A SYSTEMATIC REVIEW OF THE LITERATURE ON HUMANITARIAN LOGISTICS USING MULTIMETHOD ANALYSIS

João Cesar de Souza Ferreira¹
Pedro Henrique Pereira dos Santos²

ABSTRACT

Objective: The main objective of this study was to identify research on Humanitarian Logistics (HL) and demonstrate the development of the research field through multimethod analysis with the purpose of providing a comprehensive understanding of the study area and identifying research trends that have not been previously observed.

Theoretical Framework: The study was based on the literature addressing Humanitarian Logistics.

Method: A bibliometric analysis was conducted through the application of multimethods, encompassing: i) keyword analysis; ii) examination of the productivity of leading authors over time; iii) bibliographic coupling; iv) co-citation analysis; and v) network analysis.

Results and Conclusion: The results evidenced a growing trend in research on Humanitarian Logistics (HL), and it was possible to identify the emergence of research subfields within HL focusing on innovation, big data, computational simulation, and decision systems in the humanitarian logistics chain.

Implications of the research: The study contributed to the understanding of the development of research on humanitarian logistics and provides a comprehensive overview of the subject through metrics that allow the identification of the evolution and trends in the research field.

Originality/Value: The study extrapolates the application of a single literature review method and employs multimethods to assess and present the development of the field. It contributes to an overarching view of the research domain, serving as a guiding framework for the advancement of future investigations.

Keywords: Humanitarian Logistic, Bibliometrics, Multi-Methods.

1 Universidade Federal dos Vales do Jequitinhonha e Mucuri, Teófilo Otoni, Minas Gerais, Brazil.
E-mail: joao.cesar@ufvjm.edu.br Orcid: https://orcid.org/0000-0002-3705-8746

2 Universidade Federal dos Vales do Jequitinhonha e Mucuri, Teófilo Otoni, Minas Gerais, Brazil.
E-mail: pedro.henrique@ufvjm.edu.br Orcid: https://orcid.org/0000-0001-5511-1646
1 INTRODUCTION

The COVID-19 pandemic highlighted the importance of Humanitarian Logistics (HL) as a field of study. Van Wassenhove (2020) noted that HL was now considered a necessary component of any relief effort. The variety of costs associated with the supply chain and logistics accounts for between 62% and 79% of all costs, and these costs are crucial to saving time and money in humanitarian response. Capacity building in HL should be a priority in humanitarian investments (Van Wassenhove, 2006).

Humanitarian logistics is defined as the part of logistics charged with managing resources and knowledge to contribute to people affected by disasters whether natural or caused by human impact on nature (Correa, 2019). In this regard, the importance of humanitarian logistics in cases of outbreaks of diseases and migratory flows of refugees is highlighted, as discussed by Santiago and Oliveira Júnior (2022), since such occurrences generate diverse impacts, such as economic, social and health.

In the HL study, many attempts were made to analyze current trends and define future directions of scientific research. Later investigations mainly employed bibliometric methodology, analyzed and anticipated significant research trends, identified influential articles based on associated statistics (e.g. the number of articles and citations), and grouped authors to discover associations among them (Kim et al., 2022).

More recently, Behl and Dutta (2019) published a systematic literature review focusing on Humanitarian Supply Chain Management (HSCM), which was divided into ten parts: review-based research, HSCM classification according to disaster phases, change in disaster management trend for HSCM, humanitarian logistics and its various categories, resilience, information technology, mathematical models, theoretical grounding, case study-based approach and HSCM performance management.

Jabbour et al. (2019) conducted a systematic review of the literature on HSCM and HL Supply Chain Management with the aim of renewing the classification of the literature and identifying gaps for future research. Focusing on performance measurement in HO (humanitarian operations), HL and HSCM, Banomyoung et al. (2019) they carried out a review in which some bibliometric techniques for scientific mapping arose, but it was very restricted to the theme of performance. Modgil et al. (2020) conducted a systematic review of the literature specifically aimed at quality management applied to humanitarian operations and disaster relief management, composed of 61 articles published from 2009 to 2018.
However, a bibliographic survey by means of multiple methods is lacking for an understanding of the state of the art development of HL research. Other fields of study have used analyzes using separate techniques, but multi-method analysis in HL is little used. Only Zary et al. (2014) they investigated the trends of citation and citation to build a knowledge network. Network analysis is different from other methodologies because it leads to significant discoveries; it does this by combining with methods of statistical analysis (Park & Park, 2015). The use of multimethod analysis to investigate HL research trends can therefore lead to a new perspective that has not been observed previously.

This raises the following question: what is the scenario of the field of study on humanitarian logistics? To answer this question, the present research intends to conduct a bibliometric and scientific investigation with the purpose of comprehensively analyzing the research trends of HL through the use of multiple methods to demonstrate the production, network analysis, thematic evolution and historiographic map of research in humanitarian logistics.

2 HUMANITARIAN LOGISTICS

Many studies have been conducted to synthesize the findings of recent research in HL and direct future research. Wassenhove (2006) he proposed that private sector logistics could and should be used to improve the performance of disaster logistics; however, he emphasized that before doing so, the private sector had to understand the fundamental resources of logistics. Kovács and Spens (2007) They aimed to broaden the understanding of the planning and execution of logistics in disaster relief. Kovács and Apens (2009) they sought to identify the challenges of humanitarian logistics in relation to different types of disasters, phases of disaster relief and type of humanitarian organization. In this sense, Boonmee et. al. (2017) they examined the four main problems and challenges highlighted in the research on the location of humanitarian logistics related facilities: deterministic facility location problems, dynamic facility location problems, stochastic facility location problems, and robust facility location problems. The authors were able to identify that research is focused on responsiveness, risk and cost-efficiency.

In light of the critical role of the facility's location in planning humanitarian logistics, Mishra et. al. (2022) proposed a two-stage relief distribution location model. To address the challenges of providing emergency aid to stranded populations with Faiz, Vogiatzis and Noor-E-Alam failed infrastructure networks (2022), proposed a new robust computing structure to solve a two-tier vehicle routing problem that uses unmanned autonomous vehicles, or drones, for deliveries.

Özdamar et al. (2015) developed research that focused on disaster lifecycle response planning and recovery phases. Other influential works include (Jahre & Jensen 2010; van der Merwe 2010; Leiras et al. 2014).

Research in humanitarian logistics and supply chain has shown a significant increase in the amount of emerging work, mainly journal articles. In this context, Jabbour et al. (2019) they aimed to systematize selected contemporary literature on humanitarian logistics and supply chain management. A review of 362 articles published between 2011 and 2017 provides a thematic outline of the study (Behl & Dutta, 2019). For their part, Tomasini and Van Wassenhove (2009) discussed the evolution of supply chain management in disaster relief, differentiating it from the commercial supply chain. In addition, the authors argue about the role of new actors such as the private sector.

Other influential work included contributions that discussed processes that can be used to continuously overcome and mitigate the supply chain that are not limited to preparation and
movement, but also engagement, standardization, innovation and collaboration, supply chains and society to face disruptions in the present and future (Kovács & Falagara Sigala, 2021).

In the same sense, Rahman et. al. (2022) sought to shed light on the trend of humanitarian supply chain (HSC) studies in the era of pre-, during and post-COVID-19 pandemic outbreaks. Clemente et al. (2022), through modeling, presented different optimization solutions for aid distribution using graph analysis of the road network. The potential benefits of the proposed model and the improved approach are discussed (Zhan et al., 2022). Khan et al. (2022) proposed a model for understanding the association that mediates transparency between emerging technologies and sustainability in Humanitarian Logistics.

Another study aimed to explore methodologies to conduct a comprehensive literature review (Banomyong et al., 2019). Sabbaghtorkan et. al. (2020) conducted a review of the main journal articles of Operations Research and Management Science (OR/MS) published between 2000 and 2018 on this topic. Unlike previous research papers on pre-disaster and post-disaster humanitarian logistics, a study was developed with a specific focus on the pre-positioning of assets and supplies in the field of natural disasters. Thus, based on the different needs of disaster victims, shelters are divided into two types: basic guarantees of life and psychological medical services (Geng et al., 2020).

In the same vein, Ahmed et. al. (2019) sought to understand how coordinated effort affected resource management (RM). Wagner et al. (2021) they addressed the issue of interest to both international humanitarian organizations and their aid workers of how to measure and manage the impact of these aid workers. Timperio et al. (2020) proposed a multi-criteria decision-making integration, network optimization and discrete event simulation, to address stock pre-positioning to improve the efficiency, effectiveness and agility of relief chains.

Ali et al. (2022) identified opportunities for new research in the area of Humanitarian Logistics in which they point to a transition from traditional studies in operations management from traditional disciplines (business process re-engineering, marketing, outsourcing, heuristics) to more recent topics including patient waiting times, Industry 4.0 technologies, sustainable operations, risk and resilience, climate change and a circular economy.

New research has emerged focusing on technology as support for the management process and understanding of Humanitarian Logistics. Kumar et al. (2022) developed a dynamic transmission model to investigate the impact of social media, particularly tweets, through the social networking platform Twitter on the number of cases of influenza and COVID-19 infection and deaths.

In the same vein, Ehsani et. al (2023) have developed a new humanitarian model of location-allocation-inventory, focusing on preventing COVID-19 outbreaks with Internet of Things-based technology in the disaster response phase. Altay et al. (2023) they aimed to identify gaps in the literature on innovation in humanitarian supply chains and develop an appropriate framework for future research through a systematic literature review. Other influential work includes the study that proposed a research project of systematic mixed methods for the HL problem in disaster response (Baharmand et al., 2022).

3 MATERIALS AND METHODS

The main objective of this study is to identify HL studies and demonstrate the development of the research field. To this end, it was performed: i) keyword analysis; ii) analysis of the productivity of the main authors over time, using the AuthorProdOverTime function, which calculates and plots the authors' production in relation to the number of publications and total citations per year over a given period of time; iii) bibliographical coupling, which consists of the analysis of two articles, being considered bibliographically coupled if at least one reference used appears in the bibliographies or reference lists of the two
articles (Kessler, 1965; Grácio, 2016, 2020) iv) cocitation analysis, which considers the citation of two articles together in a third article (Graccio, 2016); and v) network analysis, which investigates the collaboration network, made up of us who are authors and the links that are co-authored (Glänzel & Schubert, 2005).

The direct citation network through the historical map, the historiographic mapping is a graph proposed to represent a chronological network map of the most relevant direct citations resulting from a bibliographic collection (Garfield et al., 2002). The data was systematized using the Bibliometrix software (Aria & Cuccurullo, 2017).

3.1 Data collection

Data was collected from the Scopus and Web Of Science database in the period 2004-2023 using the keywords 'Humanitarian Logistics', 'Humanitarian Supply chains', 'Disaster Logistics', 'Disaster Supply chains', which were selected after examining the keywords in previous literature reviews. Initially, 1250 articles were collected and examined to evaluate their relevance for this study, of which, 870 articles were selected after excluding articles that did not focus on humanitarian logistics or were overlapping or without abstracts.

3.2 Data processing

The pre-processing phase is fundamental for a robust bibliometric analysis (Afonso et al., 2012). To do so, before importing into the software, a simple comparison was carried out to identify word similarities, though written in a different manner, which could provide a wrong interpretation. The authors' verification was also carried out with the purpose of identifying inconsistencies in the writing of the authors' names. A duplicate check was also performed and 378 duplicate articles were removed and are already considered in the 870 articles of the final database.

4 SEARCH RESULTS

Considering the periods from 2018 to 2022 already completed, there is a trend of research growth in relation to the annual production of studies on Humanitarian Logistics as shown in Figure 1.

![Figure 1: Annual scientific production](source: search data)
This evolution may be associated with events that escape normality, such as wars, refugee migration, climate disasters, among others, and lead to the development of new research.

The database was constituted of 278 research sources, 870 articles, with an annual growth rate of 15.32%, composed of 1778 authors, being 41 authors of articles with single authorship and 21.61% of international co-authorship, on average 3 authors per articles with an average of 5 years of production and 26 citations per article on average.

4.1 Bibliometric analysis

Initially, for a demonstration of the development of research in HL, we carried out the elaboration of the graph of three fields in which they were selected to demonstrate the association between the 10 most prominent authors, their countries and the associated keywords as shown in figure 2.

![Three Field Association Chart](image)

Figure 2 - Three Field Association Chart
Source: research data

It can be observed that the humanitarian logistics keyword is predominant among researchers and is more associated with the researches carried out in the countries: the United States, the United Kingdom and France. In Brazil, research on humanitarian logistics and supply chain management is highlighted in humanitarian logistics.

Table 1 shows that the most relevant source for publications of studies on humanitarian logistics is the Journal of Humanitarian Logistics and Supply Chain Management, which is understandable in view of its scope focused on this theme.

<table>
<thead>
<tr>
<th>Sources</th>
<th>Articles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Journal of Humanitarian Logistics and Supply Chain Management</td>
<td>77</td>
</tr>
<tr>
<td>European Journal of Operational Research</td>
<td>48</td>
</tr>
<tr>
<td>International Journal of Disaster Risk Reduction</td>
<td>37</td>
</tr>
<tr>
<td>Annals of Operations Research</td>
<td>36</td>
</tr>
<tr>
<td>Production and Operations Management</td>
<td>32</td>
</tr>
<tr>
<td>International Journal of Production Economics</td>
<td>22</td>
</tr>
</tbody>
</table>
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Transportation Research Part E: Logistics and Transportation Review 20
Socio-Economic Planning Sciences 18
Computers and Industrial Engineering 17
Computers and Operations Research 14

Source: search data

The author most prominent in the studies on Humanitarian Logistics is Van Wassenhove (2006) on Humanitarian Aid Logistics and High Speed Supply Chain Management in which he proposes an interaction between the practice of logistics in the private sector and its application in humanitarian logistics as presented in Table 2.

Table 2- Most relevant authors

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Article</th>
<th>TC</th>
<th>AC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Van W L</td>
<td>2006</td>
<td>Blackett Memorial Lecture Humanitarian Aid Logistics Supply Chain Management in High Gear</td>
<td>799</td>
<td>44</td>
</tr>
<tr>
<td>Van W L</td>
<td>2012</td>
<td>On The Unique Features of Postdisaster Humanitarian Logistics</td>
<td>351</td>
<td>29</td>
</tr>
<tr>
<td>Van W L</td>
<td>2013</td>
<td>On the Appropriate Objective Function for Postdisaster Humanitarian Logistics Models</td>
<td>299</td>
<td>27</td>
</tr>
<tr>
<td>Kovacs G</td>
<td>2021</td>
<td>Lessons Learned From Humanitarian Logistics to Manage Supply Chain Disruptions</td>
<td>54</td>
<td>18</td>
</tr>
<tr>
<td>Kovacs G</td>
<td>2009</td>
<td>Identifying Challenges in Humanitarian Logistics</td>
<td>254</td>
<td>17</td>
</tr>
<tr>
<td>Van W L</td>
<td>2009</td>
<td>From Preparedness to Partnerships Case Study Research On Humanitarian Logistics</td>
<td>233</td>
<td>16</td>
</tr>
<tr>
<td>Oloruntoba R</td>
<td>2006</td>
<td>Humanitarian Aid an Agile Supply Chain</td>
<td>270</td>
<td>15</td>
</tr>
<tr>
<td>Taken G</td>
<td>2011</td>
<td>The Multicriteria Optimization Model for Humanitarian Aid Distribution</td>
<td>188</td>
<td>14</td>
</tr>
<tr>
<td>Taken G</td>
<td>2014</td>
<td>The Stochastic Facility Routing Model for Disaster Response Planning</td>
<td>134</td>
<td>13</td>
</tr>
</tbody>
</table>

Source: search data

Note: CT refers to the total citations of the article and CA refers to the local citations, that is, from the same country as the author.

The same author, in 2012, presents prominence among the publications most cited with the study on the fleet management of humanitarian logistics pointing out the challenges in the relief, development and decentralization of operational conditions.

It was possible to show an increase in scientific productions and it is noted that there is a trend of studies related to innovation in humanitarian logistics activities, with evolutionary focus in 2021 of research focused on technology if considered the words with frequency greater or equal to 5, as presented in Figure 3.
4.2 Bibliographic Coupling

Figure 5 shows the constitution of two bibliographic coupling clusters based on the references.
Cluster 1 - (red) with work focused on humanitarian logistics, location of facilities and disaster management with more frequent reference sharing ≥ 5. This cluster highlights the systematic review of literature conducted by Behl and Dutta (2019) on humanitarian supply chain management with the proposition of pointing out future research directions, which is justified by the timeliness of the article that inevitably encompassed a greater amount of references used by previously published works.

The coupling network was also made up of cluster 2 - (blue) with publications focused on humanitarian logistics and humanitarian supply chains with a frequency of reference sharing ≥ 5, highlighting the publication of Venkatesh (2019) on the use of the AHP-TOPSIS fuzzy approach for the selection of supply partners in continuous humanitarian aid supply chains.

Considering the 150 most frequent words and with a minimum frequency of 5, we observe the formation of three clusters, as shown in Figure 6.
Cluster 1 - azul, associated with publications focused on the management of the humanitarian supply chain, is highlighted by the study that sought to identify the challenges of humanitarian logistics, in which it demonstrated that some disasters are inexplicable by a categorization of natural and man-made causes. He also pointed out that the biggest challenge is the coordination of logistics and clarified that the challenges can be better met if they are distributed in different environments involving stakeholders (Kovács & Spens, 2009).

The 2-green cluster, in turn, is associated with publications on humanitarian logistics with a focus on disaster emergency (relief), disaster prevention and management. Highlighting the work that sought to describe the unique characteristics of post-disaster humanitarian logistics in which they sent that on one side of the spectrum, we have humanitarian logistical efforts of the kind that takes place in long-term recovery and assistance, where operational efficiency is fundamental. This is similar to commercial logistics.

On the other hand, post-disaster humanitarian logistics operations in disaster response and short-term recovery activities are a totally different environment, often in a chaotic environment with urgent needs, life or death decisions and limited common resources (Holguín-Veras et al., 2012).

Finally, cluster 3 - red refers to publications that converge on the themes of localization, management and efficiency in humanitarian aid through proposed models to make processes inherent to humanitarian logistics faster. With emphasis on the work developed by Balcik et. al (2010) in which they analyzed the difficulties associated with coordinating humanitarian relief chains and described current and emerging coordination practices in disaster relief. In addition, they evaluated the popular coordination mechanisms employed in supply chains and assessed their compatibility with different environments.

4.3 Bibliographic Coupling

Based on the 250 keywords used by the authors in the publications from 2004 to 2023, the evolution of the studies related to humanitarian logistics was investigated, as shown in Figure 7.

It was possible to identify the occurrence of a diversification of studies on humanitarian logistics, which basically began as a general theme closely linked to aid from humanitarian agencies and supply chain management between 2004 and 2009, expanding to themes such as support systems, collaboration, resilience and transparency in the humanitarian logistics chain.
For a better understanding, the map was made by means of a factorial plan to present the motor, basic, emerging and niche themes as shown in figure 8.

We can observe in Quadrant I, the constitution of motor themes associated with the management of the humanitarian logistics chain and equity in the distribution of food, priority of care, allocation of resources and emergency material, which are the basis for research in humanitarian logistics, that is, they are already consolidated in the literature.

In Quadrant II, with an interconnection with the motor themes, one can observe the basic themes that establish a cross-cutting between studies on humanitarian logistics, such as disasters, deprivation, support and sustainability.
The composition of emerging themes, i.e. peripheral themes that are still marginally treated by domain literature, can be seen in quadrant III. In this context one can find themes such as transparency, the adoption of technology and performance in humanitarian logistics.

In Quadrant IV, the topics are niche, that is, they are strongly developed, but still marginal in the research on humanitarian logistics. These include themes such as simulation programs, logistical supply chain resilience, big data and data enveloping analysis, and goal programs.

For a better understanding, the cocitation network of the studies was developed with the purpose of highlighting the articles most used in research on humanitarian logistics as presented in Figure 9. There is talk of cocitation of two articles when both are cited in a third article.

![Figure 9 - Quote Network](image)

Source: search data

In the network it is possible to identify the formation of three clusters in the cocitation network, in which the cluster 1- red, presents the article ‘OR/MS research in disaster operations management’ (Altay et al., 2023). The authors conducted a literature review to identify possible research directions in disaster operations, discuss related issues, and provide interested researchers a starting point. The article ‘Facility location in humanitarian relief’ also stands out in relation to cocitation (Balcik and Beamon, 2008). The authors developed a model that determines the number and location of distribution centers in a relief network and the amount of relief supplies to be stocked at each distribution center to meet the needs of people affected by disasters.

The cluster 2- azul, features the article ‘Humanitarian aid logistics: supply chain management in high gear’ (Van Wassenhove, 2006). It advocates closer collaboration among humanitarian workers, businesses and universities to achieve better and more efficient supply chains that address the complexities of current logistics, both in the private sector and in relieving the lives of people affected by disasters.

And in cluster 3 - green, made up of a smaller network of co-cited articles, and deals with themes on the coordination of humanitarian chains, in which they analyze the challenges of coordinating humanitarian aid chains and describe current and emerging practices in disaster aid coordination. They also examine some widely applied supply chain coordination mechanisms and assess their adaptability to specific environments (Balcik & Burcu et al., 2010).
Next, we investigate the authors’ collaboration network through the co-authoring links, this being considered one of the best documented forms of scientific collaboration (Glänzel and Schubert, 2005). As shown in Figure 10.

We can observe the constitution of 14 clusters in which two networks stand out, the 4 network - rock, in particular the authors Van Wassenhove, with 17 degrees of intermediation and research in collaboration with authors from the United States, France and Germany. And Holguín-Veras with 9 degrees of intermediation and research in collaboration with researchers from the United States and France.

The network 11- lilac, highlighted the author Kovacs, with 5 degrees of intermediation and research in collaboration with the United States, France, Australia, Finland and Germany.

Brazil appears with a collaborative network (2-blue network), still small, made up of authors Leiras and Fontainha belonging to the Catholic University of Rio de Janeiro, in which they carry out studies on the impact of disasters on the supply chain and review of the literature on humanitarian logistics.

In a global analysis it is possible to show that there is a large network of research collaboration associated with humanitarian logistics as shown in Figure 11.
Table 3 shows that the USA is the largest collaborative network in humanitarian logistics research. Brazil has a network that is still small, but it has already shown that it is directed towards the institution of collaborative research networks that deal with the theme of humanitarian logistics.

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>China</td>
<td>11</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>Netherlands</td>
<td>9</td>
</tr>
<tr>
<td>Finland</td>
<td>Ireland</td>
<td>8</td>
</tr>
<tr>
<td>United States</td>
<td>Canada</td>
<td>8</td>
</tr>
<tr>
<td>Netherlands</td>
<td>Norway</td>
<td>7</td>
</tr>
<tr>
<td>United States</td>
<td>France</td>
<td>7</td>
</tr>
<tr>
<td>United States</td>
<td>Finland</td>
<td>6</td>
</tr>
<tr>
<td>China</td>
<td>United Kingdom</td>
<td>5</td>
</tr>
<tr>
<td>France</td>
<td>Netherlands</td>
<td>5</td>
</tr>
<tr>
<td>Brazil</td>
<td>Colombia</td>
<td>2</td>
</tr>
<tr>
<td>Brazil</td>
<td>Peru</td>
<td>2</td>
</tr>
<tr>
<td>Brazil</td>
<td>Denmark</td>
<td>1</td>
</tr>
<tr>
<td>Brazil</td>
<td>Switzerland</td>
<td>1</td>
</tr>
</tbody>
</table>

Source: search data

Figure 12 presents the historiographic map considering the 50 authors most referenced in the humanitarian logistics theme.

Figure 12- Historiography (50 authors)
Source: search data


This was followed by Van Wassenhove's (2006) paper in the Journal of the Operational Research Society, on Humanitarian Aid Logistics: Supply Chain Management at High Speed, with 799 total citations and an average of 44 citations per year.
And the article by authors Oloruntoba and Gray (2006) on Humanitarian Aid and the Agile Supply Chain, with 270 total and average quotes of 15 quotes per year.

5 CONCLUSION

The bibliographic survey by means of multiple methods allowed an understanding of the state of the art of the development of HL research. It was possible to show an increase in scientific research on humanitarian logistics, which indicates a possible consolidation of the term humanitarian logistics with an interconnection with themes related to the research of supply chain management.

The historiographic map that could demonstrate this process of development and could serve as a basis for the elaboration of the theoretical benchmarks of future investigations, and therefore lead to a new perspective that was not observed previously.

Another important finding was the constitutions of collaborative networks between and within countries, this scenario indicates the strengthening for the constitution of appropriate and solid concepts for research in the field of humanitarian logistics, since it was evidenced that there is a differentiation of the business logistics of humanitarian logistics, in the light of the distinct objectives, although they can avail themselves of similar resources and processes. There was also a trend of research pointing to the need for further development of transparency systems in the processes involving the whole chain of humanitarian logistics.

It was also identified that new fields of research are emerging aimed at studies on innovation, above all with the use of big data, computer simulation and decision systems in the humanitarian logistics chain. This scenario demonstrates the evolution of the theme associated with the daily needs and experienced in the processes that involve humanitarian logistics in a context that is very complex and difficult to predict, as to its dimension and need for material resources and assistance of voluntary collaborators in the first care in the contexts of disasters, whether environmental or social, like involuntary migration in contexts of war or assistance of countries in extreme poverty.

The vast literature demonstrates the importance of humanitarian logistics for the victims to have mitigated their needs for food, housing, medical assistance and evacuations in a context that is always very troubled and difficult to act.

REFERENCES


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