existing body of literature.

4.1. Category selection and analysis

First, this study is classified based on the process context, the divisions of disasters, causes of disasters, disaster risk-management phases, and the methodologies in the papers used (see, Table 3). Per the selection criteria, Table 3 specifies the contexts of operations under the scope of the articles: the majority (94.64%) of the papers explored DRO; as for the speed of disasters, 100% of the articles explored sudden-onset disasters, whereas in assessing natural and man-made calamities, 86.61% of the papers explored natural disasters, whereas the majority of the studies (96.43%) were on the response phase. These studies were split into five groups based on the adopted methodologies. On the topic of HL and SD, the majority of the papers (38.39%) used conceptual research methods. The criteria recommended in (Seifert et al., 2018) and adopted in (Khan et al., 2019c) are used in this study.

Table 4 shows the annual number of publications in this study's context dated up until September 2021.

As seen in Table 4, the trend in publications covering this field is increasing, whereas the substantial rise in published articles in the most recent three years is incredible, with the majority (46.42%) published in that time. A reduction in the number of publications in 2021 was expected owing to the sampling time frame, since it does not include the full year; hence, we cannot believe it to be a drop in the number of articles. It is expected that at the end of 2021, the quantity of published articles will be more or less similar to 2020, suggesting the growing trend persists. The increase in studies during the second half of the 2010s may be an outcome of the first phase from guarantees of the Kyoto Protocol from 2008 to 2012, which would have increased the number of studies to evaluate the

Table 3. Structural dimensions and related categories

Dimension and related categories	No of paper	Frequency
<i>Context of Operation</i>		
Disaster Relief	106	94.64
Continuous Aid	0	0.00
Both or Not Specific	6	5.36
Total	112	100.00
<i>Speed of the Disaster</i>		
Sudden Onset	112	100.00
Slow Onset	0	0
Both or not specific	0	0
Total	112	100.00
<i>Causes of Disaster</i>		
Natural	97	86.61
Man-Made	0	0.00
Both or Not Specific	15	13.39
Total	112	100.00
<i>Phases of Disaster Management</i>		
Mitigation and Preparation	0	0.00
Response	108	96.43
Reconstruction	0	0.00
Several or not specific	4	3.57
Total	112	100.00
<i>Research Methodology</i>		
Simulation and Modeling	35	31.25
Conceptual Research	43	38.39
Case Study	14	12.50
Literature Review	12	10.71
Survey	35	31.25
Total	112	100.00

impacts. In this study's context, from the sample, many publications reflected emissions and impacts on economic activity. We consider the first phase of tasks under the Kyoto Protocol to have an essential role in enhancing publications on HL and SD, and approaches to these solutions are not harmful to the atmosphere, nor do they impact economic activity.

As seen in Table 5, a regional assessment was made to find which countries have the majority of articles on the contexts in question, demographics on the number of studies, and the importance of the country and the first author. Primarily, when considering any number of articles, out of 194 countries in the world, 28 have been working in this research context. It shows that merely 14% of countries had worked on HL and SD up to the time of this study. Furthermore, about 33% of all papers were from the United Kingdom, the United States, and India, followed by 31% from Finland, Australia, Germany, Canada, Italy, Spain, France, and China, while 11% have no specific region of origin. The rest of the 25% are from 19 countries.

Being a multidisciplinary area, several journals have published papers within the context of this study, with 112 articles published in the period under study. The lists are huge, in terms of the collection of publications with various themes consisting of the social sciences. Moreover, we picked up some

Table 4. Publications in the annotated bibliography corresponding to the year of publication

S/No	Year	Number of Publication
1	2006	1
2	2007	1
3	2008	1
4	2009	3
	2010	3
5	2011	1
6	2012	4
7	2013	2
8	2014	8
9	2015	12
10	2016	13
11	2017	5
12	2018	6
13	2019	14
14	2020	21
15	2021	17

articles from Google Scholars and from snowballing. The majority of the articles found relevant (20.53%) were from JHLSCM, and the second most-related articles (8.92%) were from Annals of Operations Research (AOR). The rest of the articles were picked up from the 48 journals listed in Table 6.

4.2. Most productive authors

In total, there were 289 authors among the retrieved documents. Out of these, the most dynamic/dominant scholar in terms of number of articles, by the number of citations and by total link strength, was determined based on (Bilir et al., 2020). The scholar having the majority of publications on the theme was Prof. Dr. Gyöngyi Kovács, having published five papers with total of 527 citations and total link strength at 227 (see Figure 2).

4.3. Citation analysis

Figure 3 reveals the number of studies in the field that were cited in some way. From the total of 112 articles, 98 were cited.

The total number of citations of these articles was 3,617 for a mean of 32.29 citations per document. The document titled “Identifying challenges in humanitarian logistics” received the most citations and was published in the *International Journal of Physical Distribution & Logistics Management* (IJPDL) by Gyöngyi Kovács and Karen Spens. Note that 87 of the publications had fewer than 50 citations, whereas 16 articles had more than 50 citations, and eight articles had more than 100 citations, all of which may increase in the future due to the likely rise in papers with more than 50 citations from the expected increase in studies on this theme.

4.4. Citation statistics and most-cited journals

The retrieved documents were found in 52 different journals. Out of these, the most influential journal was JHLSCM, publishing 23 papers with citations totaling 459 and a total link strength of 112, as seen in Figure 4.

Table 5. No of publication per region

No	Name of the Country	No of publication	Percentage	No	Name of the Country	No of publication	Percentage
1	United Kingdom	15	13.39	15	Morocco	2	1.79
2	USA	11	9.82	16	Norway	2	1.79
3	India	11	9.82	17	Turkey	2	1.79
4	Finland	7	6.25	18	Pakistan	2	1.79
5	Australia	6	5.36	19	Jordan	2	1.79
6	Germany	5	4.46	20	Brazil	2	1.79
7	Canada	4	3.57	21	Saudi Arabia	2	1.79
8	Italy	4	3.57	22	Peru	1	0.89
9	Spain	3	2.68	23	Iran	1	0.89
10	France	3	2.68	24	South Africa	1	0.89
11	China	3	2.68	25	Nigeria	1	0.89
12	The Netherlands	2	1.79	26	Greece	1	0.89
13	Austria	2	1.79	27	Sri Lanka	1	0.89
14	Sweden	2	1.79	28	Switzerland	1	0.89
				29	Not Specified	13	11.61

4.5. Most productive institutions

Altogether, 38 institutions published two or more articles, and their total citations and links were calculated. The organizations with the most research papers, the most citations, and the highest total link strength were selected. Out of 38 institutions, Hanken School of Economics had the most, at 10 documents and 809 citations, although total link strength was only 138 (see, Figure 5).

4.6. Most-frequent keywords and typology for HL

To do the keyword evaluation, all keywords were retrieved from the Scopus database and checked for spelling mistakes. British spellings were converted to American spellings. In addition, dashes and/or spaces that were thought unnecessary were discarded, and keywords checked carefully. We found and combined keywords with similar meanings. In the assessment, we excluded no keywords; we merely studied them and adjusted, revised, or merged them to retain common terminology among all the studies.

The Scopus database consists of three distinct types of keywords: All Keywords, Author Keywords, and Indexed Keywords. Some studies, like (J. ZHANG et al., 2016), examined which is better, but All Author Keywords well describes the content of the studies, and therefore, we particularly preferred them.

As seen in Figure 6, showing the most used keywords, 875 were found; nevertheless, when we restricted them to a minimum of five occurrences, the number fell to 15. Most-frequent keywords are visualized. The most common were *humanitarian logistics* (used 21 times) and *sustainable development* (17 times). The map shows four clusters: humanitarian logistics, supply chain management, disasters, and sustainability, with 88 links and total link strength of 211.

When the most-repeated keywords in this article were compared with keywords in similar articles, like (Bealt & Mansouri, 2017; Khan et al., 2019c), there were no such differences among them. All articles have similar keywords and sub-study categories to articles worldwide. The findings also back the common principle that, in scholarly life, some topics can become trendy, being examined by scholars for a specific time.

5. Conclusions and directions for further research

This article assessed and analyzed publications through the use of the bibliometric methodology for HL and SD literature. There have been thousands of publications in this field. Although literature reviews of the HL and SD literature have not been published yet, a detailed bibliometric and network assessment to systematically and accurately recognize prominent publications, scholars, and emergent collaboration has not been conducted either. This preliminary effort reveals the progress in influential publications and contributes to the area by further representing the inter-relationships amongst superior influential studies. To describe it, this study presented an example with a question based on users and innovation. Descriptions began with queries in the Dimensions and Scopus databases to continue cleaning of the data, their visualization, and their analysis. This article is the first to concentrate on HL and SD. Finally, along with a comprehensive review of publications, this study offers some main and exciting results. Analysis showed that out of the total papers in the last three years, 46.42% were on topic, and in short order, the ratio of HL and SD studies steadily increased over the final few years under study. It is expected that the frequency of publications on HL and SD, and their influence, will continue to rise in the near future. Furthermore, out of the 28 countries included, the most-publishing countries are the United Kingdom, the United States, and India, publishing 33% of the papers in total, with 20.53% of the articles from JHLSCM found to be relevant. The most published studies in the field were from Dr. Gyöngyi Kovács, who authored 4.47% of the articles. The most productive institution was the Hanken School of Economics with 10 documents. The document titled "Identifying challenges in humanitarian logistics" received the highest number of citations and was published in 2009 in IJPDLM. The most common keywords were *humanitarian logistics* (used 21 times) and *sustainable development* (17 times).

Table 6. Categorization of publications in the annotated list by journal

Title of Journal	Title of Journal	Number of Papers
Journal of Humanitarian Logistics and Supply Chain Management	JHLSCM	23
Annals of Operations Research	AOR	10
International Journal of Physical Distribution & Logistics Management	IJPDLM	6
Disaster Prevention and Management An International Journal	DPMIJ	4
Central European Journal of Operations Research	CEJOR	3
Disasters	Disasters	3
International Journal of Logistics Research and Applications	IJLRA	3
International Journal of Production Economics	IJPE	3
International Transactions in Operational Research	ITOR	3
Production Planning & Control	PPC	3
Supply Chain Management An International Journal	SCMIJ	3
Annals of the New York Academy of Sciences	ANYAS	2
Benchmarking An International Journal	BIJ	2
Decision Sciences	Decision Sciences	2
International Journal of Emergency Management	IJEM	2
International Journal of Environmental Research and Public Health	IJERPH	2
International Journal of Production Research	IJPR	2
Transportation Research Part E Logistics and Transportation Review	TRPELTR	2
Agribusiness	Agribusiness	1
Asia Pacific Journal of Public Administration	APJPA	1
Business Horizons	Business Horizons	1
Canadian Journal of Administrative Sciences	CJAS	1
Decision Sciences Journal of Innovative Education	DSJIE	1
Development in Practice	DP	1
Environment International	EI	1
European Journal of Operational Research	EJOR	1
Gestao & Producao	GP	1
IIE transactions	IIET	1
International Journal of Learning and Change	IJLC	1

(Continued)

Title of Journal	Title of Journal	Number of Papers
International Journal of Logistics Systems and Management	IJLSM	1
International Journal of Operations & Production Management	IJOPM	1
International Journal of Productivity and Performance Management	IJPPM	1
International Journal of Quality and Service Sciences	IJQSS	1
Journal of Business Logistics	JBL	1
Journal of Cleaner Production	JCP	1
Journal of Development Effectiveness	JDE	1
Journal of Economic Structures	JES	1
Journal of Environmental Management	JEM	1
Journal of Governance and Regulation	JGR	1
Journal of Operations Management	JOM	1
Journal of Pharmaceutical Policy and Practice	JPPP	1
Management of Environmental Quality An International Journal	MEQIJ	1
Procedia Engineering	PE	1
Review of African Political Economy	RAPE	1
Safety Science	SS	1
Sustainable Development	SD	1
Sustainable Production and Consumption	SPC	1
Technological Forecasting and Social Change	TFSC	1
Thunderbird International Business Review	TIBR	1
The Science of The Total Environment	TSTTE	1
Transportation Research Interdisciplinary Perspectives	TRIP	1
Voluntas: International Journal of Voluntary and Nonprofit Organizations	VIJVNO	1

Similar to other research, ours does not lack limitations. We found some of the more current studies can be applied to find potentially prominent studies. Awareness of the many researchers who are dominant in this area is important as they set the phase for future developments. Thoroughly examining their and their collaborators work can present procedures for future studies. For instance, recent work by some leading researchers has concentrated on SD and sub-supplier management. The role of HL on SD, and the barriers to, and enablers of, assessment of HL can be investigated further.

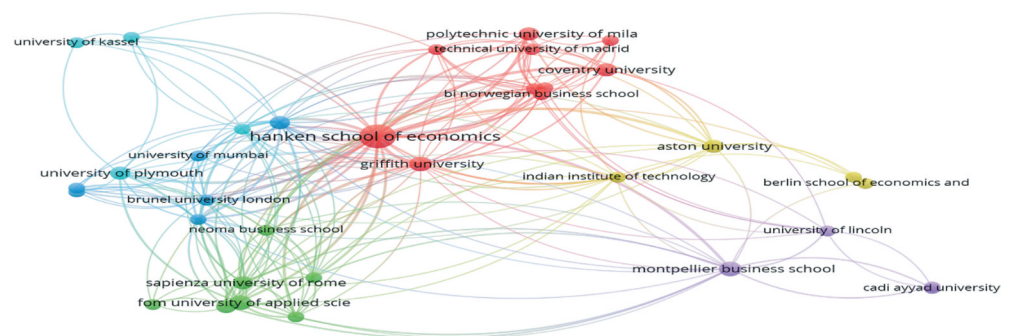
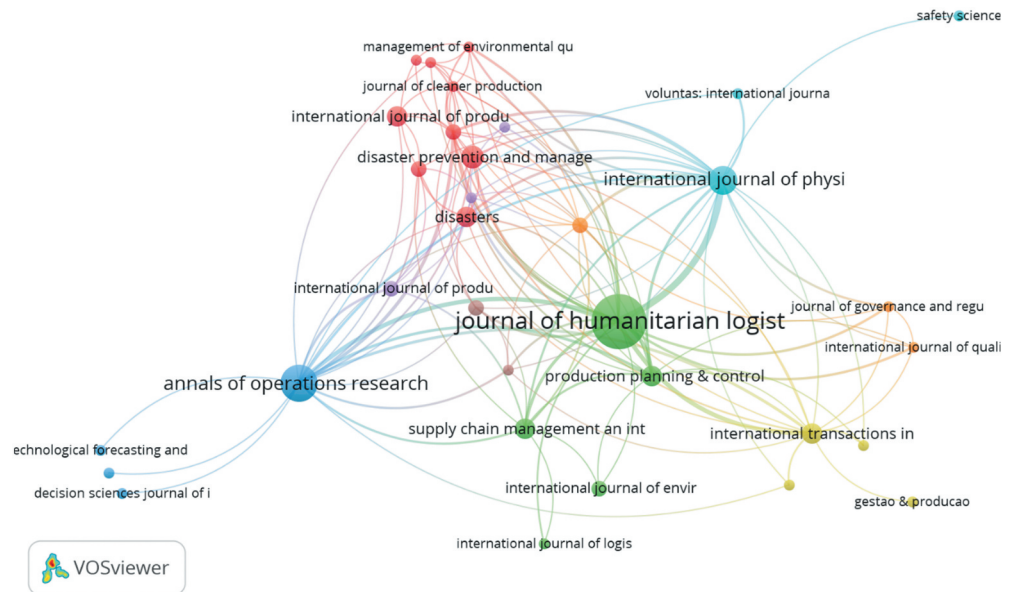
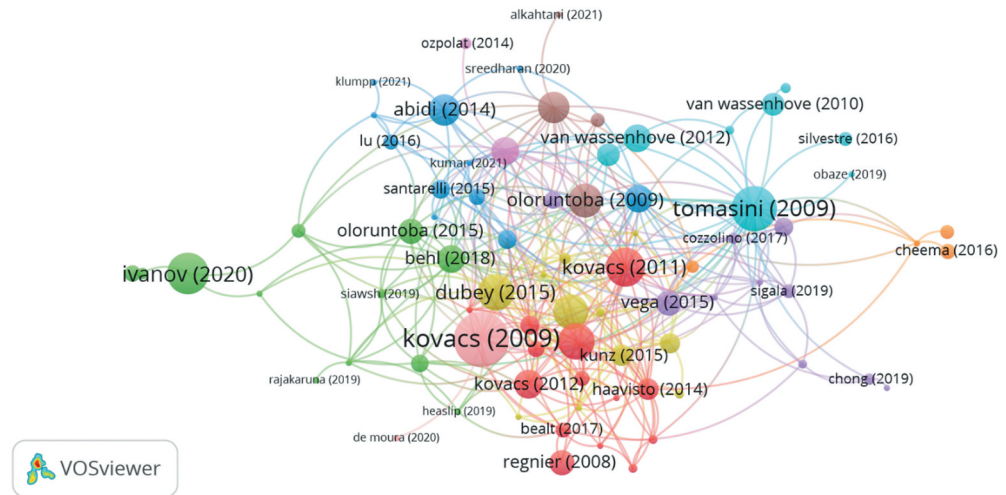
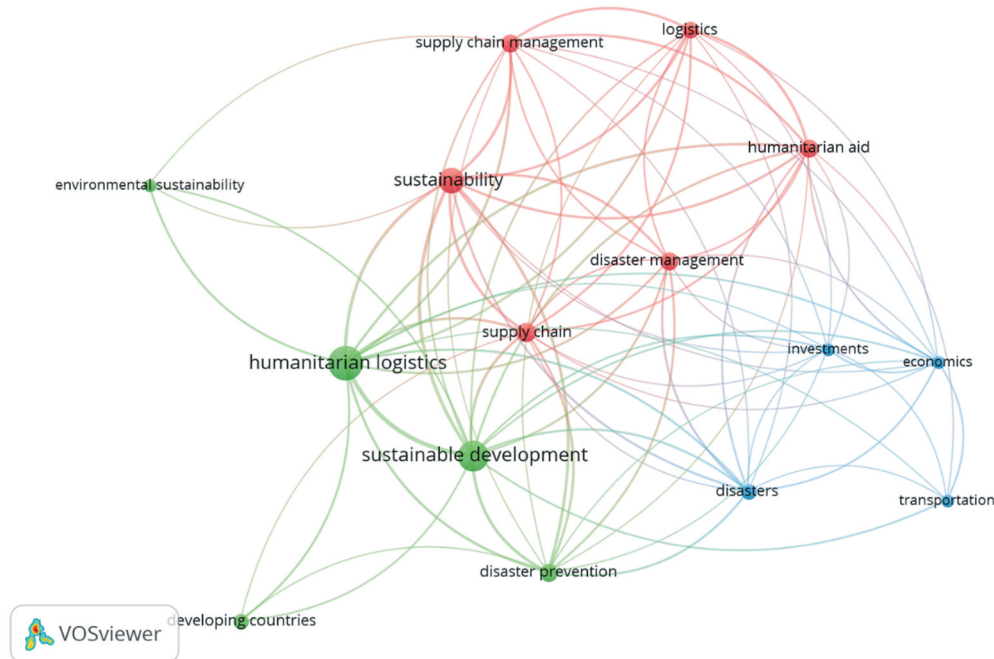


Figure 6. Mapping the most frequent keywords.



Some weaknesses in the results and the field as a whole can be identified. First, some researchers in the articles, even though prominent, may offer a dormant view of HL and SD. We expect this is not an issue, and trust that further and various scholars can contribute and affect the area in modern and exciting directions. The lack of research from developing and less-developed countries is problematic. HL and SD is essentially globalized. Expanding the frequency and location of countries where HL and SD is examined is needed. Having publications exclusively from developed regions is a main weakness, and prevents a multicultural and internationally related perspective.

Second, this paper denotes the inadequate study of HL and SD. Even though the subject is under consideration, authors achieved their goals by using the bibliometric-review-analysis method. This study applied an approach that opens up a new understanding of the theme and that provides a new viewpoint of the current literature. Nonetheless, this bibliometric-review-analysis has not completely explained the challenges of the role of HL on SD. Consequently, further research ought to apply quantitative data to statistically make clear the gap in the research outcomes. Furthermore, case studies, based on surveys and interviews will properly clarify the present state of the role for HL on SD.

Third, humanitarian assistance may be required for a long time after a calamity. Inadequate water sanitation and health services might permit diseases to spread quickly (Khan et al., 2019c). The information in this article shows that researchers have concentrated on DROs, and continuous aid did not get appropriate consideration. Thus, further study should concentrate on such ongoing aid. In this context, slow-onset and man-made disasters have drawn less attention than sudden-onset and natural disasters. Therefore, future study ought to investigate both of these. Similarly, the planning stage, the relief stage, and the recovery phase could be further examined in this research area (see, Table 3).

Fourth, the study findings are limited to the Dimensions and Scopus Databases, which are generally considered suitable. Anyhow, no extraction of data from the Web of science can reduce the results' reliability, restrict the generalizability of the findings, and perhaps introduce biases. Thus, future research may extract data from Web of science data base in order to enrich the study findings. Similarly, collected related articles from Emerald, Science Direct, Springer, Taylor and

Francis, Wiley, and MDPI. Hence, it may be fruitful to find related articles from other publishers and databases as well.

Lastly, the problems identified in current research can be taken as the beginning points for future exciting assessments of HL. This paper focused on HL and sustainability as a review, and consequently, the actual means of sustainable development in terms of HL have not been discussed in any detail. Further research requires more in-depth studies of what sustainable development means when used in the HL context. Similarly, this study contributes to a wider understanding of HL and SD. Compared to prior HL studies, the HL and SD viewpoint, as basically anticipated, becomes more essential. Therefore, a field for future study is in-depth investigation with the goal of theory building in the contexts of this paper, concentrating on the developmental stage of calamities, which has not attracted much attention in previous studies.

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