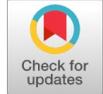


Behavioral Challenges of Humanitarian Supply Chain in the Context of Natural Calamities in India

Anoop C., Regi Kumar V.



Abstract: When natural occurrences affect populated areas and destroy local infrastructure and population, they are referred to as natural disasters and cause pain and deprivation. India is one of the regions in the world that experiences disasters most frequently due to its physiographic and meteorological conditions. Natural disasters have become more frequent over the past decade, particularly in India. Increased population, urbanisation, industrialisation, development in high-risk areas, environmental degradation, and climate change can all contribute to heightened vulnerability to catastrophe risks. Humanitarian operations are initiated as soon as a disaster occurs to assist victims quickly in various ways, including rescuing those affected or stranded, gathering and disposing of corpses, allocating resources, providing food aid, shelter, and medical care, and reopening access to remote areas. Delays in delivery or relief during humanitarian efforts can result in the loss of lives. Therefore, as it guarantees the seamless flow of products and services in a convoluted supply chain, logistical efficiency is a crucial component of humanitarian success. Logistics is essential to the effectiveness and responsiveness of major humanitarian initiatives like health, food, shelter, water, and sanitation. It acts as a link between catastrophe preparedness and response, as well as between procurement and distribution. Calamities, crises, plagues, and destructive actions can all be categorised as disasters, depending on the logistical effort required. Different types of disasters require different approaches to management. Running refugee camps is considerably different from providing the kind of aid needed after a sudden natural disaster or a nuclear accident. Offering assistance to help a place develop is different from aid given to deal with famine and drought. The humanitarian supply chain (HSC) is an organisation that specialises in planning the distribution and storage of supplies to affected areas and individuals during emergencies and natural disasters. The complex environments involved in a disaster, quick design, new or unfamiliar intermediaries or participants, and thus, it faces many possible obstacles, making it highly unpredictable and tumultuous. The humanitarian supply chain comprises numerous players, each with a distinct approach, mindset, and cultural background. In situations involving India, the humanitarian supply chain involves foreign aid agencies, host governments, the military, local self-governments, regional aid agencies, and others, all of whom have competing interests, mandates, capacities, and logistics expertise.

Due to the complexity, it is imperative to analyze key variables to create a humanitarian supply chain that meets the needs of donors, beneficiaries, and service providers alike. The history of India illustrates how a lack of professionalism, inadequate cooperation among various parties, and several other cultural factors have contributed to the field of humanitarian logistics being a complex and multifaceted area with numerous challenges and significant considerations. When building a supply chain, from sourcing to production, storage, distribution, and all transportation links in between, a sustainable supply chain (SSC) aims to consider the environment, the economy, and social and human issues. The humanitarian supply chain should be integrated with sustainable practices from the outset of its design and development. To effectively handle the most challenging situations arising from natural calamities, a sustainable and optimised humanitarian supply chain is necessary. With the aid of cutting-edge technologies such as artificial intelligence, blockchains, and machine learning, the domain of sustainable humanitarian supply chains in India is facing challenges and obstacles, with considerable room for improvement. In the context of the natural disasters in India, the article's primary focus is on the importance of an effective and sustainable humanitarian supply chain. The goal of this article is to identify the obstacles and variables that affect the efficient development of a humanitarian supply chain in India that is flexible enough to fulfil the unique needs of an HSC that are entirely different from those of a commercial supply chain

Keywords: Disaster, Humanitarian Supply Chain, Sustainability, Natural Calamities.

I. INTRODUCTION

Each year, disasters strike worldwide. The United Nations Office for Disaster Risk Reduction (UNISDR) has statistics showing that between 2000 and 2012, 2.9 billion people were affected by various types of catastrophes, resulting in 1.2 million fatalities. At the same time frame, it was projected that the damages had an economic impact of almost US\$1.7 trillion. These figures demonstrate that the preparedness for and relief from disasters have significant financial and humanitarian ramifications. India is one of the regions in the world that experiences disasters most frequently due to its physiographic and meteorological conditions. Additionally, there is a risk of being affected by CBRN (chemical, biological, radiological, and nuclear) disasters and emergencies. Nearly 5,700 km of the 7,516 km long coastline are vulnerable to cyclones and tsunamis, 68% of its cultivable area is susceptible to droughts, and its hilly regions are at risk from landslides and avalanches. Additionally, more than 58.6% of the landmass is vulnerable to earthquakes of moderate to very high intensity.

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Increased population, urbanisation, and industrialisation, as well as growth in high-risk areas, environmental degradation, and climate change, can all lead to an increased susceptibility to disaster risks. To define the roles and responsibilities, the Disaster Management Act of 2005 and the DM Policy of 2009 classify disasters as either natural or human-induced. The methodology employed in the national plan includes the Sendai Framework's four goals for each hazard into the framework for planning disaster risk reduction under the five Thematic Areas for Action.

1. Recognizing Risk
2. Coordinating between agencies
3. Investing in Structural Measures to Reduce Disaster Risk
4. Non-structural Disaster Risk Reduction Measures Investment
5. Capacity Building

A disturbance that "physically impacts a system as a whole and undermines its priorities and goals" is referred to as a "disaster" (Van Wassenhove, 2006, [1]). It is feasible to distinguish between natural and man-made disasters based on their origin, as well as between sudden-onset and slow-onset disasters based on predictability and pace of occurrence (Van Wassenhove, 2006, [1]). Calamities, crises, plagues, and destructive actions can all be categorised as disasters, depending on the logistical effort required. Different types of disasters require different approaches to management. For example, aid given to promote regional development differs from aid given to address famine and drought, and managing refugee camps is distinct from offering the kind of aid required following a sudden natural disaster or a nuclear accident. According to Kovacs and Spens (2007), [6] the organization of humanitarian activities follows two principal axes. They are ongoing aid efforts and catastrophe relief. In any disaster relief attempt, logistics are the most crucial component and determine whether the operation is successful or not (Van Wassenhove, 2006, [1]). However, it is also the most costly component of any disaster relief effort. According to estimates, logistics expenditures make up about 80% of all expenses associated with disaster aid (Van Wassenhove 2006, [1]). Disaster relief operations must be effectively managed to address and execute better responses, as a great deal of uncertainty and complexity characterise them. As a result, disaster management is a crucial component of successful relief effort implementation, and it starts with strategic process design (Tomasini and Van Wassenhove, 2009, [4]). The majority of the research in this field suggests that disaster management comprises six distinct phases, including mitigation, planning, response, and reconstruction. The preparation, reaction, and reconstruction phases of the process—collectively known as the humanitarian logistics stream—are where logisticians are primarily involved, with a focus on logistics and supply chain management. It's notable that in the case of the humanitarian logistics stream, the emphasis shifts from operational performance speed to cost reduction during the transition between the stages (Tomasini and Van Wassenhove, 2009, [4]). Two supply chain principles, agility and leanness, can be applied to each stage of the process to achieve a specific goal (Cozzolino et al. 2012, [5]).

II. DISASTER MANAGEMENT CYCLE



Figure 1: Disaster Management Cycle

Prevention: The best way to handle a disaster is to take preventive measures. Recognizing potential dangers and developing safety measures to limit their consequences are necessary for this. Even at this stage of the cycle, which involves implementing long-term precautions to help mitigate catastrophe risk, it is essential to recognise that disasters cannot always be prevented.

Mitigation aims to reduce the number of lives lost due to a disaster. Both structural and non-structural actions are feasible. A structural measure involves modifying the physical characteristics of the structure or its surroundings to mitigate the effects of a disaster.

Preparedness: Planning and practising what to do in the event of a disaster is an ongoing practice that can be advantageous to individuals, communities, businesses, and organisations. The highest level of readiness is achieved through ongoing training, assessment, and corrective action. Fire drills, active shooter drills, and evacuation drills serve as the best examples of the preparation stage

Response: A response is what occurs in the aftermath of a calamity. There are both immediate and long-term reactions. In an ideal situation, the disaster management coordinator will coordinate the use of all available resources, including personnel, machinery, and supplies, to help restore public safety, protect the environment, and minimise further property damage. During the reaction phase, any ongoing threats are dealt with.

Recovery: The fifth stage of the disaster management process is recovery. It could take months, years, or even decades to complete. The ultimate purpose of this stage is to assist individuals, groups, communities, corporations, and organizations in returning to normal—or a new normal, depending on the impacts of the disaster.

Reconstruction: The process of renovating buildings and other structures. Many different activities, such as modifying schools to make them more earthquake-resistant, can also be viewed as a form of mitigation, as this process can often take years.

As soon as a disaster occurs, players in disaster management, particularly humanitarian organisations, become involved in both the short-term response and long-term recovery stages. The four crisis management

phases listed above don't necessarily, or even typically, occur one after the other or in this particular order. Parts of the cycle usually overlap, and the severity of the disaster significantly impacts the duration of each phase. Response actions are those that are conducted immediately after receiving early warning of an imminent disaster, anticipating it, or following a disaster if it occurs without notice. Saving lives, preserving property, safeguarding the environment, and meeting the basic needs of people and other living things after a disaster are the primary objectives of disaster response. The search and rescue of those in need, as well as the evacuation of those most likely to be impacted by the disaster or any potential subsequent disasters, will take priority in the short term. Globally, improved reconstruction has become the preferred method for post-disaster restoration and rehabilitation. Despite the significant disruption to daily life caused by disasters, the immense suffering, loss of life, and destruction of property, global efforts view the recovery, rehabilitation, and reconstruction phase as an opportunity to integrate disaster risk reduction into development measures better and build disaster-resilient communities. Strengthening institutions, systems, and capacities of all stakeholders at all levels is included in capacity development. The plan acknowledges the necessity of a strategic approach to capacity building, as well as the need for passionate participation from a range of stakeholders, for it to be successful. An essential component of federal fiscal relations has been the financing of disaster relief. State Governments are responsible for carrying out rescue, relief, and recovery efforts in the event of a disaster.

Their efforts are supplemented by the Union Government's financial and logistical support. An essential component of federal fiscal relations has been the financing of disaster relief. State Governments are responsible for carrying out rescue, relief, and recovery efforts in the event of a disaster. Their efforts are supplemented by the Union Government's financial and logistical support. An essential component of federal fiscal relations has been the financing of disaster relief. State Governments are responsible for carrying out rescue, relief, and recovery efforts in the event of a disaster. Their efforts are supplemented by the Union Government's financial and logistical support. The disaster management cycle serves as an example of the ongoing procedure by which businesses in the public, private, and nonprofit sectors prepare for and respond to emergencies. The disaster management cycle highlights the continuous process by which organizations in the public, private, and non-profit sectors prepare for, mitigate, and recover from disasters. To effectively manage a disaster, the government must adopt policies and programs that either alter the causes of disasters or mitigate their effects on infrastructure, people, and property. As disaster management is reinforced before a catastrophic event, the phases of mitigation and readiness occur. Developmental issues are vital to disaster avoidance and a community's effective reaction to a tragedy. Utilized effectively, the disaster management cycle can mitigate the effects of a catastrophic event. It may also involve emergency preparations and measures necessary for a speedy and comprehensive recovery.

Major Disasters in India

Table 1: List of Major Disasters and Fatalities

Sl No.	Name of Event	Year	State and Area	Fatalities
1	Floods	October 2014	Jammu Kashmir	
2	Cyclone Hud H	September 2014	Andhra Pradesh and Odisha	
3	Odisha Floods	October 2013	Odisha	21
4	Andhra Floods	October 2013	Andra Pradesh	53
5	Cyclone Phalin	October 2013	Andhra Pradesh and Odisha	23
6	Floods/Landslides	June 2013	Uttarakhand and Himachal Pradesh	4,094
7	Cyclone Mahasen	May 2013	TamilNadu	08
8	Cyclone Nilam	October 2012	Tamil Nadu	65
9	Uttarakhand Floods	Aug-Sep 2012	Uttarkashi, Rudraprayag and Bageshwar	52
10	Assam Floods	July-Aug 2012	Assam	
11	Cyclone Thane	December 2011	TamilNadu, Puducherry	47
12	Sikkim Earthquake	September 2011	Sikkim, West Bengal, Bihar	60

III. HUMANITARIAN SUPPLY CHAIN

A supply chain is essentially a dynamic and complicated network of supply and demand. A supply chain is a network of organisations, individuals, activities, and resources that are involved in the distribution of a product or service. According to the American professional association's definition, supply chain management entails: "Supply chain management includes the planning and management of all sourcing and procurement, conversion, and logistics management activities. Importantly, it also entails coordination and collaboration with channel partners, who may include suppliers, intermediaries, third-party service providers, and customers ". Humanitarian supply chain (HSC) specializes in coordinating the delivery and storage of supplies to affected persons during natural disasters and emergency circumstances. Specifically, "humanitarian

logistics" refers to the activities of "planning, implementing, and controlling the efficient, cost-effective flow and storage of goods and materials as well as related information, from point of origin to point of consumption to alleviate the suffering of vulnerable people (Thomas and Kopczak, 2005, [3]). The function encompasses a range of tasks, including preparation, planning, procurement, transportation, warehousing, tracking, and tracing.

Customs and clearing. It is the most expensive component of any relief mission, and its success or failure determines the operation's success. HSC functions as a link between catastrophe preparation and response, procurement and distribution, and headquarters and the field.

In the Indian context, the humanitarian supply chain encompasses international



Behavioral Challenges of Humanitarian Supply Chain in the Context of Natural Calamities in India

relief groups, host governments, the military, local self-governments, and regional relief organisations, among others, all with competing interests, mandates, capacities, and logistical competencies. The primary distinctions between commercial and humanitarian supply chains have

an impact on three elements: supply chain flows, supply chain structures, and project life cycle management. The strategic objective of humanitarian supply chains is to save lives and alleviate human suffering, which is perhaps the most fundamental and significant distinction.

Table 2: Commercial and Humanitarian Supply Chain

	Commercial Supply Chain	Humanitarian Supply Chain
Network Configuration	There exist methods for supply chain network design.	Challenging due to the nature of unknowns (locations, type and size of events, politics, culture) and “last mile” considerations.
Information Systems	Typically, well-defined, making use of advanced technology.	Information is often unreliable, incomplete, or non-existent.
Performance Measurement System	Historically, focused on resource performance measures, such as maximizing profit or minimizing costs.	Primary focus on output performance measures, such as the time required to respond to a disaster or ability to meet the needs of the disaster victims.
Strategic Goals	Usually, to produce high quality products at low cost in order to maximize profitability and achieve customer satisfaction.	Minimize the loss of life and alleviate suffering.

(B. M. Beamon, 2004, [7])

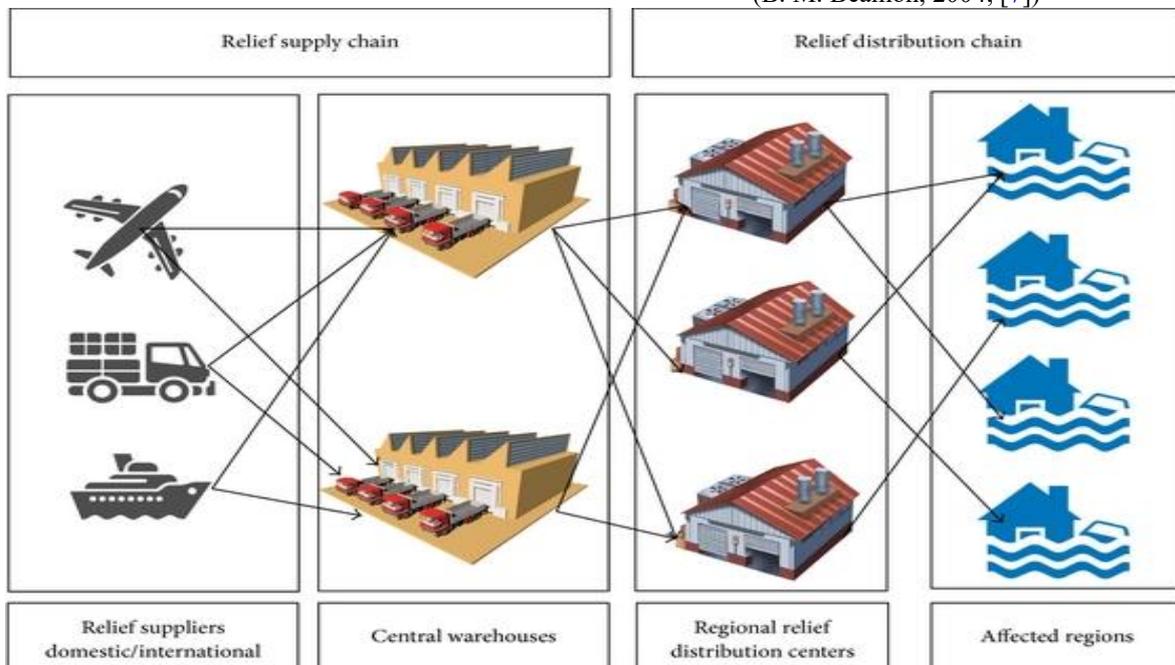


Figure 2: Relief Supply Chain Network

IV. CHALLENGES IN THE HUMANITARIAN SUPPLY CHAIN

The field of humanitarian supply chain management in India is fraught with issues and impediments, as well as areas that require urgent attention. Humanitarian logistics was a

neglected back-office function until very recently, and logistics expertise is still underdeveloped. Only after the 2004 tsunami tragedy did the Indian government and other

stakeholders begin to address the long-standing need for a humanitarian supply chain and disaster management. The obstacles can be classified into two categories: behavioural obstacles, which are briefly detailed below.

4.1 Deficit of Stability

Donors are constantly at the centre of humanitarian aid, which is funded, carried out, and administered in various ways. There are multiple categories of contributors, including government donors, corporate donors, and individual donors, each with its own purposes, tactics, and ambitions. Donors typically pledge contributions, however, it is frequently observed that actual contributions may not materialize or, if they do, will be less than the amount promised. There is a problem with the lack of transparency in funding in India. The financing may arrive in instalments that do not align with the established timeline for restoration and reconstruction. The instability of the humanitarian supply chain involves financing these modifications, donor priorities in their backyards, and politicised government donations. In India, the stability of the humanitarian supply chain is typically compromised by a lack of logistics infrastructure and public official corruption.

4.2 Absence of Collaboration Between Players

A humanitarian supply chain encompasses various actors, including funders, state, federal, and municipal governments, NGOs, the military, and others. Each participant in disaster response has the overarching objective of assisting people and alleviating their pain. However, the participants' missions, motivations, strategies, and operational restrictions may vary. Coordination, collaboration, and communication among the participants in a humanitarian supply chain are crucial. In India, the government, typically the state government of the impacted areas, plays the role of coordinator. As the existing rules and regulations govern the government's actions, it will be challenging for the military and private agencies to engage with the government's established policies. It is frequently believed that the government lacks the expertise, resources, and experience to organise such a chaotic emergency scenario.

4.3 Lack of Predictability

There are various times of year when disaster management uncertainty arises. This is a significant obstacle in a humanitarian supply chain that can be overcome via good coordination among supply chain participants. The location, timing, and intensity of catastrophes, particularly sudden-onset disasters, cannot typically be predicted, making it challenging to construct a successful humanitarian supply chain. Population characteristics and current infrastructure may not be readily available in disaster-prone locations. Therefore, the existing supply chain should have the flexibility and capacity to meet unforeseen needs in the event of a catastrophic event.

4.4 Scarcity or Oversupply of Resources

Aligning supply with demand is a significant obstacle in the humanitarian supply chain. This is due to several factors, including the unpredictability of crisis situations, a lack of supporting resources and infrastructure, inadequate funding,

and the absence of coordination structures. Even when finances are available, a lack of coordination and infrastructure can often result in vulnerable situations and panic. The aftermath of the tsunami is a prime illustration of such a scenario, where the lack of potable water became a serious concern in the coastal regions of India. There was a significant lack of attention and incompetence in the provision of potable water to the affected coastal residents, whose water resources were contaminated with saltwater. In 2009, when a boating tragedy occurred in the Thekkadi wildlife reserve, the immediate need was for searchlights. It was extremely difficult to locate and gain access to these high-capacity searchlights in nearby locations, so they had to be transported from other districts to meet the immediate need.

4.5 Knowing the Needs in Relief Operations

It is crucial to assess the ground realities, needs, and infrastructure facilities in a disaster-affected area to plan relief efforts accordingly. Typically, it is a lack of preparedness and an inability to comprehend the requirements of the suffering people that hinders the disaster management process, not a lack of cash. During the 2004 tsunami that affected hundreds of people in India, there was an image of airports piled high with humanitarian assistance flown in from worldwide donors and awaiting delivery to tsunami-stricken areas, months after the actual disaster. As a crucial component of success, a humanitarian supply chain must consider the needs of people in relief camps, their emotional state, and internal group dynamics, among other factors. During times of tragedy, it is customary to collect clothing and medications and deliver them to those in need in relief camps. However, the actual demand will be for undergarments, which cannot be provided using the same technique as the other resources.

4.6 Deficit of Leadership Quality

The establishment and coordination of a humanitarian supply chain depend significantly on the quality of the leadership provided. Especially in an Indian scenario, this factor is often overlooked and severely impacts the successful implementation of the supply chain. Although numerous rules and acts are being passed in parliament and other legislatures to support disaster management activities, practical leadership qualities and initiative are required from the political leadership and the executive to implement this authority for establishing and coordinating an HSC. Typically, in India, the district collector is the person who takes the lead in such activities, and the revenue department, under their immediate control, initiates the measures.

V. SUCCESS ELEMENTS FOR THE HUMANITARIAN SUPPLY CHAIN IN THE INDIAN CONTEXT

A Critical Success Factor is a management term indicating a requirement for a project to achieve its objective. It is a necessary activity for securing success. Critical success factors are the situations, characteristics, or variables that, when correctly fostered, sustained, maintained, or controlled, can have a substantial impact on an enterprise's success. Instead of analysing the



humanitarian supply chain on a microscopic level based on specific criteria, we have attempted to identify the essential success elements in the humanitarian supply chain and crisis management within the Indian context.

5.1 Coordination and Collaboration Between Players

Humanitarian assistance situations involve multiple players, including foreign relief groups, host governments, the military, local and regional relief organisations, and private sector enterprises, each of which may have varying interests, cultures, capacities, and logistics expertise. Despite current obstacles and past failures, coordination is receiving more attention due to the growing scarcity of global resources, accountability issues, and the potential benefits afforded by advancements in global information technology. There must be clear and effective communication among stakeholders in a humanitarian supply chain that does not interfere with their powers and sovereignty.

5.2 Training

Training is an effective tool for building the capacity of individuals, organisations, officials, and all others involved in tackling the complex situations arising from disasters. Capacity building encompasses pre-disaster activities, including personnel training, the establishment of institutions, financial security measures, and prior planning of logistics centres and shelters. This also includes customs agreements with local governments, mock drills, household preparedness, handling community equipment, understanding warning messages, and First Aid preparedness. It is crucial that the training reaches the individuals, organisations, and others who will be directly involved in the actual supply chain and disaster management activities. Care should be taken to build the capacity of local self-governments, people's representatives at the grassroots level of democracy, who will play an active role in the actual scenario. In India, with the new disaster management policy in place, the importance of training has increased significantly.

5.3 MOU with Regional Bulk Vendors

A crisis situation necessitates the procurement of large quantities of essential commodities, such as clothing, medication, and even potable water. This requires an extensive and well-established database of resources, including rescue equipment. District-specific resource data might be helpful in this circumstance. Kerala's comprehensive database of potential disaster-related needs serves as a model for other regions to follow. This will not be a simple task due to the variable nature of the demand and the intricacy of the supply chain. It will be challenging to find providers during an emergency, as there will be considerable confusion and uncertainty regarding payment, liability, and other matters. It would be preferable for the government or district authorities to identify potential suppliers and sign memoranda of understanding with them to meet the need partially.

5.4 Transport Infrastructure

In any form of the supply chain, whether humanitarian or commercial, a transportation facility is essential. It is especially difficult in the Indian context, where

transportation infrastructure is inadequate. Indian railways, which traverse the entire country in all directions, can play a crucial role in such a scenario. All participants in a humanitarian supply chain can be encouraged to use this network to meet their needs. As a government-run organisation, the Indian Railway can quickly assist the supply chain, particularly during the restoration phase of disaster management.

5.5 Participation of Local Government and NGOs

During the relief and reconstruction phase of a humanitarian mission, it is crucial to understand the group dynamics and the specific needs of the affected population. The afflicted individuals who will be housed in refugee camps will come from vastly different cultural and religious backgrounds, among other things. Their needs may vary by their cultural diversity, lifestyle, and even their caste and religion. Even a demand for a separate kitchen may arise, as it has in the past during numerous disasters in northern India. Inhabitants of a refugee camp may decline to accept the used clothing and other items provided as part of the contributions. Understanding the internal dynamics of a group is therefore essential for effective responses, refugee and rehabilitation activities, as well as the construction of a sustainable humanitarian supply chain. This highlights the need for local government and NGOs to be involved in disaster and supply chain operations, as it assists in determining the requirements and dynamics of the impacted community. The operational efficacy realities on the ground may be comprehended

5.6 Lean Supply Chain

The concept of the agile supply chain is one of continuous readiness to change, sometimes to alter radically, to respond quickly to changes in market and consumer demand. Due to its speed, adaptability, enhanced diversity, and customizability, agility is an appropriate risk management method for supply chains. The humanitarian supply chain specialises in managing large-scale hazards, coordinating disaster relief components, assessing needs, evaluating the impact of dispersed supplies, and monitoring various ongoing relief operations. Humanitarian aid often focuses on search and rescue, maintaining or saving lives, and restoring self-sufficiency to offset disaster-related losses. The essential element in any humanitarian integration is integrating lean and agile supply chain practices, which enhances coordination across humanitarian supply chain (HSC) participants.

The humanitarian supply chain (HSC) must be nimble, adaptable, and aligned; this is a key capability of many humanitarian organisations participating in disaster relief, and an area from which the commercial sector can draw to enhance its competitive advantage. (Van Wossenhove, 2006, [1]). Literature in this field indicates that the flexibility of the supply chain and its adaptability to ecological and environmental conditions are crucial aspects in enhancing the supply chain (HSC) to ensure that victims of an emergency receive effective and efficient commodity delivery

5.7 Media

Information and the media play an essential role in a

humanitarian supply chain. The data is necessary for effective planning. The term information has to be subdivided into two categories, information about the situation e.g. mortality rate, impact on health, affected people, access to areas and logistics hubs, development of the disaster, population structure, availability of sources in the affected area, staff and their education, and Information about the security, reporting to local authorities and communication to the national security services, etc. The rehabilitation process is one area where print and visual media can play a crucial role. Typically, relief activities are supported by NGOs, other groups, and political parties. This phase typically receives extensive media coverage and accolades. However, during the reconstruction phase, the interest of the organisations decreases, and the committed funds and support may not materialise as planned. Such a scenario can be prevented by clear communication, having clear terms of the agreement, the follow-up action of the respective departments, and ongoing intervention from the media.

5.8 Leadership

In every humanitarian supply chain, leadership is of paramount importance. Since every disaster management program involves a lot of participants with diverse cultures, tactics, and worldviews. The leader or organisation that serves as the coordinator between the HSC's players should be well-trained and possess practical interpersonal interaction skills, communication skills, and other relevant skills. Notably in India, where disaster management is still an issue that is being acknowledged slowly and is not given enough consideration, especially by government departments and the general public, the leadership component plays a critical role. Leadership plays a crucial role in persuading the public and concerned parties of the severity of the problem, as well as in assessing the risk and need. Risk assessment helps address the underlying causes of danger and simultaneously reduces losses of life and property. Following a catastrophic event, a needs assessment must be conducted to determine the necessary goods and services. The success of the humanitarian supply chain is also significantly influenced by the players' behaviors

5.9 Other Factors

Some of the characteristics cited as essential success factors in a humanitarian supply chain in the relevant literature are omitted from this study since their applicability was not evaluated. However, some components, such as the behavioural aspects of participants in a humanitarian supply chain, are essential factors to consider. The sustainability of the supply chain is also a crucial aspect to be considered in the successful implementation of the humanitarian supply chain. According to the available literature in this field, the agility of the supply chain and its adaptability to external conditions are crucial aspects for enhancing the responsiveness of the humanitarian supply chain. The main component in any humanitarian supply chain (HSC) is to ensure that the victims of the crisis receive effective and efficient delivery of commodities

Many commercial approaches to managing supply networks are also applicable to humanitarian logistics. Utilizing the power of information management to assure the

achievement of the '5 rights' has been a crucial element of an efficient and productive organization (the correct goods are available, in the right place, at the right time, in the correct quantity and quality, at the correct cost). This is also true in the humanitarian context, even though the difficulties of identifying the demand side of the equation while simultaneously supplying across a damaged physical environment are typically far more complex.

VI. SUSTAINABLE SUPPLY CHAIN

Government and non-governmental organisations (NGOs) operate and maintain supply chains in many developing nations to help vulnerable communities meet their core needs. Controlled supply chains have been built to carry and distribute food, water, sanitation, and medications throughout diverse regions of the world (Shareef, 2019, [2]). Since supply chain structures are interrelated and constantly mutable, modifying one structure might have repercussions on the alterations of other interconnected structures. In emergencies where catastrophes such as hurricanes, flash floods, fires, and famines can have a substantial impact on the population and environment, national governments and non-governmental organisations (NGOs) run and manage emergency supply chains (ESCs). One of the primary goals of disaster management and one of its most excellent linkages to development is the promotion of sustainable livelihoods, as well as their preservation and recovery during emergencies and disasters. When this purpose is achieved, people are more equipped to deal with crises, and their recovery is both immediate and long-lasting. The goals of a development-oriented approach to disaster management are to minimise risks, avert catastrophes, and prepare for emergencies. Consequently, the mitigation and preparedness phases of the disaster management cycle heavily consider developmental aspects. Inadequate development methods may lead to a lack of emergency readiness and an increase in disaster susceptibility. In addition, it serves as a significant focal point for key stakeholders, including civil society and the commercial sector, who are highly motivated and essential participants in reducing global, regional, national, and local disaster and climate risk.

The integration of disaster risk reduction across global activities in support of the 2030 Agenda for Sustainable Development creates a tangible and concrete link between the humanitarian and development communities.

VII. RESULTS AND DISCUSSION

The paper discusses the behavioural challenges encountered during the process of establishing an agile and sustainable humanitarian supply chain in the Indian context. India, due to its vast population, variable geography, and diverse culture, demands the optimum and vigilant utilisation of resources to ensure that the supply reaches everyone concerned. The paper tries to identify the critical factors that affect the implementation and success of a sustainable supply chain. The importance of these factors, their influence over logistics and distribution, and their correlation will be the key to establishing an agile and



sustainable supply chain. Agility and sustainability should be ensured, as the developing Indian economy demands such practices in operations performed under time constraints. Future work in this area requires an analysis of these factors, confirmatory factor analysis, and the development of a structural equation model to facilitate the creation of a suitable model for establishing a sustainable supply network.

VIII. CONCLUSION

The methodology adopted for this particular study is a literature review and discussions with experts in humanitarian and disaster management supply chains. There were several limitations due to the limited exposure to literature related to humanitarian supply chains in the Indian scenario. In emergencies triggered by natural disasters, armed conflict, economic or political crises, or, in more complex emergencies, by a combination of these factors, humanitarian action or response entails providing material and logistical assistance to save lives, alleviate suffering, and preserve human dignity. Several significant natural disasters have sparked large-scale humanitarian efforts in recent years, and this response has garnered critical attention. The natural disasters of 2020 had terrible effects on millions of people in several countries. The unique coronavirus pandemic will make 2020 stand out, but it also saw some of the worst and most expensive catastrophes. On average, there are 412 natural disasters per year. Others list mass movements, landslides, plagues, invasions, and volcanic eruptions. More frequent and unpredictable climate-related catastrophic occurrences increase risk and vulnerability, having a detrimental effect on human rights, disrupting livelihoods, and endangering lives worldwide. In 2020, a total of 389 climate-related disasters occurred, resulting in 15,080 lives claimed, affecting 98.4 million people, and causing \$171.3 billion in economic damage. No one group can address every continuing issue or concern during a humanitarian catastrophe. To successfully coordinate aid efforts and maximise efficiencies regarding costs and speed, it is essential to bring multiple players together in a network. This necessitates the development of a humanitarian supply chain management strategy. This multilateral approach coordinates the movement of supplies through international organisations and relief agencies, while obtaining funding from both national and international sources, to efficiently and effectively reach the victims of the disaster. The Humanitarian supply chain organization involved in relief supplies in disaster areas must be adaptable, aligned, and agile to improve its competitive edge. Optimising logistics performance requires that all relationships among the actors involved be managed through an integrated approach to efficiently and effectively coordinate inter-organisational performance, eliminate redundancy, and maximise efficiency along the entire emergency supply chain.

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