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Logistics Outsourcing in Supply Chain Management

Faculty of Logistics, Procurement and Supply Chain Management
Logistics and Supply Chain Management

MSc
Academic Year: 2024 - 2025

Supervisor: Dr. Ismail Abushaikha
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This thesis is submitted in partial fulfilment of the requirements for the degree of Master of Science

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Academic integrity declaration

I declare that:

- the thesis submitted has been written by me alone.
- the thesis submitted has not been previously submitted to this university or any other.
- that all content, including primary and/or secondary data, is true to the best of my knowledge.
- that all quotations and references have been duly acknowledged according to the requirements of academic research.

I understand that to knowingly submit work in violation of the above statement will be considered by examiners as academic misconduct.

Abstract

This study aims to understand the role of logistics service providers in humanitarian operations as well as the support they provide in different disaster types. The study will also formulate a theoretical framework of the logistics services providers' competencies in disaster relief operations.

A systematic literature review was used in planning, searching, selecting, synthesising, analysing and reporting the academic literature on logistics outsourcing in supply chain management. The systematic literature review ensured academic rigor, improving the consistency and reproducibility of the study. Content analysis of 63 peer-reviewed, academic journal articles, with a timeline of 2007 to 2025, was conducted.

The descriptive and thematic analyses conducted provide insights into the subject matter. It is evident that logistics service providers play an increasingly significant role in humanitarian operations. Some of these include their support with technical competencies, digital transformation of humanitarian operations, security, network access, cultural intelligence, et cetera. There is, however, the need to establish and maintain partnerships with the humanitarian organisations, pre-disaster. There is also the need to redirect focus and resources towards development efforts as against disaster relief operations to ensure resilient and sustainable structures are in place for better outcomes, post-disaster.

The relative heterogeneity of research in managerial studies makes it difficult to conduct aggregate studies, necessitating use of themes to understand the data gathered. The study's reliance on published data also introduces vulnerabilities concerning the lack of access to granular data the researchers utilised in reaching their findings. This makes it difficult to guarantee fully independent and unbiased suppositions. The focus on English language only publications may imply that the study is not fully representative of the existing body of knowledge on the subject matter.

A significant proportion of the existing literature provides a global, often one-size-fits all approach with regards to the capabilities needed in the disaster types. This

study provides more detail on context-specific nature of the disasters and the need to tailor the response accordingly.

Logistics service providers can effectively deliver on their humanitarian objectives through their operational capabilities and strategic partnerships with the humanitarian organisations and the local communities.

Keywords:

Humanitarian*, emergency response logistics, third party logistics, disaster relief operations, outsourcing capabilities.

Acknowledgements

Lepeng and Cynthia: you two were the perfect teammates. Hilarious, yet with such calming personalities.

Lucile: you were such a kind-hearted study partner and a standup kind of girl. I still do not know what sympathic means, but I believe you; a Microsoft Teams call is more sympathic than a voice note.

Soumina: not me wondering who cut the onions when you got your first paycheck at JD.com, so you went to buy me things to say thank you for everything. Because, if I were to play it all in reverse, I'd say THANK YOU. For prawns and dessert, for several hours we spent studying together, Sunday mornings from 7am; for working on the exams together, for the job searches, interview preps, CV updates, Willen Lake, hot chocolate at the café, my first bubble tea, movie days and nights at the cinema, fried chicken wings, TEDx and games night, salmon cooked rare, grocery shopping, careers fairs, long walks to nowhere, pictures, memories, shared pasts, dreams about making it big someday, screenshots, time-sensitive information I'd have missed out on from days rotting in bed, spicy Nigerian jollof, fried mackerel and ijebu garri. Friendship with you is so wholesome.

Ruyi: you were in all of my highlights and happiest memories.

Dr. Ismail: you were the perfect Supervisor.

I wish you all happier days.

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List of Abbreviations

IT	Information Technology
AI	Artificial Intelligence
AAR	After Action Review
CLSP	Commercial Logistics Service Providers
CSR	Corporate Social Responsibility
DM	Disaster Management
DRO	Disaster Relief Operation
EV	Electric Vehicle
HLO	Humanitarian Logistics Operations
HO	Humanitarian Organisation
HO	Humanitarian Operation
HROs	Humanitarian Relief Organisations
HSCs	Humanitarian Supply Chains
IDP	Internally Displaced Person
IoT	Internet of Things
IRC	Indonesian Red Cross
IT	Information Technology
LC	Local Community
LOD	Lines of Development
LSPs	Logistics Service Providers
NGOs	Non-Governmental Organisations
PPP	Public-Private Partnership
PRISMA	Preferred Reporting Items for Systematic Reviews & Meta-Analyses
RACI Matrix	OR Responsibility Assignment Matrix (RACI – Responsible, Accountable, Consulted, and Informed)
RBV	Resource-Based View
RDC	Regional Distribution Centre
RQ	Research Question
SCM	Supply Chain Management
SCOR	Supply Chain Operations Reference
SLA	Service Level Agreement
SLR	Systematic Literature Review
SOP	Standard Operating Procedure
UN	United Nations

1 Introduction

1.1 Background

HOs have gained more mainstream status in operations management (Vega & Roussat, 2015); presumably due to the increasing demand for the said intervention globally and especially as climate change has increasingly impacted on natural and man-made disasters, further destabilising regions, disrupting supply chains and worsening humanitarian crises.

These happenings normalise the discourse surrounding HOs, in operations management, as logistics service providers have emerged as key contributors in this field. They also underscore the relevance of research studies in this field, to help understand evolving practices of how outsourcing strategies have been adapted to improve context-specific capabilities and operational efficiency of the HOs and third-party logistics companies.

1.2 Problem Statement

Despite the growing involvement of LSPs in HOs, their specific contributions to HSCs have often been overlooked. Some of the challenges with obtaining clearer insights in this field border on the tendency to focus on theoretical studies. Pedraza-Martinez & Wassenhove (2016) suggest that existing literature has largely prioritised deterministic optimisation models that are not typically reflective of real-world scenarios. This is significant because the lack of practical applicability of such models will hinder the development of theories in HOs.

There is also the challenge with the type of individuals that end up in field work. Pedraza-Martinez & Wassenhove, (2016) maintain that these individuals are typically hands-on and lack the capacity to conduct sophisticated data gathering, data analysis, or the rigours of academic research. Jola-Sanchez et al. (2016) corroborate this by highlighting the remote access and the often unsafe nature of data gathering in conflicts and suggest this differentiates HOs from commercial operations and may discourage significant research endeavours. Likewise, Morrice et al. (2016) discuss the challenges faced with HOs while trying to optimise resource allocation during natural disasters.

Despite the challenges faced with conducting research in this field, valuable field studies exist and have shed light on various aspects.

For instance, Sahay et al. (2016) illustrate how these operations often try to ensure that supply meets demand even under severe resource constraints and poor visibility. Acimovic & Goentzel (2016) also discuss the lack of visibility for HOs to sufficiently map out the location and total humanitarian inventory. Berenguer et al. (2016) showcase the impact of context- and region-specific behaviour in performance outcomes. Holguín-Veras et al. (2012) suggest the need for proper objective functions in HOs instead of adopting a more commercial approach. Jahre et al. (2016) illustrate how funding constraints impact on network design and timeliness of service delivery. Sodhi (2016) seeks to develop a feedback loop whereby hazards, vulnerability and disaster are seen to directly impact on the economy and vice versa. van der Laan et al. (2016) suggest that development operations enable HOs to plan properly when they adequately forecast. Yoo et al. (2016) study the proliferation of technology, and its impact on HOs.

A key observation is the strong focus on DROs as against concurrent multi-objective operations, with both short- and long-term development operations that ideally should be conducted simultaneously to ensure sustainable practices and to boost the affected region's preparedness and resilience to future disruptions. By analysing the existing gaps and opportunities and attempting to answer the RQs, this study aims to contribute to the existing literature by linking logistics outsourcing to resilience and advocating for frameworks that balance both disaster response and development operations to ensure more sustainable practices.

1.3 Field of Study

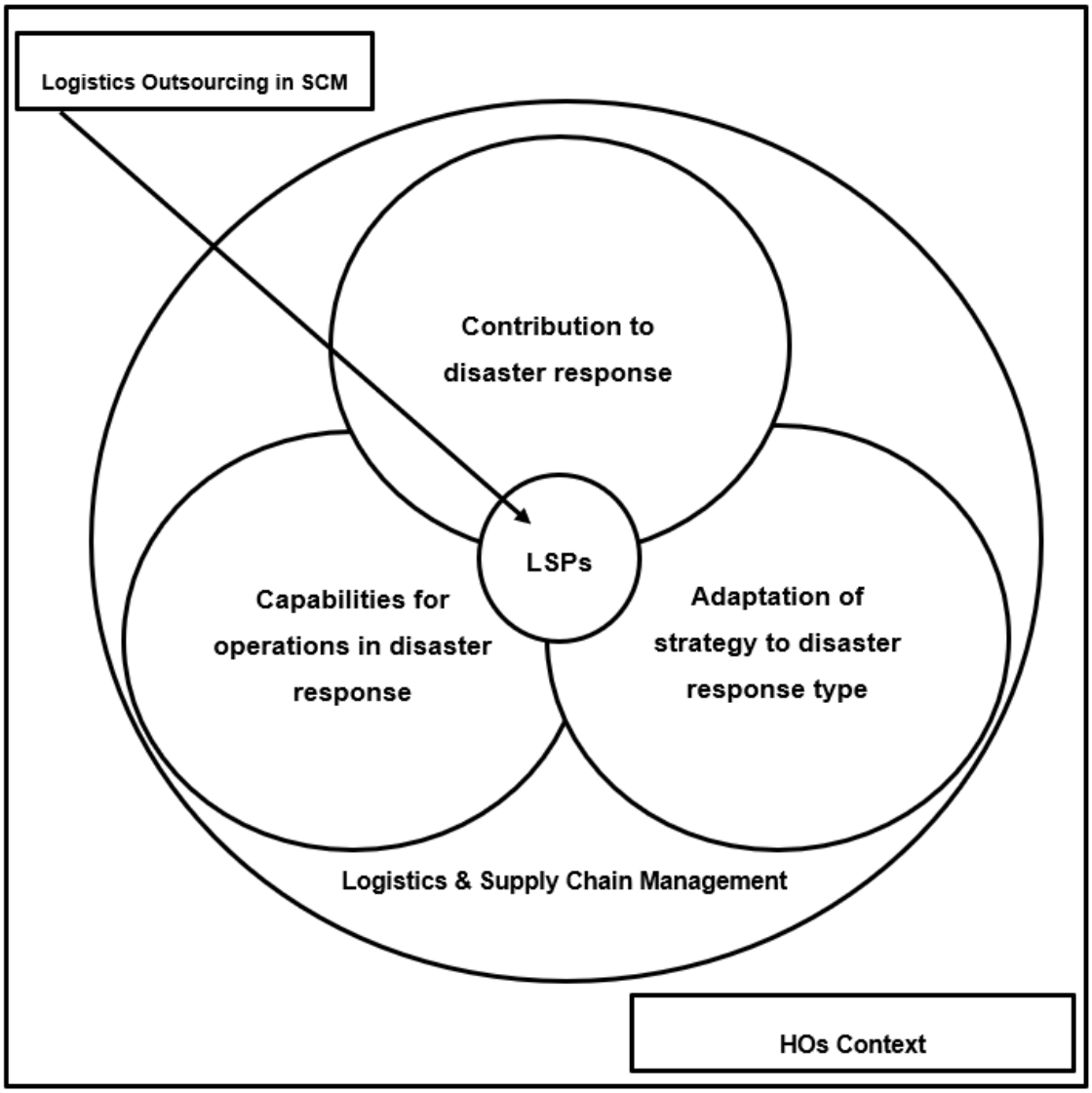

Figure 1 Scope

1.4 Research Significance

The main significance of this research study is to provide an independent, systematic and thorough review of the existing literature on logistics outsourcing in SCM within the context of HOs. Inasmuch as LSPs have become essential actors in the field of HOs, gaps still exist regarding their roles in the humanitarian ecosystem. This study will investigate the roles of LSPs in disaster management

efforts (Vega & Roussat, 2015) and address the fragmented nature of LSPs' roles in the existing literature (Pedraza-Martinez & Wassenhove, 2016; Gossler et al., 2020). The study will also highlight the low-trust, often transactional and short-term partnerships existing among the various actors in HOs (Gossler et al., 2020). Furthermore, the study will showcase the changing narratives in empirical investigations being conducted in logistics outsourcing in DROs (Sigala & Wakolbinger, 2019; Ittmann, 2022; Edwards et al., 2024).

The study will compare the different types of disasters and map out capabilities LSPs use in the different typologies, given the changes to context specifications per disaster type. For instance, Baharmand et al (2017) discusses how LSPs provide specific technical expertise and fleet variety, post-disaster in earthquakes because the transportation networks in the affected regions were completely decimated. In another instance, after commercial air transportation was shut down during the Covid-19 pandemic, the LSPs pooled resources together and continuously evolved with the changing needs of the pandemic, with some LSPs handling cold storage facilities for the vaccines (Ittmann, 2022). Furthermore, we see humanitarian crises with undercurrents of conflicts, where the LSPs had to act as security apparatus, safeguarding lives and property (Malhouni & Mabrouki, 2024).

Lastly, the study will develop a capability framework designed to help HOs and relevant stakeholders forge strategic collaborations, to improve supply chain resilience in humanitarian crises, and to improve performance outcomes of the actors in the humanitarian ecosystem. The existing literature already supports the need to identify and leverage on such frameworks. While Kim et al (2019) developed a framework focused on a selection criteria for CLSPs in the preparedness stage, Apte et al (2016) developed a competency test to identify and leverage on these frameworks for disaster management. Likewise, Shokr et al. (2021) highlighted the practical use of such frameworks in coordination, demonstrating the value of these frameworks in performance outcomes of HOs.

1.5 Research Aim and Objectives

The aim of this study is to explore the role and capabilities of LSPs in supporting HOs.

The research objectives are as follows:

1. To conduct an SLR on how logistics outsourcing supports the response stage of HLOs
2. To gain an understanding of how outsourcing partners operating in the humanitarian sector support the different types of disasters
3. To develop a model that explains the capabilities needed by LSPs to operate in disaster-stricken areas
4. To provide directions for research in this area

Consequently, the following RQs were derived from the objectives:

1. How has logistics outsourcing supported disaster response in HOs?
2. How do LSPs support HOs across the various disaster types?
3. What capabilities do these LSPs need to effectively operate in these crises and what are the differences observed as the humanitarian contexts vary?
4. What research gaps and future opportunities can be explored?

1.6 Thesis Structure

In section 1 (planning stage), the problem statement was discussed, and the research aim and objectives were developed.

In section 2 (searching stage), basic definitions were provided, keywords and key strings were formulated.

In section 3 (screening stage), initial and secondary screenings were conducted with exclusion and inclusion criteria.

In section 4 (extraction and synthesis stage), the data was extracted and documented in the data extraction forms provided. The data was then synthesised using thematic analysis.

In section 5 (reporting stage), the findings were reported and the SLR architecture was mapped.

2 Methodology

2.1 Systematic Literature Review

An SLR was conducted for this research study. As Tranfield et al. (2003) demonstrate, SLRs are valuable in management studies because they analyse and synthesise a comprehensive body of knowledge in a field of study to provide reliable findings, through the explicit statement of the underlying assumptions of the review. They maintain that the similarities between medical and management research, along with the need for reliable data synthesis, underscore the importance of ensuring sourced data accurately reflects reality and that findings can effectively inform practice and policy making. Probable questions in such studies consider the applicability of the review, the value addition, as well as the standards and quality criteria that make the studies reliable and reproducible. By conducting a comprehensive review on logistics outsourcing in humanitarian logistics, valuable insights can be gained on themes such as drivers, impacts, research gaps and best practices for humanitarian context.

2.2 Review of Design and Protocol

This review was designed in line with Tranfield et al.'s (2003) guidelines, developing a protocol for the intended review before data collection to reduce research bias and ensure replicability of the process.

2.2.1 The Stages in SLR

The SLR adopted the following 3-stage process:

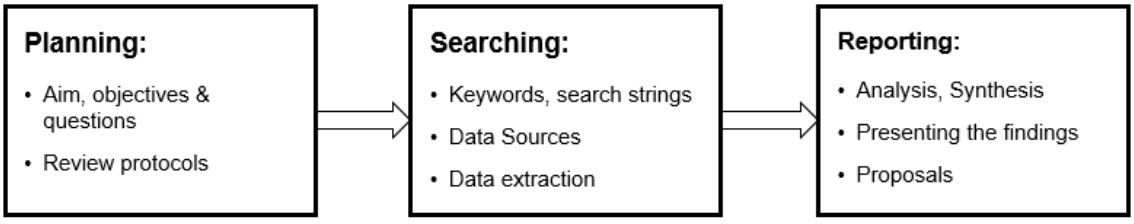

Figure 2 The Stages in SLR (Sourced from Tranfield et al., 2003)

2.2.2 Development of the Research Protocol

A detailed research protocol was developed to outline the review process. Table 1 below illustrates key elements included in the research protocol:

Table 1 The Research Protocol

Stage	Details
Planning stage:	
• Constitution of review panel	• A panel was constituted.
• Preamble	• The context was provided on logistics outsourcing in SCM.
• Discussion on significance, aim & objectives	• The significance, aim, objectives and questions were highlighted, with the intention of informing better practice through the development of a capability framework designed to help HOs forge strategic collaborations to improve supply chain resilience in humanitarian crises.
Searching stage:	
• Development of protocol	• A research protocol was developed, prior to conducting the research, with details of selection criteria, search strategy, methodology and thematic synthesis approach to be employed.
• Identification of research study	• Predetermined keywords were formulated into search strings and used to conduct a systematic search on three electronic research databases

	(Scopus, ABI/Inform & EBSCO) for peer-reviewed, journal articles published in English language only. These three databases were selected as the data sources for the study because they have wide accessibility to quality research studies (Thome et al., 2012).
• Selection of articles to be analysed	• Inclusion and exclusion criteria were applied to select relevant articles that aligned with the research topic, objectives, and questions. Subsequent screenings were conducted using keywords, titles, abstracts, introductions and conclusions and also full text screening, to ensure only relevant, reliable and quality papers were selected.
Reporting stage:	
• Quality Assessment	• The journal articles were assessed with the use of the pre-determined research protocol.
• Data Extraction	• The relevant information was extracted and documented in the data extraction forms for synthesis.
• Reporting & dissemination	• The data was synthesised into key characteristics using thematic analysis. Answers to the RQs were derived from the findings.

2.3 Search Strategy and Keywords

Keywords were developed and formulated into search strings using Boolean Connectors as detailed below:

Table 2 Keywords and Search Strings

Keywords
Humanitarian logistics, emergency response logistics, logistics outsourcing, disaster relief logistics, humanitarian aid, humanitarian supply chain*, logistics service provider*, third party logistics, 3PL, humanitarian response, outsourcing capabilities, humanitarian operations, disaster relief operations, capabilities. resilience, performance, competence, humanitarian crisis, natural disaster, armed conflict, man-made disaster, disaster stricken.
Search strings
Search string 1 ("humanitarian logistics" OR "disaster relief logistics" OR "emergency response logistics" OR "humanitarian operations" OR “disaster relief operations” OR "humanitarian supply chain*" OR "humanitarian relief aid" OR "humanitarian response" OR "disaster management") AND ("third party logistics" OR "3PL" OR "logistics outsourcing" OR "logistics service provider*" OR "outsourcing capabilities")
Search string 2 ("humanitarian logistics" OR "disaster relief logistics" OR "emergency response logistics" OR "humanitarian operations" OR "humanitarian supply chain*" OR " disaster relief operations") AND ("third party logistics" OR "3PL" OR "logistics outsourcing") AND ("capabilit*" OR "resilien*" OR "performance" OR "competenc*")
Search string 3

("humanitarian logistics" OR "disaster relief logistics" OR "emergency response logistics") AND (“humanitarian logistics” OR "humanitarian supply chain*" OR "logistics outsourcing" OR "third party logistics" OR "3PL") AND ("natural disaster*" OR "armed conflict*" OR “man-made disaster” OR "humanitarian crisis" OR "disaster-stricken")

2.4 Inclusion and Exclusion Criteria

To increase the relevance of the data and to streamline it further, the articles were filtered using inclusion and exclusion selection criteria that align with the research objectives and questions. The criteria considered were language, research type, timeframes, formats and relevance. Details of the inclusion and exclusion criteria are as indicated in Table 3.

Table 3 Inclusion and Exclusion Criteria

Selection Criteria	Inclusion Criteria	Exclusion Criteria	Rationale
Language	Publications in English Language.	Publications in other languages.	In view of the authorship of prominent journals in English language and due to English language’s linguistic dominance within the science of systematic reviews in research studies (Cooper et al., 2018).

Accessibility	Full-text.	Abstracts, conference proceedings, editorials.	To enable adequate access to all of the material required for thorough evaluation, data extraction and quality appraisal (Moher, et al., 2009).
Quality	Peer-reviewed publications.	Non-peer-reviewed publications.	To increase the scientific rigour of the literature reviewed (IQWIG, 2015).
Relevance	Materials that are related to the research topic as indicated in the developed keywords and keystrings.	Materials outside the scope of study as indicated by the developed keywords and keystrings.	To increase the sensitivity and ensure the materials used focus on the research objectives and questions (IQWIG, 2015).
Publication stage	Published articles.	Articles that were yet to be published or those that are still under review.	To prevent duplication of counts as the same research study may be publicly available

			in different stages of publication (Tranfield et al., 2003).
Document type	Scientific and scholarly journal articles or case studies.	Conference papers, book chapters, conference reviews.	To serve as a primary measure of quality research (Thome et al., 2016).
Source type	Journals	Conference proceedings, books, book series.	To ensure that the studies used possess validated knowledge that has been subjected to extensive academic rigour and are readily accessible to the academic community (Tranfield et al., 2003).
Time frame	No time frame was considered.	There were no exemptions.	To observe the evolution of management theories and practices overtime and to ensure that

			significant foundational studies are not inadvertently omitted.

2.5 PRISMA Flow Diagram

The PRISMA flow diagram was used for reporting the findings (Moher et al., 2009). Figure 3 below breaks down the systematic process used to select the most relevant academic journal articles for this review:

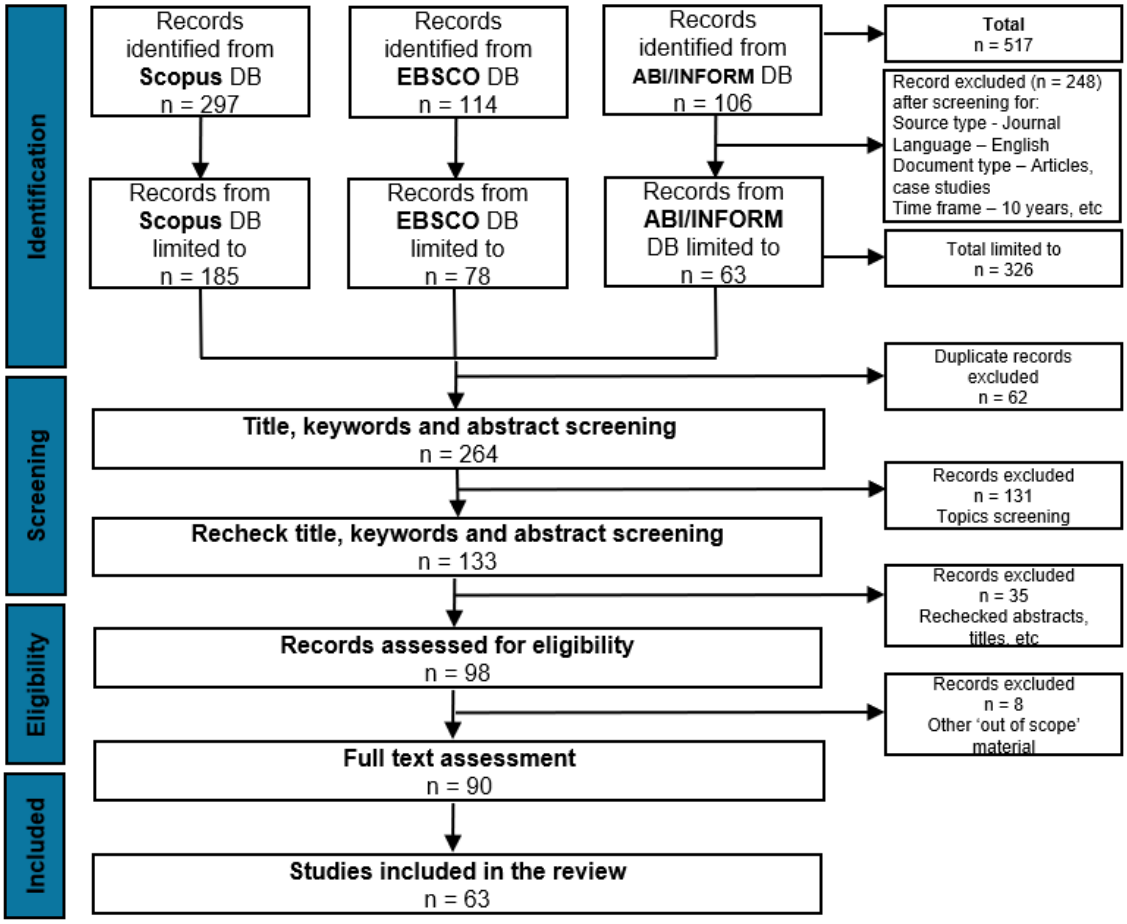

Figure 3 PRISMA Flow Diagram for the Journals

Adapted from Wang et al., (2024). Digital transformation in food supply chains: an implementation framework. *Supply Chain Management*. Vol. 29(2), 328-350.

2.6 Data Extraction and Thematic Synthesis

Data extraction forms were used to document relevant information from the journal articles. Some of the details included were the titles, author(s), publication year, research methodology adopted, research findings and their relevance to the research objectives and questions.

Please see 7.1Appendix B, for ease of reference and details of an attached sample of the completed forms.

Thematic synthesis was used to identify, analyse, link and report key findings from the different studies assessed, to demonstrate the degree of consensus with the existing body of knowledge and, where possible, to identify emerging themes (Tranfield et al., 2003).

To ensure reliability of the study, a detailed audit trail was provided.

Listed below are the academic research papers that were utilised for the SLR.

Table 4 Research Papers for the SLR

S/N	Title	Document Name
1	Managing in-country transportation risks in humanitarian supply chains by logistics service providers: Insights from the 2015 Nepal earthquake	Baharmand et al. (2017)
2	Cooperation between single third-party logistics provider and government for emergency disaster relief operations in Thailand	Chata et al. (2022)
3	A novel humanitarian and private sector relief chain network design model for disaster response	Shokr et al. (2021)

4	The impact of using outsourcing strategy by humanitarian organisations on logistical performance: An empirical investigation from a developing country	Rifai et al. (2021)
5	Capabilities and competencies in humanitarian operations	Apte et al. (2016)
6	Humanitarian logistics network design under mixed uncertainty	Tofighi et al. (2016)
7	Logistics service provider selection for disaster preparation: a socio-technical systems perspective.	Kim et al. (2019)
8	Humanitarian logistics: the role of logistics service providers.	Vega & Roussat (2015)
9	Toward a conceptualisation of humanitarian service providers.	Vega & Roussat (2019)
10	Business model canvas for humanitarian operations of logistics service providers.	Kucukaltan et al. (2022)
11	Outsourcing in humanitarian logistics – status quo and future directions	Gossler et al. (2020)
12	Applying the Delphi method to determine best practices for outsourcing logistics in disaster relief	Gossler et al. (2019)

13	Outsourcing of humanitarian logistics to commercial logistics service providers: An empirical investigation	Sigala & Wakolbinger (2019)
14	Collaborative relationships between logistics service providers and humanitarian organisations during disaster relief operations	Bealt et al. (2016)
15	Logistics service network design for humanitarian response in East Africa.	Dufour et al. (2018)
16	Logistics service providers' engagement in disaster relief initiatives: An exploratory analysis	Cozzolino et al. (2017)
17	A Bi-objective stochastic optimisation model for humanitarian relief chain by using evolutionary algorithms	Javadian et al. (2017)
18	Crowdsourced humanitarian relief vehicle routing problem	Parappathodi & Archetti (2022)
19	Pre-positioning and Multiperiod Distribution of Relief Supplies in Humanitarian Logistics: A Case Study on Earthquakes in Ya'an, China	Wang et al. (2025)
20	Investigating the strategic antecedents of agility in humanitarian logistics	L'Hermitte et al. (2017)

21	A multiobjective mathematical model for a humanitarian logistics multimodal transportation problem	Romero-Mancilla et al. (2024)
22	A blockchain-enabled framework for sharing logistics resources during emergency operations	L'Hermitte & Nair (2021)
23	A Multi-Objective Model for Humanitarian Logistics Model During an Earthquake Crisis: A Case Study of Iran	Yaghoubi & Dadmand (2024)
24	Challenges in international humanitarian logistics: problem areas	Işik & Dinler (2023)
25	Mitigating risks and overcoming logistics challenges in humanitarian deployment to conflict zones: evidence from the DRC and CAR	Malhouni & Mabrouki (2024)
26	Model of multi-period emergency material allocation for large-scale sudden natural disasters in humanitarian logistics: Efficiency, effectiveness and equity	Wang & Sun (2023)
27	The impact of COVID-19 on informal humanitarian supply chains – The case study of Zimbabwe	Ittmann (2022)
28	Humanitarian Assistance in G5 Sahel: Social Sustainability Context of Macrologistics Potential	Płachciak & Marcinkowski (2022)
29	Greening of humanitarian supply chain with focus on logistics	Jilani et al. (2018)

30	Humanitarian logistics: enhancing the engagement of local populations	Sheppard et al. (2013)
31	Humanitarian logistics: A new field of research and action	Apte (2010)
32	Towards a humanitarian logistics knowledge management system	Tatham & Spens (2011)
33	Integrated disaster relief logistics: A stepping stone towards viable civil-military networks?	Tatham & Rietjens (2016)
34	Coordination of humanitarian logistic model plan for natural disaster in east java, Indonesia	Octavia et al. (2016)
35	Investigating humanitarian logistics issues: From operations management to strategic action	Chandes & Paché (2010)
36	Cracking the humanitarian logistic coordination challenge: Lessons from the urban search and rescue community	Tatham & Spens (2016)
37	Responding to disruptions in the supply network-from dormant to action	Kovács & Tatham (2009)
38	Humanitarian logistics: A clustering methodology for assisting Humanitarian operations	Lima et al. (2014)

39	The islanding effect: Post-disaster mobility systems and humanitarian logistics in Haiti	Sheller (2013)
40	Humanitarian logistics planning for natural disaster response with bayesian information updates	Liu & Ye (2014)
41	Development and application of humanistic logistics models for optimising location-allocation problem solutions to volcanic eruption disaster (Case study: Volcanic eruption of Mount Merapi, Indonesia)	Prabowo et al. (2017)
42	A robust optimisation model for distribution and evacuation in the disaster response phase	Fereiduni & Shahanaghi (2017)
43	Host government impact on the logistics performance of international humanitarian organisations	Dube et al. (2016)
44	4PL routing optimisation under emergency conditions	Huang et al. (2015)
45	Optimization models for disaster response operations: a literature review	Kamyabniya et al. (2024)
46	Cross-sector humanitarian-business partnerships in managing humanitarian logistics: an empirical verification	Nurmala et al. (2018)
47	A grid-based humanitarian logistics solution	Olivier & Kruger (2022)

48	Optimal stochastic inventory-distribution strategy for damaged multi-echelon humanitarian logistics network	Kawase & Iryo (2023)
49	Operational excellence in humanitarian logistics and supply chain management through leagile framework: a case study from a non-mature economy	Nayak & Choudhary (2022)
50	Multicriteria optimisation in humanitarian aid	Gutjahr & Nolz (2016)
51	Natural disaster management planning: A study of logistics managers responding to the tsunami	Perry (2007)
52	Planning the delivery of relief supplies upon the occurrence of a natural disaster while considering the assembly process of the relief kits	Rivera-Royero et al. (2020)
53	Including deprivation costs in facility location models for humanitarian relief logistics	Cotes & Cantillo (2019)
54	The role of the military logistic system in support of the civil crisis management operations to mitigate the effects of natural disasters and technical failures: the case study of polish military logistics	Lis (2017)
55	On the unique features of post-disaster humanitarian logistics	Holguín-Veras et al. (2012)

56	Operational improvement programs and humanitarian operations	Dora & Kumar (2022)
57	Japanese and American approach to humanitarian logistics in natural disasters' prevention	Marcinkowski (2017)
58	Improving civil-military coordination in humanitarian logistics: the challenge	Heaslip & Barber (2016)
59	Reverse logistics for electric vehicles under uncertainty: An intelligent emergency management approach	Jauhar et al. (2024)
60	The application of “swift trust” to humanitarian logistics	Tatham & Kovács (2010)
61	Models and metrics to assess humanitarian response capacity	Acimovic & Goentzel (2016)
62	Use of delivery drones for humanitarian operations: analysis of adoption barriers among logistics service providers from the technology acceptance model perspective	Edwards et al. (2024)
63	Protecting vulnerable people during pandemics through home delivery of essential supplies: a distribution logistics model	Breitbarth et al. (2021)

2.7 Limitations

Tranfield et al. (2003) highlight key differences between medical and management research, noting that while medical research often builds on previous or similar work, management research tends to be more heterogeneous and divergent. This is evident in earlier discussions in the introduction, about the often divergent, yet relevant themes identified from research conducted by key stakeholders in logistics and HOs. The heterogeneity is significant because it reduces the suitability of aggregate research methods, like meta-analyses, for data analysis and synthesis in management studies. Nonetheless, the focus should be placed on how medical research methodologies can inform the review process in management, helping to create more rigorous and relevant literature reviews.

Also, since the research study conducted merely reviewed existing literature, the researcher could not access raw, ground data and had to accept findings from already published literature – which potentially precludes the most recent research – as valid, reliable and unbiased (Thome et al., 2016).

Furthermore, the restriction of selections to publications in only English language introduces a degree of language barrier as there are potentially relevant and high quality papers that might have been published by non-English speaking scientists from around the globe. Given the context of studying logistics outsourcing in humanitarian contexts across the globe, English only publications might not be fully representative or reflective of all the geographies affected by this phenomenon.

3 Literature Review

3.1 Descriptive Analysis of Major Concepts

In this chapter, the data extracted from the 63 peer-reviewed research papers are collated and analysed to identify trends such as publication timelines that trace the evolution of the publications, illustrating their historical context as well as the currency and relevance of these publications to the existing body of knowledge. Other trends highlighted are the geographical and sectoral scopes, which map out areas of concentration and distribution of the publications across different geographies.

3.2 Overview of Literature Pool

The SLR consists of 63 peer-reviewed, academic articles from journal publications including: Journal of Humanitarian Logistics and Supply Chain Management, Annals of Operations Research, International Journal of Physical Distribution & Logistics Management and European Journal of Operational Research.

For ease of reference, please see 7.1Appendix C below with the distribution of the Publication Journals.

The research paper types include empirical studies (Ittmann, 2022), optimisation models (Octavia et al., 2016), conceptual / theoretical frameworks (Kovács & Tatham, 2009) and SLRs (Kamyabniya et al., 2024). Some of the studies, however, adopt combinations of the listed frameworks, e.g., empirical case studies with theoretical underpinnings (Liu & Ye, 2014), modelling with empirical validation (Yaghoubi & Dadmand, 2024), theoretical studies with conceptual modelling (Huang et al., 2015), etc.

Key discussions include natural disasters (Vega & Roussat, 2015; Romero-Mancilla et al., 2024), man-made disasters (Ittmann, 2022; Malhouni & Mabrouki, 2024), complex emergencies (Kovács & Tatham, 2009; Tatham & Spens, 2016),

partnerships between aid agencies, LSPs and other actors in the humanitarian ecosystem (Nurmala et al., 2018). The emerging trends include the use of drone technology for last mile delivery (Edwards et al., 2024), the use of EVs to reduce carbon emissions (Jauhar et al., 2024), the deployment of blockchain technology to improve visibility in resource mobilisation (L'Hermitte & Nair, 2021) and the application of machine learning for demand sensing (Jauhar et al., 2024).

3.3 Publication Timelines and Trends

The publications reviewed span a timeline of 2007 to 2025, with spikes that coincide with certain, high-impact disasters circa 2016, 2019, 2022, 2024. An increase was observed in normalising discourse post-2010, likely due to climate change and the increasing magnitude and frequency of disasters (Baharmand et al., 2017). Initial publications largely focus on gaps identified in collaboration and coordination in HOs, arising from the different actors in the field of HOs, their inherent independence and the resultant duplication of efforts (Perry, 2007; Apte, 2010; Chandes & Paché, 2010; Tatham & Spens, 2011).

A proliferation of publications with diverse research approaches, frameworks and models was evident between 2016 to 2020, likely due to the increasing complexity of the humanitarian crises and the need for interdisciplinary collaboration (Acimovic & Goentzel, 2016; Dube et al., 2016; Heaslip & Barber, 2016; Octavia et al., 2016; Fereiduni & Shahanaghi, 2017; Prabowo et al., 2017; Cotes & Cantillo, 2019; Rivera-Royero et al., 2020) to resolve the often multi-objective problems (Vega & Roussat, 2015; Gutjahr & Nolz, 2016; Fereiduni & Shahanaghi, 2017; Javadian, et al., 2017; Dufour et al., 2018; Cotes & Cantillo, 2019; Gossler et al., 2019; Romero-Mancilla et al., 2024; Yaghoubi & Dadmand, 2024).

Post-2015, there are also publications on the emerging technological trends – from vehicle routing to EVs for a reduction in carbon emissions, to blockchain and drone technology (L'Hermitte & Nair, 2021; Parappathodi & Archetti, 2022; Edwards et al., 2024; Jauhar et al., 2024) in the humanitarian space.

Figure 4 below illustrates the distribution of the publications over the period under review:

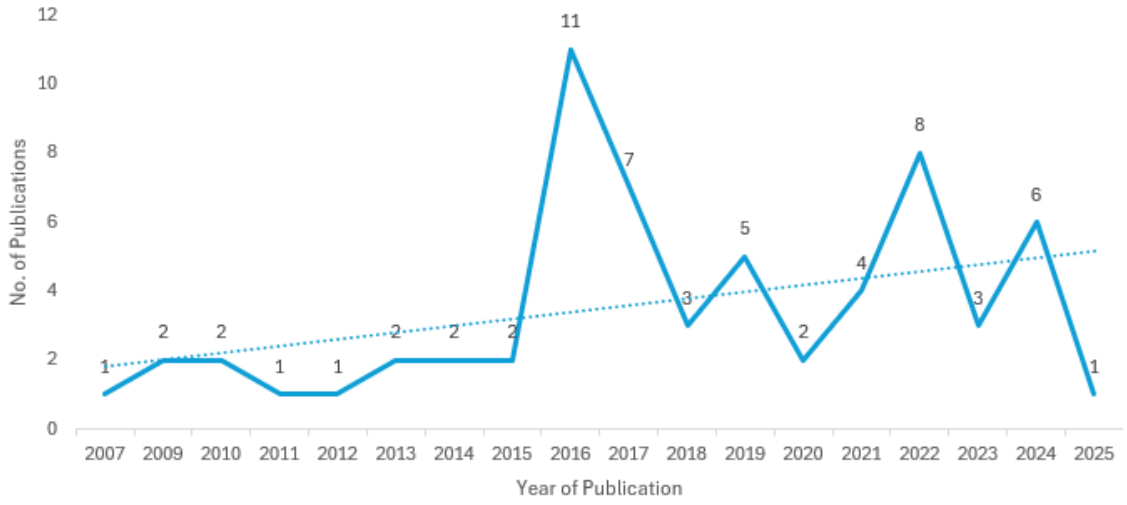

Figure 4 Time Distribution of Publications in Logistics Outsourcing in HSCs

3.4 Description of Theories

The distribution of research types varies with 37% adopting qualitative methods and utilising case studies, interviews, theoretical frameworks and document analysis for data collection (Perry, 2007; Apte, 2010; Chandes & Paché, 2010; Sheppard et al., 2013), 8% adopting quantitative methods and utilising surveys and statistical analysis for data collection (Cozzolino et al., 2017; Jilani et al., 2018; Rifai et al., 2021), 21% adopting mixed methods and utilising combinations of delphi studies, interviews, modelling, content analysis and quantitative metrics for data collection (Vega & Roussat, 2015; Kim et al., 2019; Ittmann, 2022; Romero-Mancilla et al., 2024) and 34% adopting optimisation / modelling with network designs, simulations and vehicle routing computations (Cotes & Cantillo, 2019; Wang & Sun, 2023; Yaghoubi & Dadmand, 2024).

While Pedraza-Martinez & Wassenhove (2016) highlighted a gap in the number of empirical research in the existing body of knowledge and the inability of theoretical frameworks to fully mirror real-world, humanitarian contexts, there has been a surge in publications with empirical methodologies, post-2015. These now

dominate the field, spanning diverse approaches such as single- and multi-case analyses, studies integrating theoretical frameworks with fieldwork, and as earlier discussed, hybrid models combining optimisation techniques with empirical validation, among others.

3.5 Geographical and Sectoral Scope

A majority of the publications covered disasters in the Asia-Pacific regions (Octavia et al., 2016; Chata et al., 2022; Wang et al., 2025), with Africa, Middle East and Europe (Breitbarth et al., 2021; Płachciak & Marcinkowski, 2022; Yaghoubi & Dadmand, 2024) being insufficiently examined despite numerous humanitarian crises in the State of Palestine, DRC, South Sudan, Nigeria, Somalia, etc, suggesting the influence of region-specific contexts on academic research. Publications in the Americas mostly cover the response and recovery efforts of natural disasters (Rivera-Royero et al., 2020; Olivier & Kruger, 2022). A number of publications generically discuss HOs from a global perspective (Cozzolino et al., 2017; Işik & Dinler, 2023; Dora & Kumar, 2022); however, with the exception of Sheller (2013), Dube et al. (2016) and Marcinkowski (2017), most fail to establish equivalent comparative frameworks that would have facilitated analysis of the similarities and / or differences across the different regions and guaranteed context-informed consistency in response to the humanitarian crises.

Figure 5 below is a graphical illustration of the distribution across the geographical regions:

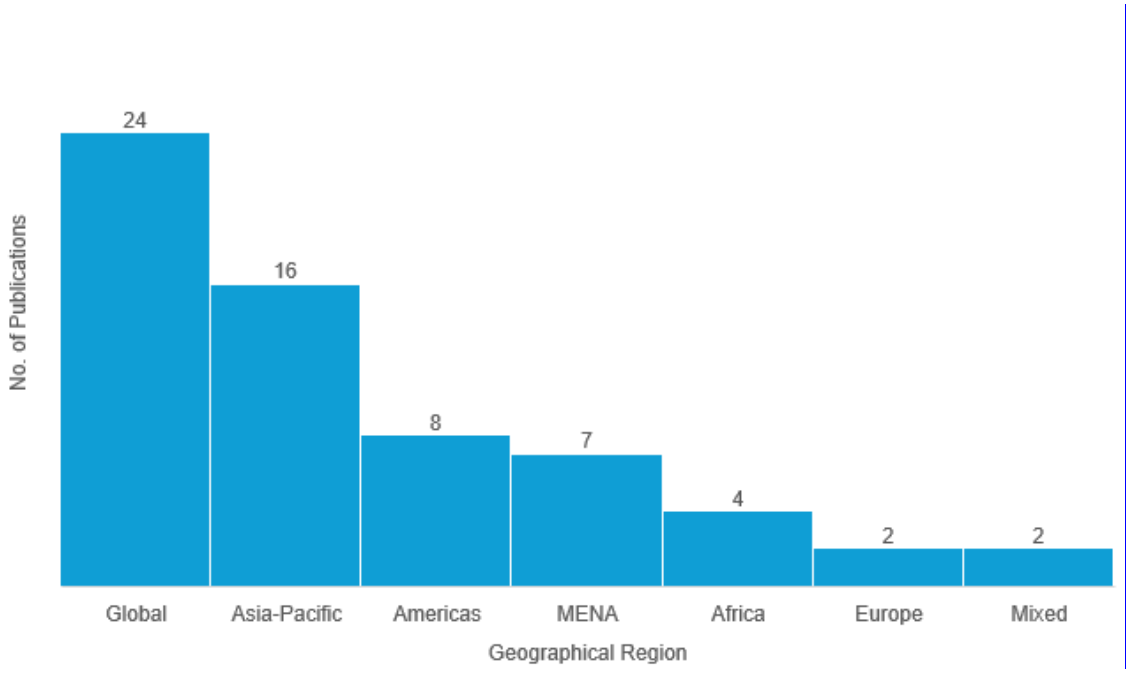

Figure 5 Regional Distribution of the Publications

The context industry and research focus for a majority of the studies point to an emphasis on disaster management – disaster response and relief operations – and also collaborations between humanitarian aid agencies, their commercial partners, governments and the military (Perry, 2007; Lis, 2017; Prabowo et al., 2017). A few articles highlight the varying objective functions (Tatham & Kovács, 2010; Octavia et al., 2016). Others discuss the need for partnership between HOs and the LSPs from as early as the preparedness stage (Sigala & Wakolbinger, 2019). The optimisation models formulate optimal pre-positioning networks, distribution networks for last mile delivery, evacuation, etc (Dufour et al., 2018; Chata et al., 2022; Apte, 2010). Other significant discussions cover funding (Gossler et al., 2019), deprivation costs (Cotes & Cantillo, 2019), context-specific behaviours that influence humanitarian efforts (Dube et al., 2016), transactional relationships and short-term memory of HOs due to high staff turnover (Gossler et al., 2019) and tensions that arise between the varying objective functions of the different actors (Tatham & Kovács, 2010) involved in HOs.

4 Thematic Analysis

4.1 Themes and Major Concepts

In this chapter, the extracted data from the 63 peer-reviewed research papers are collated and analysed. Recuring themes are synthesised from the analyses in a bid to identify and understand key concepts in the existing literature and see aspects that are relevant to the research objectives and questions. The relationships will also be explored to observe how frequently these themes occur and how central they are to the discourse (Thomé et al, 2016). Theoretical underpinnings are discussed. Subsequently, a summary table of the themes is developed, with a thorough analysis of the themes provided.

4.2 Theoretical Underpinnings

One of the concepts analysed is the RBV through which HOs often operate, focusing on the optimal use of their own internal resources to facilitate efficient delivery of humanitarian aid and to build resilient structures for operational continuity and future sustainability (Kovács & Tatham, 2009; Apte et al., 2016). For example, Baharmand et al. (2017) and Shokr et al. (2021) discuss the use of live tracking and adaptive routing systems in logistics outsourcing, to overcome bottlenecks encountered post-disaster. Likewise, Nayak & Choudhary (2022) apply ‘leagile’ frameworks that combine efficient, lean operations with the agility needed to adapt to dynamic disaster settings. Additionally, these HOs form partnerships with the LCs to build trust and cultural competencies that will improve their knowledge of the distribution networks and optimise resource allocation (Kim et al., 2019).

Another concept is ‘swift trust’, which highlights different antecedents of trust (third-party information, dispositional trust, rules-based trust, category-based trust and role-based trust) and how these position the HOs for interoperability, mitigating perceived risks and driving down costs of operations (Tatham & Kovács, 2010). An example is rule-based trust, apparent in the development and

adherence to SOPs that reduce complexity in resource planning. Through these, HOs develop the rules and cultural intelligence needed to adapt to institutional gaps and context-specific behaviours that are encountered in DROs. For example, Kucukaltan et al. (2022) discuss the failures of HOs entering into PPPs in prolonged conflicts, while Ittmann (2022) suggests that a slightly different approach of leveraging diaspora networks to rebuild, might improve localised resilience.

A third concept is the deprivation cost, which calculates the extent of suffering that the intended beneficiaries experience due to the inability to access essential commodities and / or services during humanitarian crises. Studies argue that the relationship follows an exponential, rather than a linear pattern, with the conditions deteriorating at an accelerating rate overtime (Cotes & Cantillo, 2019). This exponential deterioration of the conditions is significant because it highlights the underlying tensions between HOs – who prioritise rapid disaster response to minimise suffering – and LSPs, who are typically commercially oriented and operate with commercial priorities accordingly. Consequently, implementing deprivation cost frameworks for equitable resource distribution could be beneficial. However, L'Hermitte & Nair (2021) argue that their application may prove abortive because the technological infrastructure deployed within the HOs typically prioritise security, and not equity.

A fourth concept is the islanding-effect that depicts how physical isolation and unintended consequences of HOs can block access to relief efforts for some of the most vulnerable victims of a humanitarian crisis (Sheller, 2013) and the need for these aid agencies to be adaptable, restructuring outsourcing strategies to build local resilience and ensure their relief efforts are actually effective. An example is during natural disasters such as hurricanes or floods, when distribution networks are completely decimated for remote locations, and the affected areas cannot access essential commodities and / or services. Yaghoubi & Dadmand, (2024) suggest that a key adaptation and capability would be the ability to deploy rapid clearance technologies to remove the rubble and provide better access for resource distribution to these remote locations.

Table 5 below discusses recurring themes across the different publications, highlighting contextual levels of influence.

Table 5 Contextual Levels of Influence

Theme / Study	Inputs	Outcomes	Findings
Risk Management			
Baharmand et al. (2017)	LSPs provide logistics expertise, fleet variety, real-time data for HSCs. They can build in contractual clauses to protect against potential risks.	This results in better adaptive routing and resource allocation. It also improves responsiveness and decentralised decision-making in disaster management.	LSPs can help mitigate potential risks in HSCs. Their services should be used as early as the planning stage.
Wang & Sun (2023)	The model indicates LSPs can help achieve rapid response and equity / fair service.	The model indicates LSPs significantly improve performance during resource mobilisation and allocation.	This is a deterministic study and does not factor in real world settings, such as the potential risks from perishability and road-network disruptions.
Dufour et al. (2018)	LSPs provided RDC in Uganda, pre-positioning high	This lowered potentially high transportation costs which would have	Finding optimal locations and pre-positioning optimises

	demand, essential items.	been incurred, pre-disaster. It also reduced cycle times and helped build resilience.	resource allocation, post-disaster.
Malhouni & Mabrouki (2024)	LSPs handle stakeholder negotiations, align with the community's needs, empower grassroots, share information, decentralise decision-making and store fuel reserves.	This reduces potential security risks and hostility. It also prevents perceptions of bias or hidden agenda, building trust and sustainability.	LSPs can increase community acceptance of disaster management initiatives by mitigating against risks that build low trust.
Digital Transformation			
Cozzolino et al. (2017)	LSPs use tracking systems, AI and data analytics for demand sensing.	This can optimise HSCs and reduce lead times.	There is a need for alignment between objective functions of LSPs and HOs, with joint planning to build trust and operational understanding.
Jauhar et al. (2024)	LSPs can transition away from bio-fuel technology by increasing EV adoption and	This will minimise carbon emissions, maximise resource utilisation and lower	There is a need to incentivise more sustainable practices in HOs.

	improving raw material recovery processes.	environmental footprints for HOs.	
L'Hermitte & Nair (2021)	LSPs carry out direct resource-sharing between the humanitarian aid workers and the logisticians. They also sign smart contracts.	This optimises resource utilisation, speeds up processes and enables real time tracking.	Integration can be complex, especially as its dependence on IoT poses challenges in areas with damaged infrastructure. Regional laws may also impact on its usage.
Edwards et al. (2024)	LSPs can optimise last mile delivery operations by deploying drone technology. This will improve fair service.	The calculated gains do not sufficiently drive acceptance of the drone technology, and its adoption.	Security concerns and the perceived usability significantly influence its adoption
LSPs interactions with other actors facilitating HOs			
Tatham & Kovács (2010)	They can apply the 5 antecedents of swift trust towards deepening interoperability.	This reduces the cost of doing business, ensures transparency and reduces perceived bias.	Competition for funding still fuels low trust behaviour.
Kim et al. (2019)	The study identifies selection criteria for CLSP in disaster management;	CLSPs mainly consider economic factors as key motivation for their	The eligibility criteria for LSP selection and consideration for longstanding

	suggesting interdependence of the key drivers.	involvement in disaster management.	relationships by the HROs is largely due to technical, then social and economic drivers respectively. This indicates misalignment in objective functions between the CLSPs and the HOs.
Nayak & Choudhary (2022)	LSPs can adopt the leagile framework and RACI matrix for identifying accountabilities. They can also tailor information flow in line with the operations phase, procure from local suppliers during disasters, enter into PPPs, conduct demand forecasts and route optimisation.	Decoupling points decentralise operations and decrease delays in delivery. The leagile framework improves responsiveness and reduces waste. RACI matrix maps out accountabilities and prevents duplication of efforts. Upstream information flow in preparedness and downstream information flow in response improves communication. PPPs reduce	Integrating the leagile principles in the disaster management framework may results in disaster risk reduction.

		bureaucracy. Buying local in emergencies will reduce cycle times. Demand sensing will reduce overstocking.	
Holguín-Veras et al. (2012)	LSPs should develop standardised performance metrics and strategies to ensure alignment and material convergence with other actors.	Divergence currently presents as knowledge gaps, unstable social networks and poor resource allocation.	Metrics that measure deprivation costs and route optimisation can help.
Bealt et al. (2016)	Operational costs, trust and misaligned objectives influence outcomes of HOs.	LSPs mostly conduct HOs for profit, CSR and publicity. Donor and military inputs influence decisions and actions of HOs.	Partnerships should start in preparedness phase with the need to optimise timing of collaborative efforts.
Dube et al. (2016)	There can be tensions with governance in the host country depending on the level of access the host government enables.	Negative correlation and continuum that are evident in performance of HOs vary with the level of	LSPs should adjust safety stock in line with the unpredictability encountered in the country.

		restrictiveness of the host country.	
Kovács & Tatham (2009)	Differences in military and humanitarian models can influence interoperability.	Harnessing the differences between the models results in improved coordination and knowledge management.	There is a need to manage the resources from external supply networks.
Tatham & Spens (2011)	LSPs can standardise knowledge across the various stakeholders by integrating the SCOR model with the LOD framework.	This reduces knowledge fragmentation, improves coordination and reduces redundancies.	There is a need to control the quality of information being shared by the stakeholder.
LSPs interactions with the LCs			
Nayak & Choudhary (2022)	LSPs can position decoupling points for the local pull systems to drive demand and the relief aid provided. They can also buy locally during humanitarian crises.	Leagile frameworks lower inventory and increase responsiveness. Buying local during a crisis reduces lead times and transportation costs.	Using local pull forces reduce overstocking as a result of the accuracy of the demand forecasts, allowing for better resource allocation.
Sheppard et al. (2013)	LSPs may not be optimally engaging	Leveraging on regional knowledge	Policy frameworks are typically

	and utilising local capacity.	will improve lead times, accuracy of resource allocation and overall efficiency of the disaster response provided.	developed without inputs or insights from the LCs that are faced with the realities on ground.
Kim et al. (2019)	CLSPs can prioritise strategic alliances with the LCs for technical capabilities and cultural alignment at the preparedness phase.	CLSPs considered suitable when they supported community projects and had previous. experience in executing these.	CLSPs' interactions with the LCs treated as selection eligibility criteria.
Malhouni & Mabrouki (2024)	LSPs collaborate with stakeholders in the community, respect their culture, seek their input to improve needs assessment, empower the members and share information.	This builds trust, aligns relief aid initiatives with actual needs of the people, may reduce potential security and safety risks to the aid workers.	Community acceptance is key.
Safety, security vs. equity			
Sheller (2013)	The unintended consequence of the military's control of a country's airport	This islanding effect and inequity in service can fuel unrest, deepen	There is a need to reorient mindsets. Digitalisation can help improve access.

	was that it immobilised the victims of the disaster, while enabling mobility for the aid workers. As with several other cases, border control for safety and security of one group can mean inequity and unfair service to the actual victims of the disaster, who are sometimes the most vulnerable.	racial and class tensions, worsen vulnerability and make it harder for the grassroots to actually access the relief aid provided.	
Gutjahr & Nolz (2016)	Gaps exist between the humanitarian tenet of equity and the need to provide this fair service under safe and secure conditions.	It may be difficult to quantify and measure equity and security.	This also does not factor in deprivation costs and suggests that centralised models outperform decentralised ones. Perhaps, hybrid models might be more promising.
Sigala & Wakolbinger (2019)	In disaster response, because the focus is on rapid response to save lives, there is	Cultural clashes may erupt from the trade-offs between the HOs	Opportunities for partnerships from the preparedness phase, for resilience building, are often

	sometimes less focus on compliance with the SOPs.	compliance and the LSPs efficiency.	hindered by funding gaps.
Malhouni & Mabrouki (2024)	Insecurity is a major risk to be managed in disaster response. To reduce this risk and improve resource allocation, LSPs should build trust through collaboration and effective communication.	Effective communication and collaboration build trust, optimise resource allocation, and may reduce potential security and safety risks to the aid workers.	Community acceptance is key to optimising resource allocation, while safeguarding the people and properties.

4.3 Thematic Analysis

A recurring theme is the risk mitigation strategy that LSPs develop, with robust structures in place to facilitate their resilience, post-disaster, especially as distribution networks are typically decimated during humanitarian crises. The LSPs often implement a multi-dimensional approach, helping HOs to pre-position essential items in secure locations (Dufour et al., 2018), diversifying their supplier base and transportation modes (Baharmand et al., 2017), setting up solid information and communication channels (Malhouni & Mabrouki, 2024), etc. The LSPs also partner with HOs and LCs to facilitate resource planning, mobilisation and allocation, by leveraging regional knowledge of grassroot distribution networks.

Another theme is the LSPs' investments in advanced digital transformation to improve operations. Edwards et al. (2024) discuss the leapfrogging experienced in emerging economies. Jauhar et al. (2024) also discuss how these economies utilise AI systems to anticipate bottlenecks and enhance their predictive analytics capabilities. LSPs utilise blockchain technology to improve visibility through the supply networks (L'Hermitte & Nair, 2021) and deploy EVs to reduce carbon emissions from the transportation of the essential commodities (Jauhar et al., 2024). They also utilise drone technology for last mile delivery operations (Edwards et al., 2024). Even with all of these technological capabilities, the LSPs are often faced with context-specific behaviours that force them to adapt their technology to the existing infrastructure, and under the permissible laws of the land. This may be challenging, especially as the success of these systems are largely dependent on IoT capabilities, power supply, road networks, which are often under-developed in these regions, or completely decimated in humanitarian crises.

A third theme discusses the fragmented information systems that are present among the various actors in HOs (Işik & Dinler, 2023) and the technical capabilities (Kim et al., 2019) and cultural intelligence (Tatham & Kovács, 2010) that the staff deployed to these regions will need to navigate the existing complexities, curtail inefficiencies, and optimise the impact of their relief efforts. Collaboration with the government, military, UN, NGOs, CLSPs, beneficiaries, etc, must involve information sharing (Nayak & Choudhary, 2022) and understanding of the varying objective functions of the different stakeholders and their potential impact on performance (Holguín-Veras et al., 2012; Bealt et al., 2016; Dube et al., 2016). For example, the military have a separate chain of command, are required to follow a different protocol (in the case of perceived individual threats), cannot be a neutral party, cannot always share information or resources to external parties and the resources utilised are internally generated (Kovács & Tatham, 2009). This is contrary to the tenets of HOs and the SOPs thereby adopted. By improving collaboration through enhanced knowledge management (Tatham & Spens, 2011), the humanitarian community can

significantly make more meaningful impact and develop better resilient response mechanisms that capitalise on their collective knowledge, expertise and capacity.

A fourth and similar theme is the need for more community-centred resilience initiatives that involve the LCs in the development, response and recovery stages of HOs (Nayak & Choudhary, 2022), to leverage on the members' invaluable knowledge of the LCs' needs, distribution networks and fair sharing. This approach reduces tensions that arise between the HOs' & CLSPs' typical requirement of central coordination and the local autonomy that may be necessary for successful operations (Nayak & Choudhary, 2022). It also builds and leverages on local capacity (Sheppard et al., 2013) to ensure that members of the affected communities develop the resilience and self-reliance needed to better recover from future humanitarian crises. This can be achieved through upskilling in technical capabilities for the local actors, while also advocating for mindfulness of cultural norms and value systems across the diverse groups, to ensure technically sound and culturally appropriate response protocols that meet the humanitarian objective functions and are sustainable through time (Kim et al., 2019; Malhouni & Mabrouki, 2024).

A fifth theme is the trade-off observed between the need to provide fair service to all affected communities and the potential safety / security concerns that this might pose to the aid workers (Sheller, 2013; Gutjahr & Nolz, 2016; Sigala & Wakolbinger, 2019; Malhouni & Mabrouki, 2024). In other words, how do these workers reach the most vulnerable in the remotest locations, while minimising the risks to their own safety and security? Choosing to limit the potential risks to their own safety may limit their ability to provide fair and equitable service to the most vulnerable and restrict their relief operations to accessible communities, essentially providing disproportionate service. This conundrum showcases the fundamental conflict between the aid workers' responsibility to protect themselves and their co-workers, and the core principles of HOs to show humanity, neutrality, impartiality and independence.

5 Reporting

5.1 Establishing Connections

This chapter extends the previous chapter's discourse on the synthesised themes and finds connections between these and the research questions. Specifically, it will highlight the role of LSPs in HOs and the capabilities required per disaster type.

5.2 Connecting the Findings to the RQs

5.2.1 RQ1 – How has logistics outsourcing supported disaster response in HOs?

As a result of insufficient capacity of the HOs in disaster management, certain activities have typically been outsourced to LSPs, who have the logistics expertise, fleet variety and access to data needed for resource mobilisation and allocation (Baharmand et al., 2017). This has improved their responsiveness and made them more operationally efficient.

Sigala & Wakolbinger (2019) maintain that LSPs have helped with warehousing and pre-positioning of essential items in secure locations. They suggest that LSPs can take the role of member, operator or actor and partner with HOs at different phases of HOs, with each phase involving supply chain operations that require some level of planning, coordination and implementation. They maintain that HOs often outsource to LSPs to leverage on the expertise of the LSPs. This enables the HOs to lower their capital investment in facilities in those remote regions, while focusing on their core businesses. This is significant given the funding limitations experienced, the stretched resources and reports that HOs mostly receive donations, post-disaster. Yet, the very financial pressures that necessitate outsourcing also restrict the depth of partnership possible during this critical planning phase, leading to the characteristically transactional and short-term relationships observed between HOs and LSPs.

Octavia et al (2016) discuss logistics coordination in natural disasters and IRC's evacuation of individuals from hot spots. The simulation model proposes improving response time by avoiding duplication of relief efforts, utilising boats for evacuation, etc. The study is significant because it makes a case for more centralised, coordination hubs, demonstrating how consolidating resources and efforts can improve emergency response outcomes. However, this centralised approach suggests a heavy reliance on one organisation and neglects the uncertainty and pressures of humanitarian crises that often overwhelm aid agencies, compromising their ability to solely deliver. The model essentially reduces systemic resilience by assuming that the IRC has the capacity and competencies needed to take on all of the responsibilities that would have been handled by a cohort of organisations, especially in large scale crises. It also fails to focus on other relevant, multi-objective conditions that relief agencies are faced with during post-disaster, reducing its applicability in real-world settings.

Baharmand et al (2017) identify Nepal's infrastructural risks and last mile delivery efforts, post-disaster. They maintain that the urgency, need for visibility of relief efforts and simplicity of partnerships between HOs and LSPs add to the complexity of risk management. They discuss how HOs transfer transportation risks to LSPs that are best able to handle them. The LSPs, who are faced with context-specific behaviours, then pool resources to reduce capacity constraints and integrate fragmented distribution networks to ensure successful last mile delivery. They maintain that HOs with pre-established partnerships with the LSPs were better able to leverage on strategic risk transfer mechanisms that enabled them to focus on their core operations. The scope of the study, which focuses on transportation risk management in the Nepal earthquake, may however limit its generalisability to other humanitarian contexts that exhibit different risk profiles. Also, although it is taken for granted that the LSPs are the critical enablers of last mile delivery in HOs, some of these LSPs will actually fail in the said operations because they do not have the level of access, regional knowledge, or longstanding relationships that the HOs do in certain regions. They also may not appreciate or fully comply with the principles of HOs. Perhaps, the focus should

be on more sustainable, culturally appropriate and community-based distribution networks that would ensure systemic resilience in the future.

Breitbarth et al. (2021) discuss the role LSPs play in distribution to the vulnerable populations in HOs. They suggest that through strategic resource planning, LSP's can increase resource allocation to Berlin's vulnerable senior population, even when the resources available are limited. Again, the limited scope in the group considered vulnerable oversimplifies the complexities inherent in resource allocation to all vulnerable groups. Also, the model's underlying assumption that the vulnerable can be sufficiently catered to during humanitarian crises by reducing the frequency of deliveries and length of service is flawed, as the reverse is often the case in such scenarios.

Nayak & Choudhary (2022) discuss partnerships with LCs that have resulted in better understanding of the actual needs of the people, culturally appropriate resource allocation mechanisms and knowledge of the local distribution networks. The leagile framework provided is significant as it advocates for PPPs and more decentralised coordination efforts – a direct contrast to Octavia et al's (2016) suggestion of more centralised operations – that reduce lead times increase responsiveness of DROs and facilitate the community's engagement. The RACI matrix also markedly assigns responsibilities to the different actors in HOs. The study, however, neglects the power dynamics between the LSPs and the affected communities. It also neglects the cultural barriers that might hinder collaboration between them. The quantitative metrics applied in the study may also neglect the nuanced qualitative aspects of engagements with the LCs.

Jauhar et al. (2024), L'Hermitte & Nair (2021) and Edwards et al. (2024) all discuss how CLSPs are reshaping HOs, by digitally transforming the space with AI-inspired predictive analytics for demand sensing, blockchain-enabled technology for visibility along the networks and drone technology for last mile delivery. Adopting these technologies, in a way, changes the nature of work within the HSCs and likely gives the LSPs a more integral role in the field of HOs. The technology-mediated partnerships formed could potentially improve operational efficiency and create more sustainable practices. However, the heavy

dependence on technology (often backed by IoT and similar infrastructure) makes these HSCs vulnerable when communication networks or IT infrastructure are compromised. It also could potentially cause inequality in resource allocation, with locations that lack the needed technologies experiencing challenges with accessing the relief aid. Moreover, the complexities of setting up the needed infrastructure in resource-poor regions might render such grand proposals impractical.

Jauhar et al. (2024) and Shokr et al. (2021) discuss how LSPs have leveraged their technical expertise in handling temperature-specific storage facilities in pandemics as well as infrastructural development / restoration efforts in floods. The model, however, poses potential risks as the cost of robustness, in which excess inventory is pre-positioned in preparation for pending disaster, could increase holding costs and over-reliance on commercial entities, whose objectives functions may not align with those of the HOs.

In the case of HOs or Military acting in similar capacity, these LSPs have safeguarded lives, served as the provider of last resort, and also helped with coordination and stabilisation efforts, post-disaster. Tatham & Rietjens (2016) and Tatham & Spens (2011) highlight the military's ability to leverage on speed and scale, which are advantageous to humanitarian crises, where rapid / emergency response significantly impacts on the outcomes of relief aid. The military's capabilities amplify the strengths of HOs and are typically complementary to the HOs' missions and core competencies. Nonetheless, tensions persist as knowledge fragmentation and differences in key objective functions of autonomy, neutrality, etc compromise operational effectiveness and efficiency.

5.2.2 RQ2 – How do LSPs support HOs across the disaster types?

LSPs support HOs in man-made disasters (conflicts and disasters through the following competencies and capabilities:

LSPs serve as security apparatus (Sheller, 2013; Malhouni & Mabrouki, 2024), with expertise in managing security of the aid workers and the affected

communities. They also partner with the military in its peacekeeping efforts. In pandemics, they ensure the safety of care workers and the secure delivery of essential medical items (Breitbarth et al., 2021). A potential challenge LSPs may encounter is their inability to enforce their powers, as they often lack the legal authority to do so. This may impede their effectiveness in conflicts. Additionally, their competencies are largely logistical, with limited scope and capacity to scale security operations. This implies that they may not be the most suitable primary, security apparatus during humanitarian crises.

LSPs build resilience of the supply networks by diversifying their supplier base (Shokr et al., 2021) to reduce the impacts of potential geopolitical restrictions, or even damage, on resource availability. Additionally, they help with market sensing to tackle surges that may cause disruptions. Regardless of the resilient structures pre-built into affected communities, the uncertainty and complexities inherent in man-made disasters can undermine the LSPs' ability to deliver. Phenomena like clustering, where the diverse pool of suppliers all rely on the same infrastructure for their operations, could also increase vulnerabilities; especially for situations whereby the shared infrastructure is completely compromised or decimated. Furthermore, panic-buying during humanitarian crises invalidates demand forecasts and resource plans, making it difficult for accuracy in resource allocation.

LSPs participate in coordination efforts that are adaptable to the regional contexts (governance, interoperability) and ensure neutrality and fair service in their service delivery (Dube et al., 2016). They also help with empowerment of the field workers for timelier decision-making, in view of the rapidly changing nature of some of the humanitarian crises handled that necessitate more decentralised forms of coordination (Shokr et al., 2021). Nonetheless, LSPs may struggle with maintaining neutrality, given their commercial interests; especially as they may have had pre-existing relationships in these regions, further impeding their ability to stay neutral or to provide fair service. Furthermore, their consideration of prospective business opportunities might leave room for bias. This difficulty in

remaining neutral makes it harder to build trust amongst the beneficiaries of relief aid and essentially negatively impacts on coordination efforts.

LSPs also have cultural intelligence that positions them to execute more culturally appropriate relief efforts that are welcome by the LCs (Malhouni & Mabrouki, 2024). They establish long-standing relationships with governance structures in these regions that reduce the effects of bureaucracy and facilitate the ease of administering aid when needed (Sigala & Wakolbinger, 2019). However, close ties with the government of the land make it harder to take a neutral and independent stance and could potentially introduce bias in resource allocation. They may also miss nuanced context of the affected communities, with surface generalisations that fail to deeply reflect or address community dynamics at its core, undermining the efficacy of the relief efforts and also the possibility of fair service.

LSPs support HOs in natural disasters (floods, typhoons, hurricanes, etc) via the following competencies and capabilities:

LSPs can conduct rapid disaster response through the deployment of advanced technologies or transportation fleets to the affected regions, helping to ensure equity in delivery of essential items to all locations (Dufour et al., 2018). Nonetheless, there remains a contradiction between the promised roles of LSPs in disaster management versus the realities of natural disasters and the often collapsed infrastructure that significantly disrupt supply chains and make it difficult to deliver as promised; again, leaving room for bias and inequity in resource allocation as they may only be able to conduct their operations in accessible locations.

LSPs conduct demand forecasting through the integration of advanced technologies such as machine learning tools for improved forecast accuracy, improved resource planning and fair resource allocation (Wang & Sun, 2023). It is worth noting that the data-rich and stable environments needed to enable the use of such technologies are often hard to create in disaster settings, especially in resource-poor regions. Also, depending on context-specific behaviours of the

affected region, the data needed could be difficult to gather and unify, reducing the forecast accuracy of the tools and their ability to inform accurate resource allocation.

LSPs collaborate with different actors in the humanitarian aid ecosystem to reduce duplication of efforts (Gossler et al., 2020) and also improve information and resource sharing. They also take advantage of clusters, hubs and crowdsourcing for resource allocation (Parappathodi & Archetti, 2022). The problem with collaboration is that these different actors often thrive on independence. They also compete with funding opportunities from the same sponsors, have competing priorities and often incompatible systems; all of which fuel the complexities inherent in such collaborations and undermine the efficiency of the DRO.

5.2.3 RQ3 – What capabilities do LSPs need to effectively operate in crises and what are the differences observed as the humanitarian contexts vary?

LSPs need technical expertise to navigate the complexities of HOs (L'Hermitte & Nair, 2021) and enable them implement technologically advanced systems for predictive analysis, planning, network routing, real-time tracking, etc. As earlier discussed, the technical expertise needed may vary depending on the disaster type. For natural disasters, LSPs may need expertise in rapid response and alternative routing, as the traditional routes may be inaccessible. However, in war zones, LSPs might seek expert opinion from an intelligence specialist on security protocols and risk mitigation strategies to pursue; while refugee humanitarian crises may require expertise in evacuation, long-term resource planning and re-socialising for individually displaced persons.

LSPs should possess technological integration with the available infrastructure to enhance predictive analytics, route optimisation and supply chain visibility (Wang & Sun, 2023). The experts deployed must also be adaptable to the existing infrastructure on ground, tailoring their solutions to ensure compatibility and feasibility of the technologies used in the varying contexts. In natural disasters, LSPs may try to maintain communication with transportation networks through

the remaining satellite communications, while in war zones, LSPs may need to establish more secure channels to operate. There is then the increased level of complexity in resource-poor areas that pose different problems than in the urban areas, as the minimal infrastructure in the former makes integration harder and increases the need to develop local capacity to enable more robust structures; an indication of the context-specific nature of technological integration.

LSPs should also demonstrate flexibility as this enables context-specific adaptableness to regional geopolitical norms and behaviours that may require a shift from standardised disaster management (Cozzolino et al., 2017). The problem with standard frameworks and SOPs often utilised by relief aid agencies and LSPs is the difficulty in adapting these to diverse regional norms, with contextual requirements that are often encountered in humanitarian crises. LSPs must then ensure that their frameworks are flexible and will factor in local context and expectations, because factors like restrictiveness of governance structures, supplier availability, resource constraints, insecurity and existing infrastructure, can severely impact on the outcomes of the disaster management efforts conducted.

LSPs should conduct sustainable practices that establish resilient structures, empower LCs and reduce the impact of HOs on the environment (Jauhar et al., 2024; Gossler et al., 2020). These sustainable practices will ensure that existing structures can withstand current realities while building resilience to improve the community's ability to recover from future humanitarian crises. Unintended consequences of HOs include waste generation and carbon emissions. LSPs can adopt more eco-friendly solutions in the preparedness stage, while considering durable, low-impact solutions for long-term development work. As an example, the raw materials used in construction and waste management structures of IDP camps, should be low-impact and should keep environmental degradation to a minimum.

In all, a key difference observed between man-made and natural disasters is the focus on security, trust and cultural intelligence for the former and the focus on equity and collaboration for the later.

6 Conclusion

6.1 Summary

This chapter provides a summary of the research approach, keys findings and contributions of the study. In Chapter 1, a panel was established, with research significance, objectives and questions formulated. In Chapter 2, a detailed protocol of the research methodology was developed to ensure scientific rigour, replicability and validity. In Chapter 3, a literature review was conducted, with details of the descriptive analysis provided. In Chapter 4, themes were synthesised to understand theoretical and empirical underpinnings in the existing body of knowledge. In Chapter 5, connections were established between the research findings and the research questions. In Chapter 6, a summary of the key findings was provided alongside a framework for LSPs in HOs.

6.2 Model for Optimisation of LSP Operations in Disasters

The model below serves as a framework for LSPs to put into consideration when undertaking humanitarian logistics operations in disasters settings:

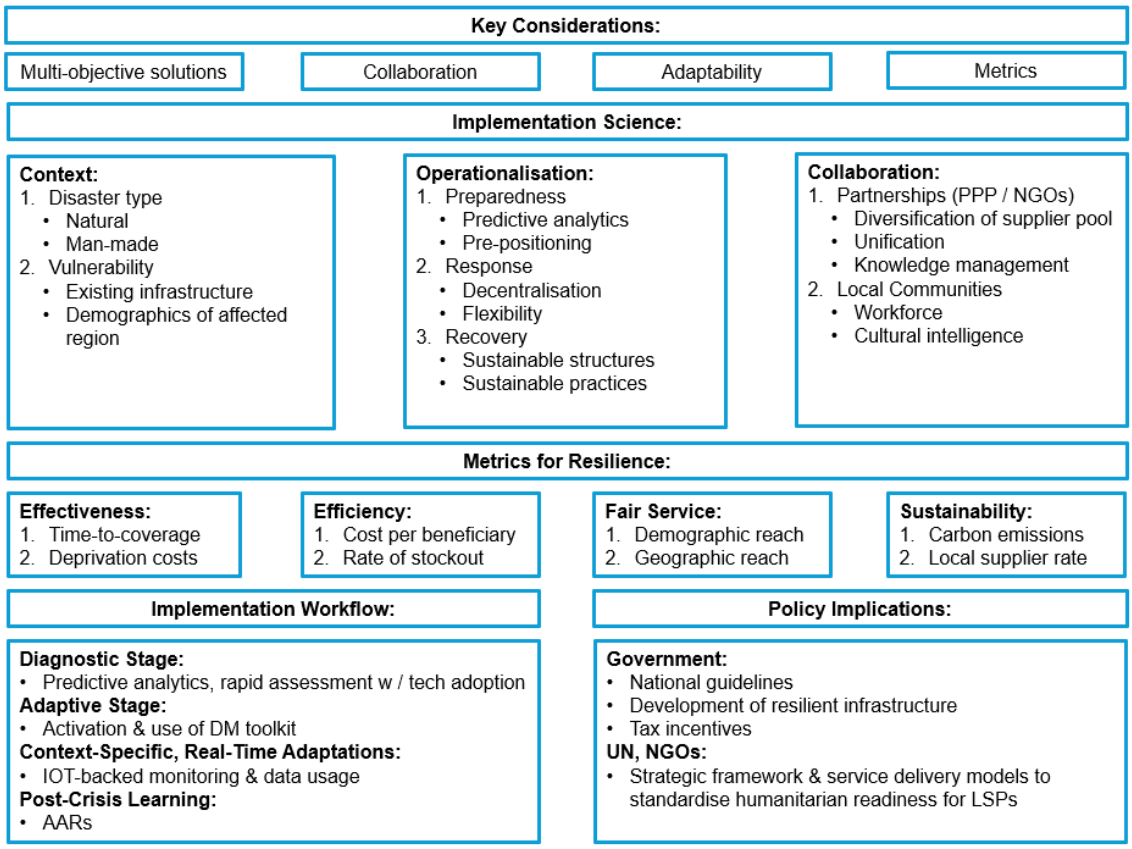

Figure 6 Model for LSPs in HOs

6.2.1 In-Depth Examination of the Model

In HOs, it is key for the LSPs to consider multi-objective solutions (Wang & Sun, 2023), to work on these solutions by collaborating with other critical stakeholders (Gossler et al., 2019) and also to improve their adaptability and responsiveness to the changing nature of the disasters and the needs of the affected communities, through the use of measurable objective functions (Cotes & Cantillo, 2019). This is significant because of the complexities involved in emergency situations, with the affected region often facing a myriad of challenges, from disruptions of distribution networks to destruction of properties and also the need for cultural acceptance of the humanitarian aid provided. LSPs

will typically collaborate with the government and private sector to align objective functions, improve capacity and reduce redundancies in HOs.

Implementation encompasses the context-specific behaviours of the affected region, operationalisation of the framework and collaboration with the critical stakeholders. Understanding these behaviours, i.e., disaster typology (man-made or natural) and the region's vulnerability (or the affected region's ability to recover from a disaster, given the existing infrastructure and demographics) is significant because the behaviours directly influence the efficiency, safety and appropriateness of the DROs to be provided. For example, the man-made, Covid-19 pandemic required deployment of cold-storage facilities for the Covid-19 vaccines. It also required data on vulnerable populations and access to the remote locations. Knowledge of these behaviours will enable the critical stakeholders to improve resource allocation and risk mitigation.

Operationalisation involves preparedness, response and recovery phases of HOs. In preparedness phase, predictive analyses can provide knowledge on the specific disaster and enable the needed infrastructural investments (Acimovic & Goentzel, 2016). Similarly, in the response phase, LSPs try to align logistics with the needs on ground, improving responsiveness by decentralising decision making (Baharmand et al., 2017). For example, LSPs trying to provide the needed services in a region with poor transportation network may need to prioritise the vulnerable citizens of the affected region. The recovery phase focuses on physical and socio-economic aspects of the development. For example, the LSPs carry out activities like road reconstructions / restoration of decimated infrastructure. This is significant as building sustainable infrastructure, ensures resilience and reduces vulnerability of the region in its ability to recover from future disaster.

Collaboration includes a two-pronged approach of partnering with the government, UN, NGOs and private sector (Gossler et al., 2020) as well as the LCs or beneficiaries, to improve capacity (Sheppard et al., 2013) by accessing regional knowledge, gaining cultural acceptance, streamlining coordination, thereby reducing redundancies and aligning objective functions. Through these

partnerships, LSPs combine resources, technical expertise and networks to resolve challenges encountered with the supply networks and last-mile delivery operations. For example, LSPs have been known to partner with WFP and other relevant agencies to carry out the mandate of logistics clusters, when activated. This enhances scalability, diversifies the supplier pool, encourages the use of shared services and reduces costs.

Another consideration is the measurement of the objective functions to ensure outcomes are mission focused and that the metrics align with the objective functions. Key metrics would be 1.) effectiveness (Cotes & Cantillo, 2019), 2.) efficiency (Jilani et al., 2018), 3.) equity (Wang & Sun, 2023), and 4.) sustainability (Płachciak & Marcinkowski, 2022; Malhouni & Mabrouki, 2024); with 1.) measuring parameters like time to coverage and deprivation costs; 2.) measuring cost per beneficiary and stockouts; 3.) measuring demographic and geographic coverage and 4.) measuring CO_2 emissions and local supplier rates. These metrics are significant because they guarantee that DROs meet the ethical and practical requirements. For instance, effectiveness ensures that the resources deployed in HOs achieve the projections. Efficiency ensures the optimal use of resources. Sustainability addresses the environmental impacts and preservation of the resources for future generations. Lastly, equity ensures fair distribution of resources among the beneficiaries. LSPs can use these metrics to track timeliness of service delivery, optimise costs, reduce carbon footprints and prioritise the vulnerable populations.

In implementing the DM workflow, LSPs go from the diagnostic stage, where predictive analytics and rapid assessment are conducted, to the adaptive stage, in which the DM toolkit is activated and utilised, to the real-time adaptation stage that involves IOT-backed monitoring and data usage, and lastly, to the post-crisis learning stage, where lessons learnt are highlighted and documented to improve preparedness in future disasters. The diagnostic stage enables risk identification. The adaptive stage helps with risk mitigation. The real-time adaptation stage uses IoT and real-time data to modify operations. The post-crisis learning stage helps to hone in on future strategies. LSPs can deploy predictive analytics tools in the

diagnostic stage. They can also activate their DM toolkit in the adaptive stage, use IoT-backed infrastructure to monitor updates from disasters and use AARs for long-term organisational learning (Tatham & Spens, 2016).

Lastly, LSPs should consider the policy implications, with coordination and resilience of the regions to future disasters being prioritised. The government's development of guidelines will ensure standardised protocols are used for DROs. Development of resilient infrastructure will serve as an enabler and improve resource planning, distribution and allocation. Government can also incentivise the private sector in undertaking more sustainable projects. UN / NGOs can participate in policy-shaping (Apte, 2010), through formulation of strategic frameworks to be deployed in emergencies. These strengthen preparedness and improve resilience and outcomes of DROs.

6.3 Conclusion

LSPs play an instrumental role in operationalising the objectives in HOs. These roles have significantly evolved from transactional services provision to longer-term, strategic partnerships with the HOs (Chandes & Paché, 2010; Gossler et al., 2019). The different stages of preparedness, response and recovery can be linked to RQ1 as they demonstrate the core operations of LSPs and how this outsourcing has improved the effectiveness of DROs. LSPs have been tasked with responsibilities ranging from predictive analysis (Acimovic & Goentzel, 2016) and pre-positioning (Apte, 2010; Cotes & Cantillo, 2019) in the preparedness phase, to providing flexible solutions like alternate routing and multi-modal forms of transportation, in the disaster response phase (Javadian et al., 2017) and setting up more sustainable structures and practices, in the recovery phase.

LSPs have also adapted to various contexts, exhibiting varying capabilities per disaster type; from rapid response (Işik & Dinler, 2023), collaboration (Tatham & Kovács, 2010; Holguin-Veras et al., 2012; Bealt et al., 2016; Kim et al, 2019; Nayak & Choudhary, 2022) and fair service (Sheller, 2013; Gutjahr & Nolz, 2016) being prioritised for disaster management in natural disasters, to security

(Malhouni & Mabrouki, 2024), trust and cultural intelligence (Tatham & Kovács, 2010) in man-made disasters. This can be linked to RQ2, in its operationalisation of disaster types and the LSPs' adaptability as the disaster type varies. The other focus is the region's vulnerability, or ability to be affected by, and recover from, these disasters. Outcomes of DROs conducted are largely dependent on the vulnerability of the affected region, with highly vulnerable areas often lacking the infrastructure that is needed for effective and efficient resource mobilisation and allocation. Other context-specific behaviours like unstable governance also create bottlenecks in the distribution of aid items to beneficiaries (Dube et al., 2016). Highly vulnerable regions also lack sufficient local capacity. The limited infrastructure, weak governance and insufficient local capacity combined (Sigala & Wakolbinger, 2019) heighten the state of disrepair and make it harder for LSPs to perform optimally in DROs. HOs and LSPs can use climate-adaptive infrastructure alongside culturally intelligent protocols in their recovery efforts (Wang & Sun, 2023; Rivera-Royero et al, 2020).

LSPs effectively deliver on their humanitarian objectives through strategic partnerships with different stakeholders across multiple levels (Tatham & Kovács, 2010; Tatham & Spens, 2011; Holguín-Veras et al., 2012; Bealt et al., 2016; Kim et al, 2019; Nayak & Choudhary, 2022). This extends RQ3 further in its illustration of how the LSPs have needed to appreciate their social embeddedness within a larger context and redefine their collaborations with different stakeholders, honing in on their capabilities accordingly. They create a comprehensive support network by engaging with UN agencies and HOs within logistics clusters, standardising SLAs, establishing PPPs, and building relationships with LCs. These partnerships enable LSPs to streamline operations through shared resources with the UN agencies and HOs in DROs. They also improve lead times by leveraging longstanding government relationships that minimise bureaucratic delays. Furthermore, community partnerships provide valuable regional knowledge, while simultaneously developing local capacity, building trust, and ensuring acceptance of the disaster relief initiatives provided to the populations they serve (Sheppard et al., 2013; Kim et al., 2019; Nayak & Choudhary, 2022; Malhouni & Mabrouki, 2024).

LSPs should have clear objective functions that enable them to measure their performance in DROs and build resilience into the operations (Rivera-Royero et al., 2020; Wang & Sun, 2023). Key metrics to measure would include: 1.) the effectiveness of the DROs, 2.) the efficiency of the DROs, 3.) the achievement of equity / fair service in the DROs and 4.) the sustainability of the DROs. As earlier discussed, KPIs measuring timelines and deprivation costs would adequately demonstrate No. 1 (Holguín-Veras et al., 2012; Cotes & Cantillo, 2019), while KPIs measuring operational costs and rate of stockout will demonstrate No. 2 (Jilani et al., 2018). KPIs measuring the reach or coverage of disaster relief aid will demonstrate No. 3 (Wang & Sun, 2023), and lastly, KPIs measuring carbon emissions and rate of local supplies can adequately demonstrate No. 4 (Jauhar et al., 2024). These metrics can be connected to RQ3 in their measurement of performance. For example, Wang et al. (2025) showcase how the trade-off between efficiency and equity in HOs can be addressed through performance evaluation. Likewise, Cotes & Cantillo's (2019) demonstrate the deprivation costs of inequity, while also suggesting sustainability as an essential capability that these LSPs need to deliver in DROs.

To operationalise the disaster management framework of RQ4, LSPs should utilise a 3-phase implementation workflow that progresses through diagnosis, adaptive and context-specific, real-time adaptation phases. In the diagnostic phase, drone technology, which can be used to map population density, can be deployed for predictive analytics and rapid assessment. In the adaptive phase, pre-defined disaster management toolkits or protocols can be activated and utilised for tsunamis and conflicts. Lastly, in the phase requiring real-time adaptations to contexts, activities like IoT-backed monitoring, data management and Hub-like collaborations can be conducted. This will ensure a more systematic approach to resource planning, mobilisation and allocation throughout the disaster management cycle.

Lastly, governance matters. UN Agencies and other NGOs should develop customisable, strategic assistance frameworks and service delivery models to standardise humanitarian readiness of LSPs (Apte, 2010) and to establish

effective and efficient disaster response mechanisms, unifying protocols and removing operational confusion in humanitarian crises. Customising these frameworks also ensures their adaptability to varying context-specific behaviours of the affected regions. Governments also need to act as enablers of disaster management operations. They can achieve this through policy making, developing resilient infrastructure and incentivising stakeholders to pursue sustainable initiatives (Dube et al., 2016).

In all, this model addresses theoretical gaps between the LSPs' competences and the policy-shaping / policy-making initiatives of the UN, NGOs and governance structures, providing roadmaps to ensure more sustainable practices are established and increasing the region's resilience. The model contributes to the body of knowledge by taking a multi-objective and multi-stakeholder approach, combining optimisation frameworks, with stakeholder collaborations, formulation of culturally adaptive protocols and other context-specific considerations (such as governance and the economy) to create a standardised capability model that the LSPs can deploy in DROs. Also, instead of being a one-size-fits-all proposal, the model's inclusion of an adaptive feedback loop ensures that it can be customisable to these context-specific behaviours in the different regions. Lastly, the model operationalises abstract, theoretical claims by incorporating metrics that demonstrate the performance outcomes of the DROs. This way, LSPs can better align their commercial orientation and objective functions to the tenets of HOs.

7 Limitations and Future Research

7.1 What Research Gaps and Future Opportunities can be Explored?

An observation is that most of the studies and humanitarian aid efforts are focused on DROs (Apte et al., 2016; L'Hermitte et al., 2017; Shokr et al., 2021; Wang et al., 2025;) and not on development operations that may have helped the HOs build more resilient structures that enable the affected regions to be better positioned to recover from future humanitarian crises. Insufficient funding, shortage of staff and increasing frequency and magnitude of disasters are likely causes of this gap. Perhaps future research can conduct thorough impact assessment of these factors and explore scenario-based optimisation models that can demonstrate their influence on development operations.

Another observation was the low number of publications that covered sustainability, and its impact on disasters. Some studies suggest a strong correlation between climate change and the occurrence of natural and man-made disasters (Płachciak & Marcinkowski, 2022; Nayak & Choudhary, 2022; Jauhar et al., 2024). Perhaps, more research can be done to see how the adoption of more sustainable practices in HOs can reduce the footprints in the humanitarian ecosystem and possibly affect behaviours in disaster-prone regions, ultimately reducing the frequency and magnitude of the disasters.

A third observation was low trust and tensions between the different stakeholders and how this somewhat impacted on the outcome of the humanitarian aid provided (Tatham & Kovács, 2010; Sheller, 2013; Bealt et al., 2016). It is evident that the differences in objective functions have sometimes fuelled low trust and impacted on the deliverables. Perhaps, more work can be done in developing standard performance metrics that somewhat unify, or at least provide a middle ground for the various stakeholders. This may build trust and shared focus, improving the outcomes of the humanitarian efforts.

Lastly we see that, depending on the disaster types, the competences and capabilities needed by the LSPs somewhat vary, yet a majority of the publications

provided global perspectives and generic views on outsourcing in HOs (Kovács & Tatham, 2009; Heaslip & Barber, 2016; Cozzolino et al., 2017; Gossler et al., 2020). Perhaps, future research can hone in on the specific capabilities required in the different contexts to ensure that publications are not just proffering one-size-fits-all recommendations that might not be applicable in varying contexts.

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Appendix A Ethical Approval Letter

21 May 2025

Dear Ms Ode ,

Reference: CURES/25261/2025
Project ID: 28696
Title: Logistics Outsourcing in Supply Chain Management

Thank you for your application to the Cranfield University Research Ethics System (CURES).

We are pleased to inform you your CURES application, reference CURES/25261/2025 **has been reviewed. You may now proceed with the research activities you have sought approval for.**

If you have any queries, please contact CURES Support.

We wish you every success with your project.

Regards,

CURES Team

Appendix B Completed Data Extraction Form

01	Author of the article	Kovács, Gyöngyi // Tatham, Peter
02	Title of the article	Responding to Disruptions in the Supply Network-from Dormant to Action
03	Document name	Kovács, G. & Tatham, P., 2009
04	Journal title	Journal of Business Logistics
05	Date of publication	2009
06	Volume	30
07	Number	2
08	Page numbers	215-229
09	Paper Type	Theoretical study
10	Geographical Location	Global
11	Context/Industry	Humanitarian and Military Logistics in disaster relief management
12	Sample size	No primary data collection was involved
13	Data collection method	Literature review / Secondary data
14	Method of data analysis	Conceptual / Theoretical analysis
15	Study Characteristics	The study uses a RBV to explore resource configuration of both the military and HOs, underscoring the operational challenges encountered and analysing how the stakeholders manage their resources and protocols. The scope comprises the supply chain models the stakeholders adopt in their operations. Key variables considered are their dependencies, preparedness strategies, philosophy in HO, partnerships and capabilities.
16	Key findings related to research questions	The objective functions and resource configuration of the military do not completely align with those of HOs. However, both stakeholders possess core competencies (Military – asset readiness and security intelligence; HO – cultural intelligence and agility) that are relevant in disaster management. Perhaps a compromise can be reached where the military's interoperability with HOs is improved, facilitating more collaborative efforts as well as knowledge and intelligence sharing to ensure better outcomes of relief aid provided. RQ1 – How has logistics outsourcing supported disaster response in HOs? By providing technical capabilities needed in disaster management. RQ3 – What capabilities do LSPs need to effectively operate in crisis and what are the differences observed as the humanitarian contexts vary? LSPs need cultural intelligence, agility, security intelligence and ability to readily mobilise resources
17	Abstract	Managing risks in supply networks is a complex task; more so in those supply networks where the core competence lies in dealing with natural disasters, complex emergencies, and large-scale attacks—namely those of humanitarian, and military organizations where the price of failure can be counted in terms of the loss of life rather than, simply, reduced profits. This conceptual article examines the capabilities of these supply networks to manage such disruptions, based on their resource configuration in a dormant preparation state. The article concludes by presenting how different types of supply networks can manage large-scale disruptions.
18	Key words	Humanitarian logistics, Military logistics, Supply chain disruption, Resource configuration, Disaster response, Supply network, Risk management, Agility, Preparedness, Postponement strategy
19	Organisation Field	Interoperability and logistics management between critical stakeholders in HOs.
20	Quality Appraisal Score	2.0/3.0

Appendix C Distribution of Publications per Region

Breakdown of Publications per Region
Africa
DRC
Journal of Humanitarian Logistics and Supply Chain Management
G5 Sahel Nations
Sustainability (Switzerland)
Uganda + 7 E. African Countries
Omega
Zimbabwe + S. Africa
Journal of Transport and Supply Chain Management
Americas
Brazil
Journal of Technology Management and Innovation
Colombia
Socio-Economic Planning Sciences
Haiti with comparative references to US and broader caribbean region
Cultural Geographies
Mexico
Journal of Humanitarian Logistics and Supply Chain Management
Peru
Online Information Review
United States
Journal of Humanitarian Logistics and Supply Chain Management
Orion
Asia-Pacific
China
Annals of Operations Research
International Journal of Disaster Risk Reduction
Journal of Industrial and Management Optimization
Natural Hazards Review
India
Annals of Operations Research
Computers and Operations Research
Production Planning & Control
Transportation Research Part E: Logistics & Transportation Review
Indonesia
Cogent Engineering
International Journal of Physical Distribution & Logistics Management
International Journal of Supply Chain Management
Japan
European Journal of Operational Research
Nepal
International Journal of Disaster Risk Reduction
Philippines

Journal of Humanitarian Logistics and Supply Chain Management

Thailand

Journal of Emergency Management

Indonesia, Sri Lanka, and Thailand

International Journal of Physical Distribution & Logistics Management

Europe

Germany

Journal of Humanitarian Logistics and Supply Chain Management

Poland

Journal of Positive Management

Global

Global

Disaster Prevention and Management: An International Journal
Disasters
European Journal of Operational Research
Foundations and Trends in Technology, Information and Operations Management
International Journal of Logistics Management
International Journal of Physical Distribution & Logistics Management
International Journal of Production Economics
International Journal of Production Research
International Journal of Quality and Service Sciences
Irish Journal of Management
Journal of Business Logistics
Journal of Community Positive Practices
Journal of Humanitarian Logistics and Supply Chain Management
Journal of Operations Management
OR Spectrum
Production Planning & Control

Not specified

International Journal of Business Performance and Supply Chain Modelling
Knowledge-Based Systems

MENA

Iran

Control and Optimization in Applied Mathematics
European Journal of Operational Research
International Journal of Disaster Risk Reduction
International Journal of Engineering, Transactions A: Basics
Journal of Industrial Engineering International

Jordan

Journal of Governance and Regulation

Turkey

Production Planning & Control

Mixed

6 anonymised countries selected based on economic status (GDP), state fragility, and complex emergency severity

Journal of Operations Management

Japan & United States

LogForum

Grand Total