Analyzing the Challenges in Humanitarian Supply Chain Management in Emerging Economy

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Abstract

The nature and extent of disasters are incrementing with the progressive nature of the economies across the globe. The uncertainty factor has made the global humanitarian agencies much more proactive to analyze the coming disasters before the generation of their impact. This resilient behavior has provided ample opportunity to the decision makers for identifying, planning, and progressing towards Humanitarian supply chain management (HSCM). The literature on HSCM comprises studies dealing with the enablers or the challenges in delivering essential goods. The focus on understanding the relationships between the challenges is, however, missing from the literature. In this context, the present work aims to identify the challenges from the literature and decision-makers and to understand their relationships for a better decision-making process. The study utilizes the Grey Decision trial and evaluation laboratory (DEMATEL) to identify the interrelationship between the challenges for effective HSCM implementation. The major findings of the study are to understand the situation in an emerging economy like India for building a humanitarian supply chain operation network during pre and post-disaster scenarios.

Keywords

Humanitarian Supply Chain, Challenges, Grey DEMATEL, Emerging Economy

1. Introduction

There has been a growing increase in understanding the uncertainty due to natural and man-made disasters, globally, it has become imperative to be prepared for facing such situations and examining their degree of impact. Planning and preparing for the 'next disaster' is an ongoing process and calls for identifying critical challenges and suggest possible solutions to overcome them during a crisis (Roadman, 2020). Therefore, one could claim that humanitarian endeavors take place in an intricate and challenging situation where the immediate requirement of essential items must be fulfilled. This difficulty causes numerous challenges including the instability of demand, time pressures, and lack of resources (Sohn, 2018). The major challenges are the fear of unknown demand and sudden emergencies (Wassenhove, 2006). Providing the 'right supplies', at the 'right time', to the 'right place', in the 'right quantities' and to the 'right people' are the essential success factors in commercial and humanitarian supply chain management systems (HSCM) (Van Wassenhove, 2006). Various HSCM challenges have been recognized and discussed across various research in the literature. Numerous studies have referred to lack of coordination as a fundamental problem in humanitarian action, arguing that this challenge could cause numerous impacts ranging from ineffective aid distribution, to competition among actors for scarce resources, and congestion at airports and local roads (Kabra and Ramesh, 2015). Problems in fundraising have been highlighted as another important challenge of HSCM, due to its impact on providing immediate relief rather than making investments that would benefit the community in the long term (Kabra et al., 2015). Other essential challenges include poor information technology infrastructure, cultural differences among involved organizations, lack of clear policies, lack of knowledge management systems, and lack of trust between actors (Kovacs and Moshtari, 2018). The study by Kannan et al. (2020), discusses the application of physicians' familiarity and fuzzy inference system (FIS) to help with the demand administration in the health care supply chain, to reduce stress in the community, to break down the COVID-19 spread chain. A paper by Alessandra (2012), states key concepts related to the intricacy of an emergency relief operation by integrating effective and strong HSCM networks in organizations.
The topic of HSCM challenges has been discussed extensively in the humanitarian operations in literature, however, several gaps still need the attention of the stakeholders. First, to the best of our knowledge, none of the previous studies examined the interrelationships between HSCM challenges. Most researchers have so far focused on the detection of

the challenges with no consideration to examine the possible cause and effect relationships among them. Second, prior studies like Moghadam (2017) and Kabra et al. (2015) have not confirmed the relationships between HSCM challenges. Therefore, the prior studies only developed a structure or a list of HSCM challenges without assessing their validity using advanced statistical methods. It is crucial to examine the linkages and interactions among various elements in a system to comprehend it holistically. For instance, it can be said that emergency response efforts consist of two interlinked phases of pre-and post-disaster response and that these two should not be studied separately (Tufekci and Wallace, 1998). In this study, we aim to address these gaps in the literature by addressing the following research objectives:

- Enumerating the relevant challenges which are hampering in building humanitarian supply chain.
- Deriving a contextual relationship between the challenges.

To meet these research objectives, the present study utilizes the Grey DEMATEL approach that will aid in analyzing and knowing the relationships among the HSCM challenges, also further assist in prioritizing these motivational factors according to their level of influence. The use of grey systems theory in combination with the DEMATEL method seems an effective and victorious way to deal with the obscurity and uncertainty of data. The rest of the paper is divided into the following sections: methodology is discussed in section 2. Section 3 provides the data analysis followed by a result discussion in section 4. The conclusion and future scope are given in section 5.

2. Methodology

The study proposes a systematic research process, where the very first step aimed at extracting the key challenges from the literature, further these factors have been validated by experts. The next step involves the application of DEMATEL which helps in understanding the causal relationship of the challenges. For building an effective and efficient HSCM model for any business, the management should identify and examine the relationship between the various challenges to understand the relative importance of every challenge in context to each other. DEMATEL method has been extensively in many business applications. The classical or crisp DEMATEL is very effective in revealing the cause - effect relationships among the challenges and prioritizing them, it may have some difficulties in describing uncertainty which can be handled using Grey DEMATEL.

In true applications, the ambiguity leads to uncertainty in human decisions. Since classical or crisp DEMATEL cannot effectively overcome these limitations, grey systems theory based DEMATEL method appears to be an important approach. Grey systems theory which was developed by Tseng (2009) is a methodology that enables to integrate uncertainty and ambiguity into the evaluation process. It presents a powerful philosophy for examination of data with uncertainty, effective methodology for the analysis of systems with imprecise information and can handle uncertainty successfully. Thus, the current study uses grey DEMATEL which helps in understanding the complex relationship between challenges. As the basic DEMATEL lacks in analyzing the uncertain component, the present study proposes grey DEMATEL. The most significant advantage of grey system theory is that it can generate successful results with relatively small data in case of uncertainty and it enables to analyze and model systems with limited or incomplete information. Computational steps of the grey based DEMATEL are given below.

Step 2.1: Defining the evaluation challenges and determining the grey linguistic scale: The evaluation criteria are established and a grey linguistic scale to better represent the ambiguities of human assessments is determined. The linguistic scale and the corresponding grey numbers are “No Influence (NI)” as [0,0], “Very low Influence (VL)” as [0,0.25], “Low Influence (L)” as [0.25,0.5], “High Influence (H)” as [0.5,0.75] and “Very High Influence (VH)” as [0.75,1].

Step 2.2: Establishing the direct relation matrix: To understand the inter-relationship between challenges a group of experts are asked to make pair-wise comparisons in terms of linguistic scale. The initial direct relation grey matrix A is obtained.

$$A^k = \begin{matrix} C_1 \\ C_2 \\ \vdots \\ C_n \end{matrix} \begin{bmatrix} 0 & \otimes a_{12}^k & \cdots & \otimes a_{1n}^k \\ \otimes a_{21}^k & 0 & \cdots & \otimes a_{2n}^k \\ \vdots & \vdots & \cdots & \vdots \\ \otimes a_{n1}^k & \otimes a_{n2}^k & \cdots & 0 \end{bmatrix} \quad (1)$$

where k is the number of experts, = [$\underline{a}ij$, $\overline{a}ij$] are grey numbers and for $\otimes a_{ii}^k$=[0,0] for i=1,2,...,n.

Step 2.3: Combining all grey direct relation matrices: All the grey direct relation matrices are averaged by using Eq (6) and the aggregate matrix Z is obtained.

$$Z = \left(\sum_{i=1}^{k} A^k \right) / k \quad (2)$$

Step 2.4: Analyzing the structural model: To transform the criteria scales into comparable scales, the linear scale transformation is changed to a normalization formula. Let

$$\sum_{j=1}^{n} \otimes z_{ij} = [\sum_{j=1}^{n} \underline{z_{ij}}, \sum_{j=1}^{n} \overline{z_{ij}}] \quad (3)$$

$$r = \max_{1<i<n} \left(\sum_{j=1}^{n} \overline{z_{ij}} \right)$$

And

Then, the normalized direct-relation grey matrix, G, is equal to $G = r^{-1} \times Z$

And

$$G = \begin{bmatrix} 0 & \otimes g_{12} & \cdots & \otimes g_{1n} \\ \otimes g_{21} & 0 & \cdots & \otimes g_{2n} \\ \vdots & \vdots & \cdots & \vdots \\ \otimes g_{n1} & \otimes g_{n2} & \cdots & 0 \end{bmatrix}$$

$$\otimes g_{ij} = \frac{\otimes z_{ij}}{r} = \left[\frac{\underline{z_{ij}}}{r}, \frac{\overline{z_{ij}}}{r} \right] \quad (4)$$

Where

Step 2.5: Establishing the total relation matrix: The grey total relation matrix T can be found by using the following equations:

$$T = G + G^2 + ... + G^k$$

$$T = G(I - G)^{-1}, when \lim_{k \to \infty} G^k = [0]_{n \times n} \quad (5)$$

And

$$\otimes t_{ij} = \left[\underline{t_{ij}}, \overline{t_{ij}} \right] \quad (6)$$

And.

$$Matrix\left[\otimes \underline{t_{ij}} \right] = \underline{G} \times \left(I - \underline{G} \right)^{-1}$$

$$Matrix\left[\otimes \overline{t_{ij}} \right] = \overline{G} \times \left(I - \overline{G} \right)^{-1}$$

Step 2.6: Whitenization and calculating the sum of rows and columns: Before calculating the sum of rows and columns, the grey total relation matrix T is whitened. The grey numbers are converted into crisp values by modified CFCS (Converting Fuzzy data into Crisp Scores) method given below.

$$\otimes \underline{t_{ij}} = \left(\otimes \underline{t_{ij}} - \min \otimes \underline{t_{ij}} \right) / \Delta_{\min}^{\max} \quad (7)$$

$$\otimes \overline{t_{ij}} = \left(\otimes \overline{t_{ij}} - \min \otimes \overline{t_{ij}} \right) / \Delta_{\min}^{\max} \quad (8)$$

$$\Delta_{\min}^{\max} = \max \otimes \overline{t_{ij}} - \min \otimes \underline{t_{ij}}$$

Where

$$Y_{ij} = \frac{\otimes \underline{t_{ij}} \left(1 - \otimes \underline{t_{ij}} \right) + \otimes \overline{t_{ij}} \times \otimes \overline{t_{ij}}}{1 - \otimes \underline{t_{ij}} + \otimes \overline{t_{ij}}} \quad (9)$$

$$z_{ij} = \min \otimes \underline{t_{ij}} + Y_{ij}\Delta_{\min}^{\max} \quad (10)$$

where zij are the crisp values. Then the sum of rows and columns are separately denoted as d and r within the total relation matrix T as:

$$T = \left[t_{ij}\right], \qquad i, j \in \{1, 2, ..., n\}$$

$$d = (d_i)_{n\times 1} = \left[\sum_{j=1}^{n} t_{ij}\right]_{n\times 1} \text{ and } r = (r_j)_{1\times n} = \left[\sum_{j=1}^{n} t_{ij}\right]_{1\times n} \quad (11)$$

Step 2.6: Analyzing the results: d+r sum shows the effects among criteria and d-r shows the causal relations among challenges. In other words, d+r reveals importance of the criterion. If d-r is positive, it means that the criterion or factor has a cause effect on others, and if d-r is negative then the criterion or factor is affected by the others.

3. Data Analysis

3.1 Research Design

The foremost purpose behind the research design is to identify the challenges which can help in building a resilient humanitarian supply chain framework. An extensive survey on the literature as well as varied discussions with various stakeholders was done in return to find out the list of challenges. Seven stakeholders were identified for the interpretation of the data. The team of stakeholder comprises of three from industry and four academicians. This assorted team of stakeholders were selected to incorporate various perspectives into the decision-making process. Based on the consensus of these stakeholder, the following challenges were shortlisted:

- Clarity in adapting to organization culture and role delivery (M1): The degree of clarity in determining role in alignment to the culture of organization is one for the most relevant factor helping to build a resilient HSCM framework in organizations.
- Building flexibility in organizations (M2): Flexibility in organizations helps in making them agile to adapt changes and prepare themselves to meet unexpected challenges. Therefore, a flexible work structure is a step towards building strong HSCM framework.
- Clarity in reporting & submitting information (M3): With the increase in multitasking and handling of global workforce , the need to allocate the right job to right people with minimum flaws in managing the work and ensuring effective utilization of available resources in the demand today's business. Thus, it becomes imperative to establish a clear strategy with focused goals and transmitting correct information as and when called for.
- Effective operation management (M4): The backbone of a successful business is the efficiency of the operations in the organization. An effective operational management skill leads to organizations being prepared for meeting unexpected challenges and work strategically towards building sustainable HSCM model.
- Strategic Planning(M5): Time and again the relevance of strategic planning has been emphasized as it leads to proactive measures and future oriented strategies for long term planning. The objective of planning which aims towards making organizations prepared to meet unforeseen situation can only be possible if the plans are strategically laid and practically implemented.
- Information dissemination and advanced logistics (M6): The road to communication has major hurdles and gaps which may dissolve the essence of communication if these hurdles are not properly closed or addressed.

The dissemination of information is extremely critical for any task, be it establishment of effective HSCM framework which relies on efficient flow of information at the right time to the right people in organization.

- Infrastructural Support (M7): The backbone for any successful organization is the strong infrastructural framework which stands strong in supporting organization at various levels.
- Policy planning and practical implementation (M8): Government support and policy formulation, strategy, and capacity planning; and progress assessment of project was identified as the major driver factors.
- Customized training to stakeholders (M9): A very important requisite for building resilience in HSCM framework is the need to make the employees updated with changes in the economy and upgrade them through effective training
- Proactive communication before disaster (M10): Improving communication and coordination of organizations. A top-down approach is followed in which modular process elements are developed sequentially and relevant performance measures are identified.

Following the steps of the research methodology, Following the steps of research methodology which includes evaluation of the challenges using linguistic scale. Table 1 represent the evaluation of challenges by first decision maker.

Table 1: Linguistic Term Matrix for Decision Maker.

	M1	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**	**M8**	**M9**	**M10**	**M11**	**M12**	**M13**	**M14**
M1	N	L	VL	VL	L	L	VL	VL	L	H	VH	L	H	L
M2	N	N	L	L	H	VL	N	VL	VL	VL	L	H	H	H
M3	N	N	N	H	L	L	H	L	VL	L	H	N	VH	VH
M4	L	VL	N	N	VL	H	L	L	L	VL	N	VL	H	L
M5	H	L	N	N	N	H	VL	H	VL	H	L	L	VL	H
M6	VL	H	VL	L	L	N	L	VH	VL	VH	VH	L	VH	VH
M7	VH	L	H	L	VL	VL	N	L	L	VL	H	N	N	VH
M8	L	H	L	VH	H	L	H	N	N	N	VL	VL	L	L
M9	VL	H	VL	L	L	VH	H	VH	N	L	L	N	VL	H
M10	L	L	H	L	VH	VH	VH	L	L	N	VL	L	H	VH
M11	H	VL	H	VL	VL	VH	VL	H	L	VL	N	VH	L	VL
M12	N	N	N	VL	N	VL	L	L	H	N	L	N	L	VH
M13	VL	L	VH	H	L	H	H	H	VH	L	H	VL	N	H
M14	L	VL	L	L	H	VH	H	VH	VL	H	H	N	H	N

In the similar way the data was taken from the rest of the decision makers for the research study regarding the linguistic term. Combining the responses of all the decision makers, we form the normalize direct relation matrix as given in table 2.

Table 2: Normalized Direct Relation Grey Matrix G

	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10
M1	[0,0]	[.047,.093]	[.023,.070]	[0,.047]	[.070,.116]	[.023,0]	[0,0]	[.023,0]	[.023,0]	[.093,0]
M2	[.023,.047]	[0,0]	[.070,0]	[.023,0]	[.070,.116]	[0,.023]	[0,.023]	[.023,.070]	[0,0]	[.023,0]
M3	[0, .023]	[0,.023]	[0,0]	[.070,.116]	[.070,.116]	[.023,.070]	[.093,.140]	[.023,.070]	[.023,.070]	[.023,.070]
M4	[0.047, .093]	[.023,.070]	[0,.023]	[0,0]	[.047,.093]	[.047,.093]	[.047,.070]	[.023,0]	[.047,.093]	[.047,.093]
M5	[0.047,.093]	[0,.070]	[0,.047]	[.047,.023]	[047,0]	[.047,.116]	[.047,.047]	[.023,.116]	[.047,.070]	[.047,.093]
M6	[0.047,.093]	[.070,.116]	[.023,.070]	[0,.070]	[0,.070]	[.070,0]	[0,.116]	[.070,.163]	[.023,.047]	[.047,.140]
M7	[0.140,.186]	[.070,.116]	[.070,.116]	[.023,.070]	[0,.047]	[.023,0]	[0,.070]	[.023,.070]	[.023,.070]	[.023,.070]
M8	[0.023,.070]	[.070,.116]	[.070,.116]	[.116,.163]	[.070,.116]	[.023,.070]	[.093,.140]	[0,.163]	[.023,0]	[0,.070]
M9	[0.023,.070]	[.070,.116]	[0,.047]	[.047,.093]	[.023,.070]	[.093,.140]	[.093,.140]	[.116,.163]	[0,0]	[.023,.070]
M10	[0.023,.070]	[.023,.070]	[.070,.116]	[.023,.070]	[.116,.163]	[.140,.186]	[.116,.163]	[.023,.070]	[.047,.093]	[.000,0]

Using step 5, we obtain the total relation matrix as given in table 3.

Table 3: Grey Total Relation Matrix T

	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10
M1	[0,0]	[0.25,.5]	[0.125,.375]	[0,.25]	[0.375,.625]	[0.125,.375]	[0,.25]	[0.125,.375]	[0.125,.375]	[0.5,.75]
M2	[0.125,.25]	[0,0]	[0.375,.625]	[0.125,.375]	[0.375,.625]	[0,.125]	[0,.375]	[0.125,.25]	[0,.375]	[0.125,.125]
M3	[0,.125]	[0,.125]	[0,0]	[0.375,.625]	[0.375,.625]	[0.125,.375]	[0.5,.75]	[0.125,.375]	[0.125,.375]	[0.125,3.75
M4	[0.25,.5]	[0.125,.375]	[0,.125]	[0,0]	[0.25,.5]	[0.25,.5]	[0.25,.5]	[0.125,.5]	[0.25,.5]	[0.25,3.875
M5	[0.25,.5]	[0.125,.375]	[0.125,.25]	[0,.25]	[0,.375]	[0.375,.625]	[0,.25]	[0.375,.625]	[0.125,.375]	[0.25,3.62
M6	[0.25,.5]	[0.375,.625]	[0.125,.375]	[0.125,.375]	[0.125,.25]	[0,0]	[0.375,.625]	[0.625,.875]	[0,.25]	[0.5,4.75
M7	[0.75,1]	[0.375,.625]	[0.375,.625]	[0.125,.625]	[0,.625]	[0.125,.375]	[0,0]	[0.125,.375]	[0.125,.375]	[0.125,4.3
M8	[0.125,.375]	[0.375,.625]	[0.375,.625]	[0.625,.625]	[0.375,.375]	[0.125,.375]	[0.5,.75]	[0,0]	[0.125,.25]	[0,4.62
M9	[0.125,.375]	[0.375,.625]	[0,.625]	[0.25,.25]	[0.125,.875]	[0.5,.75]	[0.5,.75]	[0.625,.875]	[0,0]	[0.125,4.87
M10	[0.125,.375]	[0.125,.375]	[0.375,.375]	[0.125,.625]	[0.625,.875]	[0.75,1]	[0.625,.875]	[0.125,.375]	[0.25,4.125]	[0,5.37]

After the grey total relation matrix T is obtained, the matrix T is whitened to get the crisp values using the CFCS (Converting Fuzzy data into Crisp Scores) method. The whitening of Matrix T is done using the step 6 of methodology. After the values are converted to crisp values the cause effect relationship is obtained between the motivational factors by (D + R) and (D – R) in Table 4 given below. The values of D-R more than zero indicate that the motivational factor is a cause and the value D-R less than zero indicate that the motivational factor is an effect.

Table 4: Values of D + R and D – R for Critical success factors

	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10
D	17.515	14.678	17.501	17.85	17.221	20.889	18.924	20.211	21.274	23.035
R	18.76	19.034	18.461	18.177	20.08	19.36	20.019	19.59	16.849	18.768
D+R	36.27	33.711	35.962	36.027	37.301	40.249	38.942	39.801	38.122	41.803
D-R	-1.244	-4.356	-0.96	-0.328	-2.859	1.529	-1.095	0.621	4.425	4.267
Cause/ Effect	Effect	Effect	Effect	Effect	Effect	Cause	Effect	Cause	Cause	Cause

The present study is conducted to identify the critical success factors building resilient HSCM using Grey DEMATEL methodology. To conduct the study the critical success factors were shortlisted. DEMATEL methodology is extensively used in several business applications nowadays. The use of classical or crisp resultant from DEMATEL is very effective methodology in demonstrating the cause and effect relationships among the factors and by further prioritizing them, it may at times have some difficulties in deducing uncertainty and vagueness of data. In order to get over this and to increase its capabilities, the extensions of DEMATEL method is included which is not limited to fuzzy, grey DEMATEL.

In real world applications, there are chances of increased vagueness and uncertainty because of human errors in verdicts and imprecise information. In order to overcome the chances of ineffectiveness in classical or crisp DEMATEL methodology, the adoption of grey systems theory based DEMATEL method appears to be an effective and important approach as an option. The Grey systems theory which was developed is a methodology that enables the authors or researchers to work upon the chances of uncertainty and ambiguity in the evaluation process. It presents a beneficial methodology for the analysis of systems with imprecise information in order to handle uncertainty and vagueness successfully.

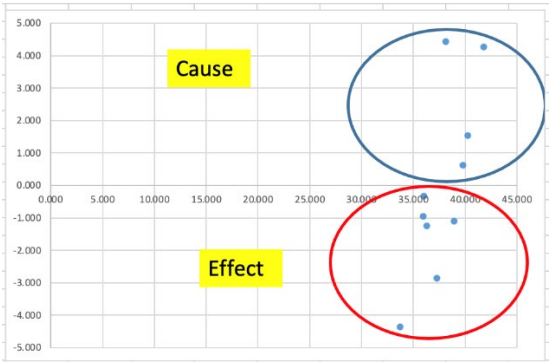

Fig 1. IRD diagram for HSM challenges

The Fig 1 represents the relationship of the 10 challenges based on the linguistic scale values, provided by the decision maker. The values above 0 indicate the causes and values below 0 indicate the effect due to the causes.

4. Results Discussion

4.1 Numerical Results

As seen from the above study and discussion, the factors which constitute cause are M6, M8 and M10. Examining the analysis, the positive number are the causal factors and negative numbers are the effect-based factors. This study has attempted to cluster the factors through the principal component analysis to find the relative importance. The present study has established three causal factors and seven effect-based factors. There have been tremendous changes the economy is making the business undergo. There are varied transitions at various levels, whether it has been due to globalization, competition or the COVID scenarios. The factor M6 - Information dissemination and advanced logistics stated that the road to communication has major hurdles and gaps, which may dissolve the essence of communication if these hurdles are not properly addressed. Effective HSCM framework is primarily dependent on efficient flow of information to the right people in organization, at the right time. While factor M8 – Policy planning and practical implementation usually depends on external factors like government support and policies formulated. The factor M10 - Proactive communication before disaster advocates implementation of a stepwise refinement to be followed in which process elements are developed sequentially and pertinent performance indicators are recognized well before the disaster takes place.

The factors which constitute the cause are M1, M2, M3, M4, M5 and M7. Factor M1 – Clarity in adopting to organization culture and role diversity is one of the most relevant factors helping to build a resilient HSCM framework in organizations. The factor M2 – Building flexibility in organizations helps in creating agility to adapt changes and prepare themselves to meet unexpected challenges. The factor M3 – clarity in reporting and submitting information is another crucial factor. With the increase in differential handling and managing of global workforce, the need to allocate the apt job to the right person with minimum flaws in managing the work and ensuring an effective utilization of available resources is in demand in today's businesses. Thus, it becomes imperative to establish a clear strategy with focused goals and transmitting correct information as and when called for. The factor M4 – Effective operational management is the backbone of a prosperous business; it is the effectiveness of the operations in the business. The factor M5 – Strategic planning states the relevance of long-term planning as it leads to proactive, measures and future oriented strategies for long term planning. Irrespective of the type of business, the key differentiator is how seamlessly the supply chain operates. The complete effectiveness of business and economy rests on a robust supply chain network interconnecting the business operations for effective performance.

4.2 Proposed Improvements

The future scope and research include the validation of cause effect model. The results of this study provide a base work which can be endorsed for the other sectors of the economy. The future work may be done by including some mathematical models. Future research may also consider other disaster types. Advance research may also reflect case studies to analyze challenges, drawbacks, and improvements in the concept of real-life humanitarian supply chain environment.

5. Conclusion

The study provides an analytical framework to the investors and policy makers in building effective and strong sustainable humanitarian supply chain. The research focused on scrutinizing the challenges in successful implantation of effective humanitarian supply chain in organizations, making them proactive and effective in meeting any unforeseen situations, preparing them for future challenges. In the literary work it was analyzed that all the authors used a limited number of challenging factors for their research lacking in making a comparative analysis in finding the relative importance of the factors critical for implementing successful and resilient humanitarian supply chain network in organizations.

The research gap identified through detailed literature review makes the study relevant when it examines the interrelation between cause and effect of humanitarian supply chain . The problem that we came across is that all the papers identified have focused their research on challenges and ways for implementing humanitarian supply chain but lacked in analyzing the cause - effect of the critical factors required in building successful HSC framework in organizations. The study adopts Grey DEMATEL methodology to understand the interrelationship. The focus of the study was to recognize the critical successful factors for the industry and to find out the cause - effect relationship for the factors. To study the relationship grey linguistic terms were used to avoid uncertainty of data. The decision makers

have different perspective for the data as per our research. All the factors are very essential for constructing effective resilient humanitarian supply chain in organizations.
The future scope and research include the validation of cause effect model. Moreover, the results of the current study can be validated for other sectors of the economy. The future work can be done by including some mathematical models.

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