European Journal of
Technology
(EJT)

Artificial Intelligence and Humanitarian Supply Chain Resilience: Mediating Effect of Localized Logistics Capacity

Dr Wilbroad Aryatwijuka, Assoc Prof Henry Mutebi, Pamela Nagawa, Assoc Prof Benjamin Tukamuhabwa, Samuel Mayanja Ssekajja, Kyomuhangi Diana & Allan Akashabaluhanga

European Journal of Technology
ISSN 2520-0712 (online)
Vol.8, Issue 5, pp 1 - 20, 2024

www.ajpojournals.org

Artificial Intelligence and Humanitarian Supply Chain Resilience: Mediating Effect of Localized Logistics Capacity

Dr Wilbroad Aryatwijuka[1*], Assoc Prof Henry Mutebi[2], Pamela Nagawa[2], Assoc Prof Benjamin Tukamuhabwa[2], Samuel Mayanja Ssekajja[2], Kyomuhangi Diana[2] & Allan Akashabaluhanga[2]

[1]Department of Procurement and Marketing, Mbarara University of Science and Technology, Mbarara, Uganda

[2]Makerere University Business School, Kampala, Uganda

Article history

Submitted 19.07.2024 Revised Version Received 23.08.2024 Accepted 26.09.2024

Abstract

Purpose: The study examines the mediating effect of Localized logistics capacity on the association between Artificial intelligence and Humanitarian supply chain resilience among Humanitarian organizations.

Materials and Methods: A cross-sectional survey and descriptive study involving 88 humanitarian firms in Uganda whose staff involved in relief operations were purposively selected. Data was analyzed using the Partial least squares structural equation modeling to test hypotheses and ascertain the mediating effect.

Findings: The study indicates a significant indirect effect of Artificial Intelligence (AI) on humanitarian supply chain resilience (HSCR) and a direct impact of Artificial Intelligence on Localized logistics capacity (LLC). The results also confirmed a full mediation effect of LLC on the association between AI and HSCR.

Implications to theory, Practice and Policy: The present study contributes deeper insights into how humanitarian organizations can develop adaptive capacities to navigate the complex landscape of humanitarian operations since it was established that logistics capacity is a conduit between artificial intelligence and humanitarian supply chain resilience. Managers should adopt artificial intelligence and build strong relationships will local logistics suppliers to achieve humanitarian supply chain resilience practices. Considering that this was a survey, a case study design with semi-structured research tools be used to have an in-depth understanding of the variables under study.

Keywords: *Artificial Intelligence (AI), Humanitarian Supply Chain Resilience (HSCR), Localized Logistics Capacity (LLC), Humanitarian Firms*

1.0 INTRODUCTION

Humanitarian organizations remain competitive when they develop resilience in times of uncertainties and this happens when they develop supply chain resilience (Dennehy et al., 2021c). Humanitarian supply chain resilience is understood as ability of a supply chain system to resume regular operations following an unforeseen event (Xu et al., 2021). This involves integrating risk assessment, robust inventory management, effective communication systems and internal capacity building Humanitarian supply chain resilience can be achieved through flexibility, redundancy, agility, efficiency, visibility, adaptation, anticipation, recovery, collaboration and security (Dennehy et al., 2021a).

Nevertheless, despite humanitarian firms having supply chain resilient strategies to keep their operations uninterrupted in unanticipated supply chain, these strategies are not always effective because of uncertainties (Mawonde et al., 2023). A humanitarian supply chain is significantly more complex than that of a commercial supply chain because of its unique features, the disorderly post-disaster environment, the large number of public and private parties involved, and the insufficient funding (Sawyerr, 2021). Notably, supply chain resilience necessitates timely coordination and information exchange, however when taking into account the various stakeholders, resilience becomes more challenging and ineffective if it isn't coupled with collaboration with other firms and supply chain partners (Dubey, Bryde, Dwivedi, et al., 2022).

Globally, humanitarian firms are realizing how building resilient systems is vital for operational efficiency (Mawonde et al., 2023). In Africa and the Greatlakes region in particular, given the humanitarian situation exacerbated by endless natural and man-made conflicts requires supply chain resilience (Aryatwijuka et al., 2022).

Contextually Uganda's humanitarian firms are addressing supply chain resilience issues, but face challenges like delivery delays, quality issues, and inefficient distribution due to inefficient supply chains resulting into more complexity and escalated demand for relief supplies (Aryatwijuka et al., 2022). In addition, a serious crisis involving the supply chains for gasoline and raw materials struck Uganda in 2011, interfering with the manufacture and delivery of several goods and services which sparked massive country-wide protests, and was followed by a violent police crackdown and many fatalities supply chains failed to withstand the crisis, leading to severe consequences (Tukamuhabwa et al., 2017).

Scholars have studied humanitarian supply chain resilience through different lenses; Sawyerr (2021) examined a focus on the procurement decisions in the United Kingdom, Mawonde et al. (2023) focused on operational performance in Zimbabwe, Tabaklar (2017) examined scalability in Kenya, Dubey, Bryde, Dwivedi, et al. (2022) studied artificial intelligence-driven big data analytics culture in India while Emilie & De Sarazignac (2016) reviewed what makes a Humanitarian Supply Chain Resilient in Philippines, Dennehy et al. (2021) role of big data analytics in Africa and Europe and Xu et al. (2021) assessed the evaluation of humanitarian supply chain resilience in flood disaster in China

On close scrutiny to the above studies, they did not study the role of Localized logistics capacity as a mediator in the relationship between Artificial intelligence and Humanitarian supply chain resilience in a developing economy. Artificial intelligence is explained as a collection of technologies that combine data, algorithms and computing power that improve humanitarian supply chain resilience (Beduschi, 2022). Artificial intelligence is essential for humanitarian firms' survival and development because they influence knowledge discovery to provide suggestions and profound understandings through the use of clever algorithms to process data (Rodríguez et al., 2020). Additionally, Artificial intelligence enhances business operations by

predicting demand, optimizing logistics, and identifying supply chain inefficiencies, improving responsiveness to fluctuations, reducing lead times, and lowering costs (Mohsen, 2023). Localized logistics capacity is understood as the involvement and empowerment of local communities in overseeing and organizing logistical operations within a specific geographic area (Frennesson et al., 2022). However, localized logistics capacity has not been used in previous studies to explain the relationship between artificial intelligence and humanitarian supply chain resilience in a developing economy. Localized logistics capacity is critical for humanitarian supply chain resilience because it intends to increase local capability to handle worldwide emergencies or pandemics by localizing logistics suppliers (Nweze, 2024a). Additionally localized logistics capacity leads to improved resilience and self-reliance of nations and communities in disaster preparedness and recovery (Frennesson et al., 2022). Localized logistics capacity mediates the relationship between artificial intelligence and supply chain resilience by enabling AI systems to adapt and customize their operations based on the unique requirements and contextual factors of specific regions, fostering a more robust and adaptive humanitarian response infrastructure that can effectively mitigate the impact of disasters and crises (Modgil & Hannibal, 2022). The studies didn't bring out the importance of how localized logistics capacity mediates the relationship between artificial intelligence and supply chain resilience in humanitarian organizations focusing on developing economies

Previous scholars have studied humanitarian supply chain resilience using organizational mindfulness theory (OMIN) Dennehy et al. (2021), oscillation physics theory Dubey et al. (2022). These theories do not acknowledge the role of artificial intelligence which is good in explain humanitarian supply chain resilience. Therefore, this study adopted the dynamic capability theory (Teece et al., 1997). The theory explains how artificial intelligence factors such as Internet of things (IoT), Big Data Analytics and AI solutions enhance operations, market adaptability, and innovation, thereby enhancing humanitarian supply chain resilience (Hercheui, 2020).

The main research question of the study is how localized logistics capacity mediate the relationship between artificial intelligence and humanitarian supply chain resilience among humanitarian firms in Uganda using the dynamics capability theory. To achieve this research question, we analyzed data using Partial Least Square Structural Equation models from 88 humanitarian firms. The study established that localized logistics capacity fully mediates the relationship between artificial intelligence and humanitarian supply chain resilience

The paper is structured as follows: Section 1 examines the introduction, Section 2 reviews the theoretical and hypothesis development, Section 3 examines methodology, Section 4 examines results of the study, Section 5 examines discussion, conclusion and implication of the results and Section 6 examines the references.

Theoretical and Hypothesis Development

Theoretical Review

The study was anchored on Dynamics capability theory (Teece et al., 1997). Dynamic capability theory provides a valuable lens for understanding the intricate interplay between key variables such as Artificial Intelligence (AI), localized logistics capacity, and Humanitarian Supply Chain (HSC) resilience within the realm of humanitarian logistics literature. The theory provides a framework for understanding how artificial intelligence emphasizes an organization's ability to adapt and innovate in response to changing environmental conditions (Teece, 2007).

In the humanitarian context, the incorporation of AI stands out as a significant variable contributing to the adaptive capacity of HSCs. AI facilitates real-time data analysis, predictive modeling, and decision-making, enhancing the overall agility and responsiveness of the supply chain (Tallon et al., 2013). Concurrently, the strategic positioning of warehouses, distribution centers, and resources in close proximity to disaster-prone areas embodies the essence of dynamic capabilities in action. This strategic localization reduces response time and transportation costs, thereby amplifying the resilience of HSCs (Anjomshoae et al., 2023; Roh et al., 2015). The emphasis on strategic resource allocation and deployment, inherent in the dynamic capability perspective, finds resonance in the effective management of localized logistics operations in humanitarian contexts.

The intersection of AI and localized logistics capacity becomes a critical nexus for fortifying HSC resilience because AI technologies optimize the efficiency of localized logistics, aligning with the dynamic capability perspective's focus on leveraging technological advancements for competitive advantage (Zhang et al., 2019). The synergy between AI and localized logistics not only streamlines operations but also enhances the adaptability of the supply chain to unforeseen disruptions, encapsulating the core tenets of dynamic capabilities within the humanitarian domain. In this study the dynamic capability theory offers a comprehensive understanding of how AI and localized logistics capacity intricately contribute to the resilience of Humanitarian Supply Chains.

Hence, with artificial intelligence which provides real-time information, firms' capacity to predict, simulate and innovate solutions is enhanced hence supply chain resilience.

Hypothesis Development

Artificial Intelligence and Humanitarian Supply Chain Resilience

Artificial intelligence is referred to as a collection of technologies that combine data, algorithms and computing power that improve humanitarian supply chain resilience (Beduschi, 2022) whereas humanitarian supply chain resilience ability of a supply chain system to resume regular operations following an unforeseen event (Xu et al., 2021).

Artificial intelligence positively impacts humanitarian supply chain resilience because it assumes a critical role in fortifying the resilience of supply chains, especially in the face of challenges such as disasters. Its contributions encompass the through the enhancement of transparency, optimization of delivery processes, provision of personalized solutions, minimization of disruption impacts, and support for agile procurement strategies, all vital components for humanitarian supply chains to adeptly respond to crises and ensure the timely delivery of essential goods and services (Ali et al., 2024; Chukwu et al., 2024). Additionally, AI contributes significantly to the identification of vulnerable populations by analyzing demographic and geographic data which proves pivotal in targeting assistance effectively and improving supply chain resilience (Modgil & Hannibal, 2022).

Research conducted in Jordan industries by Ali et al. (2024) made a revelation that AI positively impacts supply chain resilience. Additionally, research conducted in NGOs by Dubey, Bryde, Dwivedi, et al. (2022) shows that Artificial Intelligence is a significant determinant of supply chain resilience. Helen et al. (2024) studied the Nigerian e-commerce supply chain and shows a positive relationship between artificial intelligence and supply chain resilience. Furthermore, (Belhadi et al., 2024) studied firms representing diferent sizes, operating in various sectors, and countries and discovered a positive relationship between artificial intelligence and supply chain resilience (Weiss & Zouaoui, 2021). In that repute, dynamic capabilities theory shields light on how AI explains HSCREs, as AI technologies

improve humanitarian supply chains' resilience by predicting disasters, allocating resources, and facilitating communication, enabling efficient crisis response and targeted delivery of critical goods and services.

However, this is only applicable to organizations that have access to and have invested in AI technologies (Gupta et al., 2021). Additionally, AI technologies' reliance on data feedback loops can destabilize supply chains which can trigger a bullwhip effect, causing humanitarian organizations to misallocate funds by investing in unnecessary materials, ultimately undermining supply chain resilience (Shrivastav, 2021). Furthermore, as AI systems become more precise and dependable, humanitarian organizations may begin to depend more on their output and prioritize it over the opinions and preferences of the impacted communities, unintentionally stifling the voices of those who most need help and compromising their capacity to influence the assistance they receive, which has an impact on supply chain resilience (Spencer, 2024).

In this study we hypothesize that there is a positive and significant relationship between artificial intelligence and humanitarian supply chain resilience

H_1: There is a positive and significant relationship between AI and HSCRE

Artificial Intelligence and Localized Logistics Capacity

Localized logistics capacity is understood as the involvement and empowerment of local communities in overseeing and organizing logistical operations within a specific geographic area (Frennesson et al., 2022). Laynes-Fiascunari et al., (2023)and Sadaf et al., (2023) highlight AI algorithms' role in improving localized logistics by refining delivery routes and navigation based on real-time traffic data. This capability results in heightened transportation efficiency, ultimately reducing delivery times and bolstering local logistics capacity (Jucha, 2021). Additionally, AI-based decision support systems assist logistics managers in making informed decisions at the local level during relief operations optimize logistics operations by considering factors such as local regulations, traffic conditions, and resource availability, aligning with Dynamic Capability principles (Kant et al., 2023; Sahoh & Choksuriwong, 2023; Teece, 2007).

Artificial intelligence (AI) plays a crucial role in augmenting localized logistics capacity, particularly in the context of humanitarian relief operations, as highlighted by several scholars (Laynes-Fiascunari et al., 2023; Nwagwu et al., 2023; Jucha, 2021; Waltersmann et al., 2021; Xu et al., 2021). Research conducted in Pakistan by Nwagwu et al. (2023) show a positive relationship between Artificial intelligence and supply chain performance in manufacturing firms. Relatedly, research conducted by Jucha (2021) shows a positive relationship between artificial intelligence and last mile delivery.

Relatedly, Feizabadi (2022), Helo & Hao (2022) & Toorajipour et al. (2021) underline the significance of AI-powered demand forecasting models in humanitarian logistics. This ensures the optimization of inventory levels, mitigation of stockouts, and timely deliveries to meet the specific demands of localized relief efforts. In support, AI-driven warehouse management systems contribute significantly to localized logistics capacity as emphasized by (Dubey, Bryde, Dwivedi, et al., 2022; Frennesson et al., 2022). Furthermore, AI-powered robots and automation systems efficiently manage inventory, item picking, and warehouse organization, facilitating accelerated order fulfillment and optimal utilization of local storage facilities (Coppi et al., 2021; Ghadge, 2023). In that Repute, the Dynamic Capability theoretical perspective underscores the strategic deployment of AI in enhancing localized logistics capacity during humanitarian relief operations because AI's significant contribution to real-

time tracking and visibility in logistics during humanitarian relief, ensures accurate updates on the status and location of shipments, fostering trust and satisfaction at the local level (Ahmed et al., 2023; Belhadi et al., 2024b; Modgil & Hannibal, 2022).

In contrast artificial intelligence may not always lead to localized logistics capacity because implementing AI technologies presents substantial organizational and management obstacles which may lead to significant issues in localized logistics capacity, including lack of strategy, unaddressed workforce concerns, and negatively impacted critical business areas (Dwivedi et al., 2021). Additionally, because developing nations lack the means to develop robust AI systems, the growing and deeper cooperation between humanitarian agencies and AI providers jeopardize sector-wide commitments to localize logistics capabilities (Spencer, 2024). Therefore, we hypothesize that there is a positive and significant relationship between artificial intelligence and localized logistics capacity

H_2: There is a positive and significant relationship between Artificial intelligence and localized logistics capacity

Localized Logistics Capacity and Humanitarian Supply Chain Resilience

In contemporary discourse, there is a growing acknowledgment of the pivotal role played by localized logistics capacity within humanitarian supply chains, a perspective firmly rooted in the theoretical framework of dynamic capabilities.

Localized logistics capacity positively influences humanitarian supply chain resilience by siting warehouses, distribution centers, and resources in close proximity to areas frequently impacted by disasters or humanitarian crises (Anjomshoae et al., 2023; Dubey, Bryde, Dwivedi, et al., 2022; Frennesson et al., 2022). Additionally localized logistics capacity influences humanitarian supply chain resilience through geographical closeness serving to diminish response time and transportation costs, thereby augmenting the overall resilience of the supply chain, as emphasized by (Alem, 2021; Timperio et al., 2020; Roh et al., 2015) . Furthermore, localized logistics capacity positively influences humanitarian supply chain resilience by facilitating tailored and adaptable responses, allowing humanitarian supply chains to align efforts with the specific needs and conditions of the affected area, considering factors such as local infrastructure, culture, and resources (Saïah et al., 2023; Frennesson et al., 2022)

Scholars such as Frennesson et al. (2021), Jahre et al. (2020), and Dubey et al. (2020) have underscored the significance of strategies and best practices for optimizing this capacity, as elucidated by Anjomshoae et al. (2023) through leveraging local knowledge, resources, and networks to enhance the supply chain resilience. Additionally, Nweze (2024) shows a positive significant relationship between localized logistics capacity and supply chain resilience explaining that reducing dependency on centralized supply chain systems, which are susceptible to disruptions, localized logistics, with local storage and distribution points, enables humanitarian organizations to maintain operations even in the face of broader supply chain

Relatedly, (Lucatello & Gómez, 2022; Pusterla & Pusterla, 2021; Robillard et al., 2021) underline the significance of localized logistics capacity by facilitating more efficient resource allocation, with humanitarian organizations directing resources based on local needs assessments and evolving conditions. Additionally, the effectiveness of localized logistics hinges on robust information-sharing systems, allowing for real-time data collection, monitoring, and decision-making (Rahman et al., 2022; Robillard et al., 2021). In that repute, dynamic capabilities theory aids in understanding localized logistics capacity and humanitarian supply chain resilience guiding the expeditious response to emergencies, enabling

humanitarian organizations to promptly assess needs, mobilize resources, and deliver aid to affected communities (Frennesson et al., 2022).

However localized logistics capacity may not lead to humanitarian supply chain resilience because the effectiveness of localized logistics hinges on robust information-sharing systems and interconnectedness, but without robust information sharing systems, localized logistics capacity may lead to inefficient resource allocation and deceased humanitarian supply chain resilience (Robillard et al., 2021).

Therefore, we hypothesize that there is a positive and significant relationship between localized logistics capacity and humanitarian supply chain resilience

H_3: There is a positive and significant relationship between localized logistics capacity and humanitarian supply chain residence

Artificial Intelligence, Localized Logistics Capacity and Humanitarian Supply Chain Resilience

Localized logistics capacity serves as a crucial mediator between artificial intelligence (AI) and humanitarian supply chain resilience, as elucidated in recent published journal articles.

Ivanov et al. (2019) revealed that AI technologies, including predictive analytics, real-time data analysis, and automation, shapes humanitarian supply chain resilience by optimizing and enhancing the efficiency of humanitarian supply chains. Additionally, (Min, 2010) explains that artificial intelligences full potential can be realized when integrated into localized logistics capacity. This entails strategically positioning AI-powered solutions, such as AI-driven demand forecasting and dynamic routing algorithms, within proximity to disaster-prone areas and vulnerable communities (Ali et al., 2024). Relatedly, humanitarian organizations can leverage AI's capabilities to swiftly assess needs, allocate resources, and execute agile responses to crises, bolstering supply chain resilience (Roh et al., 2015)

In that repute, dynamics capability theory explains how localized logistics capability mediates the relationship between artificial intelligence and humanitarian supply chain resilience as localized logistics capacity enables AI systems to adapt and customize their operations based on the unique requirements and contextual factors of specific regions, fostering a more robust and adaptive humanitarian response infrastructure that can effectively mitigate the impact of disasters and crises (Modgil & Hannibal, 2022).

Based on the aforementioned, the hypothesis is that:

H_4: Localized logistics capacity mediates the relationship between artificial intelligence and humanitarian supply chain resilience positively

2.0 MATERIALS AND METHODS

Sample Description

The research design was cross-sectional survey and descriptive with a study population of 120 humanitarian organizations. Using simple random sampling, a sample size of 88 humanitarian firms as determined using (Krejicie and Morgan, 1970) formed the unit of analysis. The unit of inquiry was Supply Chain Officers/ Procurement Officers followed by Logistics / Supply Chain Coordinator because they are involved in the day-to-day procurement process, requiring them to have knowledge and the ability to provide valid responses to what is being studied whereas the unit of analysis was humanitarian firms in Uganda

Sample Characteristics Results

Results in Table 1 shows that most humanitarian organizations foreign with headquarters in other countries other than Uganda followed by NGOs with Local Headquarters and then community-based NGOs. Based on this, it shows that International NGOs have high capacity in terms of donations to handle any disruptions compared to local and community-based NGOs. Additionally, results reveal that 64.8% of the NGOs have been in existence for more than 20 years. Based on this, they have enough experience to deal with disasters and any disruptions that may come since they have been in existence for a longer period of time which indicates experience and skills to handle disruption as they have relevant information about resilience.

Further, Results indicate that most organizations employ above 200 employees, followed by 151- 200. This finding means that most of these organizations are large and have the capacity to deliver the required relief to beneficiaries in different locations. Similarly results shows that most of the NGOs are in the Health & Nutrition, followed by Core relief, Wash, and Food. Based on this, the settlements were in a recovery phase of relief during the research period. This is so because they were delivering resilience humanitarian activities.

On the other hand, majority of the respondents are male. This implies that Humanitarian organization employ more men who are practical, flexible, and energetic for the hectic work involved in humanitarian organizations. Also, the majority respondents were of age group between 36-40 years, followed by 31- to 35-years. This implies that the majority of the employees working in humanitarian organisation are relatively middle-aged persons with experience and skills to ensure sustainable procurement activities.

Relatedly, majority respondents were Supply Chain Officers/ Procurement Officer followed by Logistics / Supply Chain Coordinator. The results indicate that most respondents had an in-depth knowledge and skills of their organizational procurement operations. In terms of educational level, majorly respondents had a Bachelor's degree, followed by those with a postgraduate degree. This indicates that most of the humanitarian NGO staff members understand the key aspects of sustainable procurement and provided the appropriate information.

Conclusively, majority of respondents have worked within the HOs between 6-10 years. This implies that majority of the humanitarian NGO employees that were involved in the study have been in sector for more than 6 years therefore most of the employees are experienced, so they can offer informed opinions on procurement practices.

Instrument Development and Validity

The survey instrument was developed to measure artificial intelligence, Localized logistics capacity and humanitarian supply chain resilience. The questionnaire instrument was tested for content validity by involving professionals in the humanitarian industry and academics. Artificial intelligence was operationalized tapping practices of infrastructure and skilled resources, forecast and predict beneficiaries' requirements and statistical, self-learning, and prediction with 3 items (Dubey, et al., 2022; Dubey et al., 2020). Localized logistics capacity was operationalized using localization capacity and localization parties with 11 items (Frennesson et al., 2021) while Humanitarian supply chain resilience was operationalized using responsiveness and readiness (Dennehy et al., 2021c). A six-point Likert scale, with denoting strong disagreement and 6 denoting strong agreement, was used by study participants to express their degree of agreement or disagreement with statements.

Measurement Validation

To validate the study variables, we first determined whether the instrument was validated for reliability and validity using content validity to obtain expert judgments on whether the item tested is what it tends to measure. The measurement models for these constructs were assessed in terms of item loading and significance, item reliability, Cronbach's Alpha and average variance extracted (AVE). Cronbach Alpha was used to assess the constructs' reliability and in order to produce consistent findings, Cronbach Alpha should be over 0.7 (Hair et al., 2019). These results verify that all constructs are reliable and valid. The convergent validity was looked at in terms of Average Variance Extracted (AVE) and the rule of thumb is that AVE should be above 0.5 (Sarstedt et al., 2019). The results in Table 1 shows that all constructs met this requirement.

Table 1: Organizational and Respondents Characteristics of the Humanitarian Organizations

Nature of the organisation	**F**	**%**	**Gender**	**F**	**%**
International HO	55	62.5	Male	128	50.6
Local HO	23	26.1	Female	125	49.4
Community Based NGO	10	11.5	**Total**	**253**	**100**
Total	**88**	**100**	***Age Bracket***	**F**	**%**
Period of Operation	**F**	**%**	Less than 30 years	30	11.9
Less than 5 years	3	4	31 - 35	94	37.2
5 - 10 years	7	7.5	36 - 40	88	34.8
11 - 15 years	7	7.9	41 - 45	32	12.6
16 - 20 years	14	15.8	46 & above	9	3.6
Above 20 years	57	64.8	**Total**	**253**	**100**
Total	**88**	**100**	***Employee Position***	**F**	**%**
Number of employees	**F**	**%**	Logistics / Supply Chain Coordinator	41	16.2
Below 50	3	4	Project manager	42	16.6
50 - 100	7	8.3	Operations Managers	38	15
101 - 150	13	14.6	Supply Chain Officers/ Procurement Officers	63	24.9
151 -200	18	20.2	Field Project Coordinators	69	27.3
Above 200	47	53	Total	253	100
Total	**88**	**100**	***Level of Education***	F	%
Sector of the NGO	**F**	**%**	Diploma	9	3.6
Food security	12	13.4	Degree	157	61.1
WASH	7	8.3	Masters	81	32
Education	14	16.2	PhD	6	2.4
Health & Nutrition	22	25.3	**Total**	**253**	**100**
Shelter & Infrastructure	8	9.1	***Employee Tenure***	**F**	**%**
Core Relief services	15	17	Less than 2 year	19	7.5
Protection	7	7.5	2 - 6 years	135	53.4
Energy & Environment	3	3.2	7 -11 years	70	27.7
Total	**88**	**100**	12 - 16 years	24	9.5
			17 & above	5	2
			Total	**253**	**100**

Source: Analysis of Descriptive Statistics

Discriminatory Validity

Discriminant validity was measured using Heterotrait Monotrait (HTMT) ratio (Henseler et al., 2015). Artificial intelligence, localized logistics capacity, and humanitarian supply chain resilience demonstrate discriminant validity because their inter-construct correlation ratio

(HTMT) is less than the recommended threshold of 0.90. This indicates that each construct is unique and distinct from the others, and they are not overly correlated.

Table 2: Construct Reliability and Validity

	Item Codes	SIL	Cronbach's alpha	rho_c	AVE
Artificial Intelligence	AI1	0.889	0.810	0.884	0.719
	AI2	0.893			
	AI3	0.754			
Localization capacity	LLPC10	0.835	0.891	0.917	0.651
	LLPC12	0.752			
	LLPC2	0.800			
	LLPC3	0.890			
	LLPC4	0.830			
	LLPC5	0.720			
Localization parties	LLPP2	0.853	0.787	0.863	0.612
	LLPP3	0.778			
	LLPP4	0.752			
	LLPP5	0.741			
RES	RES1	0.753	0.811	0.875	0.638
	RES3	0.744			
	RES4	0.870			
	RES5	0.820			
SCR	COM1	0.861	0.866	0.909	0.714
	COM3	0.850			
	CRI1	0.866			
	CRI3	0.801			

Key: Standardized Item loadings (SIL); Cronbach's alpha (); Composite reliability (rho_c); Average variance extracted (AVE)

Table 3: Discriminant Validity

	HTMT			Fornell-Larcker criterion		
Variables	**(1)**	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**
AI (1)				**0.848**		
HSCR (2)	0.620			0.552	**0.828**	
LLC (3)	0.515	0.816		0.468	0.737	**0.795**

Source: PLS-SEM measurement model

3.0 FINDINGS

Zero-Order Correlations among Study Variables

A correlation was conducted to determine the relationship among the study variables. The results show a positive relationship between Artificial Intelligence (AI) and Humanitarian Supply Chain Resilience (HSCR) (β = 0.265, p=0.001). Additionally, it shows significant positive relationship between artificial intelligence (AI) and localized logistics capacity (LLC) (β = 0.468, p=0.000). Further, there is a positive relationship between localized logistics capacity (LLC) and Humanitarian Supply Chain Resilience (HSCR) (β = 0.613, p=0.000). Along with the direct effects, the study examined a mediation hypothesis (H4) and found a

significant positive relationship between localized logistics capacity in the relationship between artificial intelligence and humanitarian supply chain resilience.

Hypothesis Results

Our hypothesis was tested using Partial Least Square Structural Equation models. We observed that PLS coefficient, p-values and outcomes are significant at $p \leq 0.05$

Based on the results in Table 4 below there is a positive and significant relationship between artificial intelligence and humanitarian supply chain resilience (β= 0.265, p=0.001). Additionally, we found a positive and significant relationship between artificial intelligence and localized logistics capacity (β = 0.468, p=0.000). Furthermore, there is a positive relationship between localized logistics capacity and Humanitarian Supply Chain Resilience (β = 0.613, p=0.000).

Table 4: Correlations

	Mean	SD	1	2	3
AI (1)	4.36	0.77	1		
LLC (2)	4.99	0.32	.468**	1	
HSCR (3)	5.04	0.47	.552**	.737**	1

*** Correlation is significant at the 0.01 level (2-tailed).*

Source: Created by Author after PLS-SEM analysis

Table 5: Hypothesis Testing

Direct	**ℬ**	**T stat**	**P values**	**Bca**	**f_2**
AI -> HSCR	0.265	3.394	0.001	0.098; 0.403	0.136
AI-> LLLC	0.468	5.189	0.000	0.262; 0.619	0.28
LLC -> HSCR	0.613	7.645	0.000	0.436; 0.752	0.731
Indirect	**ℬ**	**T stat**	**P values**	**Bca**	
AI -> LLC -> HSCR	0.287	4.427	0.000	0.161; 0.417	
Total	**ℬ**	**T stat**	**P values**	**Bca**	
AI -> HSCR	0.552	6.663	0.000	0.098; 0.403	
AI-> LLLC	0.468	5.189	0.000	0.262; 0.619	
LLC -> HSCR	0.613	7.645	0.000	0.436; 0.752	
Predictive qriteria	**R2**	**AdjR2**	**Q2predict**	**RMSE**	**MAE**
HSCR	0.598	0.588	0.283	0.854	0.632
LLC	0.219	0.21	0.194	0.807	0.735

Legend: Artificial _Intelligence (AI); Localization of Logistics _ Capacity (LLC); Humanitarian Supply_Chain Resilience (HSCR)

Source: Created by Author after PLS-SEM Analysis

Mediation Test

The mediation test was conducted to test the effect of the mediating variable. The results in Table 5 show that localized logistics capacity fully mediates the relationship between artificial intelligence and humanitarian supply chain resilience (β = 0.287, p=0.000) and a lower bound=0.161 and upper bound=0.403. Hence localization of logistics capacity fully mediated the relationship between Artificial intelligence and humanitarian supply chain resilience.

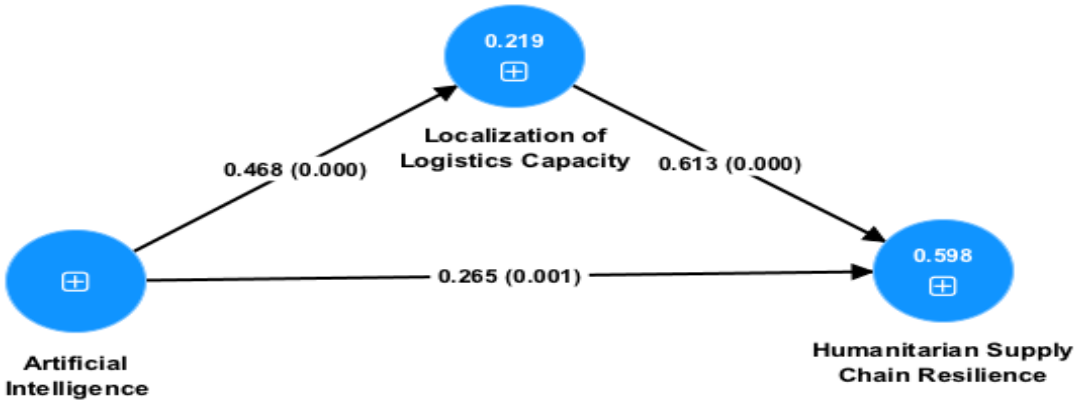

Figure 1: PLS-SEM for Humanitarian Supply Chain Resilience

Source: Source: Extracted by Author after PLS-SEM Analysis

Discussion

The study investigated the relationship between artificial intelligence, localized logistics capacity and humanitarian supply chain resilience of humanitarian firms

Our findings affirm the hypothesis that artificial intelligence is significantly correlated with humanitarian supply chain resilience (β= 0.265, p=0.001). This implies that humanitarian organizations use artificial Intelligence techniques to forecast and predict beneficiaries' requirements to improve humanitarian supply chain resilience. Additionally, humanitarian organizations leverage their infrastructure and skilled resources to develop and implement Artificial Intelligence information processing system enabling statistical, self-learning, and prediction techniques to enhance humanitarian supply chain resilience. In (Dubey et al., 2022) who advocated for the utilization of AI in disaster prediction, early warning systems, and response planning so as to increase supply chain resilience. Further, (Ali et al., 2024) acknowledges that machine learning algorithms, such as predictive analytics, real-time data analysis, and automation analyze historical data and real-time information to forecast and prepare for disasters which is essential for cultivating humanitarian supply chain resilience. According to the dynamics capability theory artificial intelligence explains humanitarian supply chain resilience because AI algorithms, adept at optimizing the allocation of resources such as food, water, and medical supplies during humanitarian crises, take into account factors such as geography, population density, and urgency

Additionally, artificial intelligence has a positive significant relationship on localized logistics capacity (β = 0.468, p=0.000). This implies that humanitarian organizations use Artificial Intelligence techniques to forecast and predict beneficiaries' requirements in order to enable localized logistics capacity. This view is supported by (Feizabadi, 2022; Toorajipour et al., 2021) who found that AI-powered demand forecasting models in humanitarian logistics enable logistics providers to accurately anticipate local demand for goods and services. According to the Dynamic Capability theory strategic AI deployment for humanitarian relief operations, improves efficiency, reduces delivery times, and enhances customer satisfaction through optimized routing, demand forecasting, and warehouse management

Furthermore, localized logistics capacity has a positive significant relationship on humanitarian supply chain resilience (β = 0.613, p=0.000). This implies that localization parties work together with humanitarian organizations to establish clear distribution and transportation channels so as to improve response to emergencies. Additionally, localization capacity of logistics enables collaboration with local communities, domestic NGO, CSOs and private

contractors harnessing their knowledge, resources and networks to enhance humanitarian supply chain resilience. This view is supported by (Anjomshoae et al., 2023) who found that collaborations with local governments, NGOs, and community-based organizations are facilitated by localized logistics, leveraging local knowledge, resources, and networks to enhance the supply chain's resilience. According to the dynamics capability theory localized logistics capacity facilitates tailored and adaptable responses, allowing humanitarian supply chains to align efforts with the specific needs and conditions of the affected area, considering factors such as local infrastructure, culture, and resources.

Lastly, localized logistics capacity full mediates the relationship between artificial intelligence and humanitarian supply chain resilience. This means that localized logistics capacity enables humanitarian organizations to harness Artificial Intelligence (AI) for real-time tracking and monitoring of supply chain operations, sensing and forecasting supply chain events through advanced statistical, self-learning, and prediction. Additionally, localized logistics capacity is connected to artificial intelligence when it forecasts and predicts beneficiaries' requirements to improve responsiveness in the occurrence of a disruption. The findings are in conformity with (Modgil & Hannibal, 2022) who revealed that AI technologies including predictive analytics, real-time data analysis, and automation, enhance humanitarian supply chain resilience by enabling swift resource allocation, crisis response, and resilience assessment, leveraging AI's capabilities to swiftly assess needs, allocate resources, and execute agile responses to crises, bolstering supply chain resilience. However, their full potential can be realized when integrated into localized logistics capacity which entails strategically positioning AI-powered solutions, such as AI-driven demand forecasting and dynamic routing algorithms, within proximity to disaster-prone areas and vulnerable communities (Feizabadi, 2022). The findings support dynamics capability theory through by enabling AI systems to adapt and customize their operations based on the unique requirements and contextual factors of specific regions, fostering a more robust and adaptive humanitarian response infrastructure that can effectively mitigate the impact of disasters and crises

4.0 CONCLUSION AND RECOMMENDATIONS

In this study we conclude that artificial intelligence and localized logistics capacity are predictors of humanitarian supply chain resilience in humanitarian firms. The results also indicate that localized logistics capacity is a mediator between artificial intelligence and humanitarian supply chain resilience. Localized logistics capacity fully mediates the relationship between artificial intelligence and humanitarian supply chain resilience. This implies that the implementation of layered defense mechanisms by humanitarian organizations will enable them to leverage Artificial Intelligence to predict beneficiaries' requirements, and will ensure they have the necessary infrastructure and expertise to apply AI-driven information processing system

Implications

Theoretical Implications

The purpose of this paper is to contribute to our understanding of humanitarian supply chain resilience in a humanitarian context especially in developing countries. The dynamics capability theory highlights the role of artificial intelligence and localized logistics capacity in implementing humanitarian supply chain resilience practices, enhancing our understanding of this crucial aspect of supply chain resilience in a developing country context

The results show that there is a direct relationship between artificial intelligence, localized logistics capacity and humanitarian supply chain resilience. In this study localized logistics capacity fully mediates the relationship between artificial intelligence and humanitarian supply chain resilience. This means the localized logistics capacity is a conduit between artificial intelligence and humanitarian supply chain resilience

In this study its shows that localized logistics capacity is important because it enables AI-driven optimization of logistics operations at the local level, enhancing responsiveness to disruptions which is useful in humanitarian supply chain resilience. Therefore, localized logistics capacity is vital in implementing humanitarian supply chain resilience in a developing country like Uganda

Managerial Implications

Manager's show be aware of artificial intelligence that relates to supply chain resilience and this can be achieved through training programs and seminars that highlight the benefits and necessity of integrating humanitarian supply chain resilience practices into business strategy Managers should build strong relationships will local logistics suppliers to achieve humanitarian supply chain resilience practices. Managers should also invest in local logistics suppliers' development programs that educate and incentivizes suppliers to handle humanitarian operations. This can be done through localization parties and localization capacity

Managers should put in place monitoring and reporting mechanisms that demonstrate progress and accountability in humanitarian supply chain resilience. This should be done by establishing key performance indicators to track humanitarian supply chain resilience

Policy Implications

Artificial intelligence and localized logistics capacity lead to effective implementation of humanitarian supply chain resilience strategies. Artificial intelligence and localized logistics capacity are crucial for successful implementation of humanitarian supply chain resilience in humanitarian firms which can be tested through the development of policies and procedures

Limitations and Areas for Further Research

As with any survey research, this study has some limitations that may affect its generalizability. This study examines the mediating role of localized logistics capacity in the relationship between artificial intelligence and humanitarian supply chain resilience. Studying humanitarian supply chain resilience in a snapshot and using quantitative trajectory limits the ability to tap into variations in humanitarian supply chain resilience over time. Thus, the researcher recommends that a case study design with semi structured research tools be used in a similar study to offer an in-depth, multi-faceted explorations on the research variables examined in this research.

REFERENCES

Ahmed, A., Shikha, D., Durgesh, B., Jasmeet Kaur, & Bharti Singh. (2023). Artificial Intelligence's Integration in Supply Chain Management: A Comprehensive Review. Issue, 13. http://eelet.org.ukhttp://eelet.org.uk

Alem, D. (2021). Insights from vulnerability-driven optimization for humanitarian logistics. Journal of the British Academy, 9, 1–4. https://doi.org/10.5871/jba/009s8.001

Ali, A. A. A., Sharabati, A. A. A., Alqurashi, D. R., Shkeer, A. S., & Allahham, M. (2024). The impact of artificial intelligence and supply chain collaboration on supply chain resilience: Mediating the effects of information sharing. Uncertain Supply Chain Management, 12(3), 1801–1812. https://doi.org/10.5267/j.uscm.2024.3.002

Anjomshoae, A., Banomyong, R., Hossein Azadnia, A., Kunz, N., & Blome, C. (2023). Sustainable humanitarian supply chains: a systematic literature review and research propositions. Production Planning and Control. https://doi.org/10.1080/09537287.2023.2273451

Aryatwijuka, W., Nyiramahoro, R., Katarangi, A., Nsambu Kijjambu, F., & Rukundo, A. (2022). Entropy in the 'entrepot': Examining the challenges of relief supply chains during COVID-19 pandemic relief item distribution operation-2020 in Uganda. Emerald Open Research, 4, 36. https://doi.org/10.35241/emeraldopenres.14694.1

Beduschi, A. (2022). Harnessing the potential of artificial intelligence for humanitarian action: Opportunities and risks. International Review of the Red Cross, 104(919), 1149–1169. https://doi.org/10.1017/S1816383122000261

Belhadi, A., Mani, V., Kamble, S. S., Khan, S. A. R., & Verma, S. (2024a). Artificial intelligence-driven innovation for enhancing supply chain resilience and performance under the effect of supply chain dynamism: an empirical investigation. Annals of Operations Research, 333(2–3), 627–652. https://doi.org/10.1007/s10479-021-03956-x

Belhadi, A., Mani, V., Kamble, S. S., Khan, S. A. R., & Verma, S. (2024b). Artificial intelligence-driven innovation for enhancing supply chain resilience and performance under the effect of supply chain dynamism: an empirical investigation. Annals of Operations Research, 333(2–3), 627–652. https://doi.org/10.1007/s10479-021-03956-x

Chukwu, N., Yufenyuy, S., Ejiofor, E., Ekweli, D., Ogunleye, O., Clement, T., Obunadike, C., Adeniji, S., Elom, E., & Obunadike, C. (2024). Resilient Chain: AI-Enhanced Supply Chain Security and Efficiency Integration. International Journal of Scientific and Management Research, 07(03), 46–65. https://doi.org/10.37502/ijsmr.2024.7306

Coppi, G., Moreno Jimenez, R., & Kyriazi, S. (2021). Explicability of humanitarian AI: a matter of principles. Journal of International Humanitarian Action, 6(1). https://doi.org/10.1186/s41018-021-00096-6

Dennehy, D., Oredo, J., Spanaki, K., Despoudi, S., & Fitzgibbon, M. (2021a). Supply chain resilience in mindful humanitarian aid organizations: the role of big data analytics. International Journal of Operations and Production Management, 41(9), 1417–1441. https://doi.org/10.1108/IJOPM-12-2020-0871

Dennehy, D., Oredo, J., Spanaki, K., Despoudi, S., & Fitzgibbon, M. (2021b). Supply chain resilience in mindful humanitarian aid organizations: the role of big data analytics. International Journal of Operations and Production Management, 41(9), 1417–1441. https://doi.org/10.1108/IJOPM-12-2020-0871

Dennehy, D., Oredo, J., Spanaki, K., Despoudi, S., & Fitzgibbon, M. (2021c). Supply chain resilience in mindful humanitarian aid organizations: the role of big data analytics. International Journal of Operations and Production Management, 41(9), 1417–1441. https://doi.org/10.1108/IJOPM-12-2020-0871

Dubey, R., Bryde, D. J., Dwivedi, Y. K., Graham, G., & Foropon, C. (2022). Impact of artificial intelligence-driven big data analytics culture on agility and resilience in humanitarian supply chain: A practice-based view. International Journal of Production Economics, 250. https://doi.org/10.1016/j.ijpe.2022.108618

Dubey, R., Bryde, D. J., Foropon, C., Graham, G., Giannakis, M., & Mishra, D. B. (2022). Agility in humanitarian supply chain: an organizational information processing perspective and relational view. Annals of Operations Research, 319(1), 559–579. https://doi.org/10.1007/s10479-020-03824-0

Dubey, R., Gunasekaran, A., Bryde, D. J., Dwivedi, Y. K., & Papadopoulos, T. (2020). Blockchain technology for enhancing swift-trust, collaboration and resilience within a humanitarian supply chain setting. In International Journal of Production Research (Vol. 58, Issue 11). http://researchonline.ljmu.ac.uk/

Dwivedi, Y. K., Hughes, L., Ismagilova, E., Aarts, G., Coombs, C., Crick, T., Duan, Y., Dwivedi, R., Edwards, J., Eirug, A., Galanos, V., Ilavarasan, P. V., Janssen, M., Jones, P., Kar, A. K., Kizgin, H., Kronemann, B., Lal, B., Lucini, B., … Williams, M. D. (2021). Artificial Intelligence (AI): Multidisciplinary perspectives on emerging challenges, opportunities, and agenda for research, practice and policy. International Journal of Information Management, 57. https://doi.org/10.1016/j.ijinfomgt.2019.08.002

Emilie, P. D. Y., & De Sarazignac, A. (2016). WHAT MAKES A HUMANITARIAN SUPPLY CHAIN RESILIENT? THE RELEVANCE OF THE CAPABILITIES FOR RESILIENCE WITHIN HUMANITARIAN SUPPLY CHAIN AND THEIR IDENTIFICATION WITHIN THE.

Feizabadi, J. (2022). Machine learning demand forecasting and supply chain performance. International Journal of Logistics Research and Applications, 25(2), 119–142. https://doi.org/10.1080/13675567.2020.1803246

Frennesson, L., Kembro, J., de Vries, H., Jahre, M., & Van Wassenhove, L. (2022). “International humanitarian organizations’ perspectives on localization efforts”. International Journal of Disaster Risk Reduction, 83. https://doi.org/10.1016/j.ijdrr.2022.103410

Frennesson, L., Kembro, J., de Vries, H., Van Wassenhove, L., & Jahre, M. (2021). Localisation of logistics preparedness in international humanitarian organisations. Journal of Humanitarian Logistics and Supply Chain Management, 11(1), 81–106. https://doi.org/10.1108/JHLSCM-06-2020-0048

Ghadge, A. (2023). ICT-enabled approach for humanitarian disaster management: a systems perspective. International Journal of Logistics Management, 34(6), 1543–1565. https://doi.org/10.1108/IJLM-11-2021-0532

Gupta, S., Modgil, S., Meissonierc, R., & Dwivedi, Y. K. (2021). Artificial Intelligence and Information System Resilience to cope with Supply Chain Disruption.

Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. In European Business Review (Vol. 31, Issue 1, pp. 2–24). Emerald Group Publishing Ltd. https://doi.org/10.1108/EBR-11-2018-0203

Helen, D. C., Elejie, A. R., Iyeumbe, O. J., Godwin, U. G., Ochang, E. M., & Etim, B. P. (2024). Exploring Artificial Intelligence for Supply Chain Resilience and Organization Performance in Developing Country: A Case of Nigeria. INTERNATIONAL JOURNAL OF SOCIAL SCIENCES AND MANAGEMENT RESEARCH, 10(1), 57–74. https://doi.org/10.56201/ijssmr.v10.no1.2024.pg57.74

Helo, P., & Hao, Y. (2022). Artificial intelligence in operations management and supply chain management: an exploratory case study. Production Planning and Control, 33(16), 1573–1590. https://doi.org/10.1080/09537287.2021.1882690

Hercheui, M. (2020). IMPROVING ORGANIZATION DYNAMIC CAPABILITIES USING ARTIFICIAL INTELLIGENCE. Global Journal of Business Research, 14(1), 87–96. www.theIBFR.com

Ivanov, D., Dolgui, A., Das, A., & Sokolov, B. (2019). Digital supply chain twins: Managing the Ripple effect, resilience and disruption risks by data-driven optimization, simulation, and visibility.

Jucha, P. (2021). Use of artificial intelligence in last mile delivery. SHS Web of Conferences, 92, 04011. https://doi.org/10.1051/shsconf/20219204011

Kant, P., Machavarapu, P. K., & Natha, A. R. (2023). Evaluation of decision support system for disaster management using multi-criteria decision techniques: a case study of Alappuzha, Kerala. Urban, Planning and Transport Research, 11(1). https://doi.org/10.1080/21650020.2023.2262546

Laynes-Fiascunari, V., Gutierrez-Franco, E., Rabelo, L., Sarmiento, A. T., & Lee, G. (2023). A Framework for Urban Last-Mile Delivery Traffic Forecasting: An In-Depth Review of Social Media Analytics and Deep Learning Techniques. Applied Sciences (Switzerland), 13(10). https://doi.org/10.3390/app13105888

Lucatello, S., & Gómez, O. A. (2022). Understanding humanitarian localization in Latin America—as local as possible: but how necessary? Journal of International Humanitarian Action, 7(1). https://doi.org/10.1186/s41018-022-00120-3

Mawonde, D., Samuel, B., Nyoni, J., & Muzenda, A. C. (2023). The effect of supply chain resilient strategies on operational performance of humanitarian organisations in Zimbabwe during the Coronavirus period. Cogent Business and Management, 10(2). https://doi.org/10.1080/23311975.2023.2246741

Min, H. (2010). Artificial intelligence in supply chain management: Theory and applications. International Journal of Logistics Research and Applications, 13(1), 13–39. https://doi.org/10.1080/13675560902736537

Modgil, S. S. R., & Hannibal, C. (2022). Artificial intelligence for supply chain resilience: Learning from Covid-19. http://researchonline.ljmu.ac.uk/

Mohsen, B. M. (2023). Impact of Artificial Intelligence on Supply Chain Management Performance. Journal of Service Science and Management, 16(01), 44–58. https://doi.org/10.4236/jssm.2023.161004

Nwagwu, U., Niaz, M., Chukwu, M. U., & Saddique, F. (2023). The Influence of Artificial Intelligence to Enhancing Supply Chain Performance Under the Mediating Significance of Supply Chain Collaboration in Manufacturing and Logistics Organizations in Pakistan under the Creative Common Attribution Non-Commercial 4.0. https://ojs.traditionaljournaloflaw.com/index.php/TJMS

Nweze, O. O. (2024a). Supply Chain Resilience Digitalization, and Localization. European Journal of Logistics, Purchasing and Supply Chain Management, 12(1), 20–32. https://doi.org/10.37745/ejlpscm.2013/vol12n12032

Nweze, O. O. (2024b). Supply Chain Resilience Digitalization, and Localization. European Journal of Logistics, Purchasing and Supply Chain Management, 12(1), 20–32. https://doi.org/10.37745/ejlpscm.2013/vol12n12032

Pusterla, Francesca., & Pusterla, E. R. G. . (2021). The future of humanitarian aid in a new context full of challenges : study. European Parliament.

Rahman, M. T., Majchrzak, T. A., & Sein, M. K. (2022). Making decisions for effective humanitarian actions: a conceptual framework for relief distribution. Journal of International Humanitarian Action, 7(1). https://doi.org/10.1186/s41018-022-00132-z

Robillard, S., Atim, T., & Maxwell, D. (2021). Localization: A “Landscape” Report A FEINSTEIN INTERNATIONAL CENTER PUBLICATION Localization: A “Landscape” Report Localization: A “Landscape” Report Acknowledgements and Language 4.

Rodríguez, E. O., Chowdhury, S., Beltagui, A., & Albores, P. (2020). The potential of emergent disruptive technologies for humanitarian supply chains: The integration of Blockchain, Artificial Intelligence and 3D Printing.

Roh, S., Beresford, A., & Pettit, S. (2015). CHALLENGES IN HUMANITARIAN LOGISTICS MANAGEMENT: AN EMPIRICAL STUDY ON PRE-POSITIONED WAREHOUSES.

Sahoh, B., & Choksuriwong, A. (2023). The role of explainable Artificial Intelligence in high-stakes decision-making systems: a systematic review. Journal of Ambient Intelligence and Humanized Computing, 14(6), 7827–7843. https://doi.org/10.1007/s12652-023-04594-w

Saïah, F., Vega, D., & Kovács, G. (2023). Toward a common humanitarian supply chain process model: the Frontline Humanitarian Logistics Initiative. International Journal of Operations and Production Management, 43(13), 238–269. https://doi.org/10.1108/IJOPM-01-2023-0054

Sawyerr, E. A. (2021). RESILIENCE IN HUMANITARIAN SUPPLY CHAINS: A FOCUS ON THE PROCUREMENT DECISIONS.

Shrivastav, M. (2021). Barriers Related to AI Implementation in Supply Chain Management. Journal of Global Information Management, 30(8), 1–19. https://doi.org/10.4018/JGIM.296725

Spencer, S. W. (2024). Seizing the potential and sidestepping the pitfalls (Vol. 89).

Tabaklar, T. (2017). Scalability and Resilience in Humanitarian Supply Chains. https://helda.helsinki.fi/dhanken/handle/123456789/172374

Tallon, P. P., Ramirez, R. V., & Short, J. E. (2013). The information artifact in IT governance: Toward a theory of information governance. Journal of Management Information Systems, 30(3), 141–178. https://doi.org/10.2753/MIS0742-1222300306

Teece, D. J. (2007). Explicating dynamic capabilities: The nature and microfoundations of (sustainable) enterprise performance. Strategic Management Journal, 28(13), 1319–1350. https://doi.org/10.1002/smj.640

Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. Strategic Management Journal, 18(7), 509–533. https://doi.org/10.1002/(SICI)1097-0266(199708)18:7<509::AID-SMJ882>3.0.CO;2-Z

Timperio, G., Tiwari, S., Gaspar Sánchez, J. M., García Martín, R. A., & de Souza, R. (2020). Integrated decision support framework for distribution network design. International Journal of Production Research, 58(8), 2490–2509. https://doi.org/10.1080/00207543.2019.1680894

Toorajipour, R., Sohrabpour, V., Nazarpour, A., Oghazi, P., & Fischl, M. (2021). Artificial intelligence in supply chain management: A systematic literature review. Journal of Business Research, 122, 502–517. https://doi.org/10.1016/j.jbusres.2020.09.009

Tukamuhabwa, B., Stevenson, M., & Busby, J. (2017). Supply chain resilience in a developing country context: a case study on the interconnectedness of threats, strategies and outcomes. Supply Chain Management, 22(6), 486–505. https://doi.org/10.1108/SCM-02-2017-0059

Waltersmann, L., Kiemel, S., Stuhlsatz, J., Sauer, A., & Miehe, R. (2021). Artificial intelligence applications for increasing resource efficiency in manufacturing companies—A comprehensive review. In Sustainability (Switzerland) (Vol. 13, Issue 12). MDPI AG. https://doi.org/10.3390/su13126689

Weiss, S., & Zouaoui, C. (2021). WHAT IS THE IMPACT OF AI ON THE DECISION-MAKING PROCESS IN HUMANITARIAN DISASTER MANAGEMENT?

Xu, W., Xiong, S., Proverbs, D., & Zhong, Z. (2021). Evaluation of humanitarian supply chain resilience in flood disaster. Water (Switzerland), 13(16). https://doi.org/10.3390/w13162158