The Effect of Supply Chain Resilient Strategies on Operational Performance of Humanitarian Organisations in Zimbabwe During the Covid-19 Period

Dumisani Mawonde[1], Regis Muchowe2, Chamunogwa Pande[3]

[1]Bindura University of Science Education

[2]Zimbabwe Open University

[3]Women University in Africa

*Corresponding Author's Email: dumiemaunde@gmail.com

Abstract

The outbreak of the Covid-19 pandemic disrupted the supply chains, and this created acute shortages of materials and products in both local and global markets. This situation demanded humanitarian organisations to implement supply chain resilient strategies in order to secure the supplies of their procurement requirements on time and keep their operations running. This study, therefore, examined the effects of supply chain resilience strategies on operational performance of humanitarian relief organisations in Zimbabwe during the Covid-19 period. A pragmatic research philosophy and a descriptive survey research design were employed. A sample of 28 supply chain professionals from humanitarian relief organisations was randomly selected from a targeted population of 30 for the questionnaire and 25 of them responded whereas interviews were conducted with 5 supply chain management professionals. Quantitative data were scrutinized by means of SPSS & AMOS programmes (versions 22.0) whilst qualitative data from interview was analysed using thematic scrutiny. Structural Equation Modelling (SEM) was used to determine the results and convergent validity of the measurement model was tested. The study findings show that supply chain resilience strategies have positive significant effect on operational performance of humanitarian relief organisations during the Covid-19 period. The study concluded that, in Zimbabwe, humanitarian relief are familiar with supply chain resilient strategies and that the supply chain resilient strategies which were analysed have a positive and significant effect on material availability, delivery flexibility and delivery time. The study recommends humanitarian relief organisations to be agile in their supply chain departments, to push for cross sector collaborations and to implement supply chain preparedness strategies as this is critical in improving their operational performance during Covid-19 period.
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Key words: supply chain, Covid-19, supply chain resilience, operational performance

Introduction

The outbreak of pandemics instigates social-economic challenges world over. The unforeseen outbreak of pandemics triggers many problems that affect humanity and economic activities. For instance, there was the outbreak of influenza in United States of America (U.S.A) in the year 1918. The influenza was short lived, but it decimated many lives that it resulted in the ripple effect where there was a shortage of manpower in manufacturing industries (Garret., 2007). This, therefore, affected the production and provision of products and services, and this generally affected the supply chains. Since extenuating an epidemic involves the efforts from the public–private partnerships in planning and cooperation, nonetheless, the U.S.A was not prepared to fight the epidemic that it extremely affected societies and the economy.

Recently, in the year 2019, cases of the new corona virus were initially discovered in Wuhan, Hubei area of China and it became widespread in the world in the year 2020.The outburst of corona virus came with several challenges, mostly the disturbance on supply chains and mainly humanitarian supply chains (Wamba, F. S., et al, 2020). The dependence of many countries on supplies from foreign and overseas markets exposed them to supply chain disruptions. The disruption of global supply chains was mainly caused by measures such as lockdown and movement restrictions which were put in place to avert the continual spreading of the virus (Ahairwe and Tondel, 2020).

Many countries in Africa rely on humanitarian aid support to attain their socio-economic goals, and most humanitarian organisations use supplies that come from overseas markets. Humanitarian organisations obtain the supplies of goods and services they use to support vulnerable societies from overseas markets such as Asia, Europe, and America. Therefore, the measures that were implemented to stop the further spreading of corona virus, such as the closure of economies and trade restriction severely disrupted global supply chains, and this affected charitable organisations. This precisely affected the operations of humanitarian aid organisations operating in Africa as the supply of goods to local markets was interrupted (Zeldy, 2020).

In West Africa, countries were quick to take strong prevention and mitigation measures to halt the spread of corona virus (Mbaye, A and Benjamin, N., (2020). However, the closure of boarders, markets, through curfews and limited internal movements had immense impact on supply chains in the region and threatened livelihoods (Mbaye and Benjamin., 2020). According to the World Bank Report concerning the effect of Covid-19 on West African value chains (2020), the food value chains were the most affected and this seriously threatened food security in the region. Preventative and mitigation measures such as the closure of boarders, movement restrictions and curfews have led to substantial supply chain disruptions, and this created immense challenge for humanitarian organisations where it became very difficult for them to import food, drugs, and other important materials (World Bank Report, 2020). Since most countries in West Africa obtain support to meet their socio-economic goals from humanitarian organisations, the disruption of humanitarian supply chains during the corona virus period exposed many governments since they could not meet the food and health needs of their people. This led to loss of livelihood due to hunger and starvation, since there was unprecedented rising of food prices in some countries, and this also led to problems of conflict and political instability.

In Southern Africa, the scourge of corona virus affected the operation of economies in many countries. According to Zeldy (2020), like in many other countries across the globe, Zimbabwe

adopted strong prevention and mitigation measures to curb the spread of corona virus. Therefore, the measures which were implemented in Zimbabwe were similar to those which were implemented in West Africa, and these include the closure of boarders, markets, the implementation of curfews and limited internal movements. These measures had immense impact on the economy as both local and international trade were stopped, and this led to both local and international supply chain disruptions. Also, in Southern Africa, Zimbabwe is one of the countries whose economy relies much on imports from global markets, and support from humanitarian organisations (Mhlanga, D and Ndhlovu E., (2020). So, the measures which were implemented by the government to combat the spreading of corona virus created huge shortages of food, medical drugs, and other paraphernalia and this led to the sharp increase of prices, hunger, and loss of livelihood. As humanitarian organisations are considered very essential in the economy of Zimbabwe, the disruption of global supply chains due to closure of economies has greatly affected their operations since they obtain their supplies from overseas markets.

Many organisations across all sectors in Zimbabwe had no response strategies in place to survive under the measures put in place to prevent the widespread of corona virus (ZCTU Report, 2020). According to Mhlanga, D and Ndhlovu E., (2020), several humanitarian organisations suffered huge shortages of resources they habitually use to give aid to communities both in urban and rural areas. These shortages were created due to the fact that the government closed the economic activities and implemented movement restrictions across the entire country. Thus, this study examines supply chain resilience strategies that are used by organisations during the Covid-19 pandemic. Precisely, the study focuses on supply chain resilience strategies that are used in order to ensure that there is uninterrupted supply of procurement requirements in humanitarian aid organisations in the context of the Covid-19 pandemic. This therefore keeps their operations running as there will be adequate supplies of procurement requirements that are critical to support the operations.

The study was guided by the following objectives:

i. To identify the impact of supply chain resilient strategies on delivery flexibility in humanitarian operations.
ii. To establish the effect of supply chain resilient strategies on material availability in humanitarian operations.
iii. To determine the impact of supply chain resilient strategies on relief response time in humanitarian operations.

Literature review

Supply chain resilience

The operations of humanitarian relief organisations are very critical since many lives depend on them. Since in modern day business environment there are many future uncertainties, organisations must be proactive in decision making in order to avoid interruptions in their operations. Essentially, supply chain departments in many organisations must be capable of preparing for unforeseen occurrences, attend to interruptions, then improve on or after them by upholding continuity of processes at the wanted level of connectedness and control over structure and function (Holcomb and Ponomarov, 2018). Therefore, humanitarian aid organisations must have resilient supply chains in order keep their operations uninterrupted. The concept of supply chain resilience is new in supply chain management that many organisations must embrace it. Having a resilient supply chain, is considered appropriate for

humanitarian organisations. In order for humanitarian aid organisations to be resilient in their supply chains, they are expected to use the following strategies:

Supply chain preparedness

As humanitarian relief operations are severely disturbed with supply chain disruptions, supply chain departments must consider procurement planning as a disaster preparedness strategy. Helferich and Cook (2002) propose that supply chain professionals in humanitarian organisations must put in place procurement plans and employ existing planning models in disaster management. Planning for disasters in supply chain management is very important as it supports the operations of humanitarian organisations with a steady supply of materials, goods, and services amidst supply chain challenges. Importantly, humanitarian organisations must not experience supply disruptions as this negatively affects their operations and customers at the receiving end.

Supply chain agility

The lack of agile supply chain decisions in many humanitarian aid organisations caused serious delays in the receipt of materials, goods, and services from suppliers which in turn have caused many challenges to the operations of humanitarian organisations in Zimbabwe. The situation was worsened by the evolving of Covid-19 and the implementation of the lockdown measures. However, this was an awakening call for many supply chain departments in humanitarian organisations to identify and put in place some strategies in order to make their supply chain departments agile. According to Esmark, and Holcomb (2015), humanitarian organisations must have agile supply chains that make them respond to changes in the needs of their clients, that is, respond swiftly to unstable request and short product life cycles. Therefore, humanitarian organisations must be able to predict the future and its changes before implementing agility strategies in their supply chains (Dallery et al, 2019).

Cross-sector collaboration

Cross sector collaboration is a key strategy that has been well thought out to improve the performances of procurement and supply functions in charitable organizations during the peak of the corona virus in Zimbabwe. The collaboration between the Government of Zimbabwe and charitable organizations is premised on the common goals they share to support the socio-economic development in the country. The government recognizes the efforts of the charitable organizations on socio-economic goals through the provision of humanitarian aid to the vulnerable and less privileged groups in in different societies in Zimbabwe. This, therefore, moved the government to relax stringent restrictions for charitable organizations to operate flexibly during the peak of the Covid-19 pandemic. Therefore, it is during the peak of the pandemic that cross sector collaboration and public-private sector partnerships help to build a resilient supply chain (Balcik et al, 2010).

Metrics for the performance of humanitarian operations

The operations of humanitarian or charitable organizations are worthy to get more attention and support from key stakeholders because they provide relief for human woes during disasters. Thus, the following metrics are used to measure the performance of operations in charitable organisations:

Delivery flexibility

The operations of humanitarian organisations must be flexible in responding to a disaster. This means that humanitarian operations must be flexible to have the minimum response time and the arrival of supplier to the disaster site (Balcik and Beamon, 2008). Therefore, humanitarian relief organisations must manage the time during the beginning of the calamity and also the coming period of the organisation's initial provisions to the catastrophe location.

Stock availability

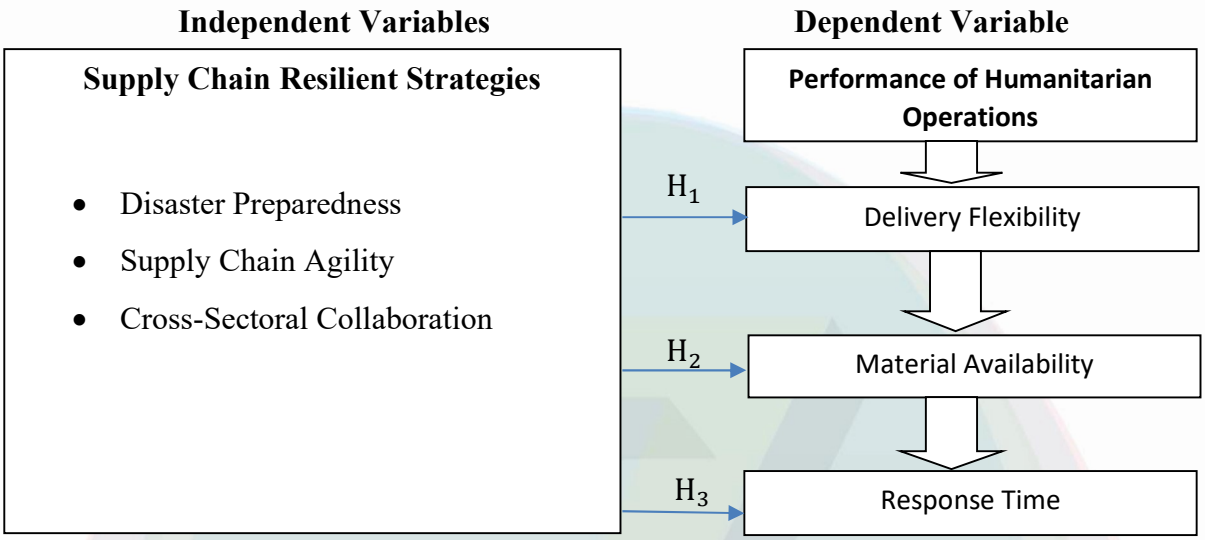
Humanitarian organisations must maintain adequate inventories of materials, goods, and essential products to keep their operations running. This is supported by Niemann et al, (2018) who is of the position that, firms must make sure that they are safe from supply inconsistency as well as the interruption by holding enough stock. Therefore, supply chain departments in humanitarian organisations must be agile enough to ensure that their operations will not be negatively affected by the shortage of stock of critical materials and goods.

Response time

In humanitarian supply chains, response time is an important aspect of operations performance. According to Balcik and Beamon, (2008), in humanitarian organisations, response time is a key operations performance measurement metric. It is important to know that for organisations that have the responsibility of providing relief services to the vulnerable of disasters, the time of responding to the affected areas is very important. The performance of the organisations that provide relief services is measured on the time they take to respond to the needs of the vulnerable. So, in humanitarian organisations, there are several issues that are important for the time of response to the needs of the needy, these are; reprieve organisation calculation, purchasing and distribution approaches, vendor site, means of carriage, analysis situs, protection, set-up, and policymaking.

Conceptual framework

The conceptual framework shows the association of the variables of the study. The conceptual framework shows the independent variable which is supply chain resilience and the dependent variable is performance of humanitarian operations. Supply chain resilience is measured by metrics such as disaster preparedness, supply chain agility as well as cross sector collaboration whilst the metrics which are used to measure the performance of humanitarian operations are delivery flexibility, material availability, and response time. The association between the independent and the dependent variable is depicted below:



Source: Authors (2022)

Hypotheses

The following are the hypotheses of the study:

H_1: Supply chain resilient strategies have a positive effect on delivery flexibility in humanitarian operations.

H_2: Supply chain resilient strategies have a positive effect on material availability in humanitarian operations.

H_3: Supply chain resilient strategies have a positive effect on relief response time in humanitarian operations.

Methodology

This study followed a pragmatic philosophy. The pragmatic philosophy was adopted in order to grant researchers the freedom to use quantifiable and non-quantifiable research approaches to get helpful and truthful intuitions concerning the lessening of the catastrophe danger as it happens in this physical world (Creswell 2014). The pragmatic philosophy enabled the researchers to answer an extensive variety of questions for the reason that the researcher wasn't restricted to one approach.

A descriptive survey research design was used to clarify the need to assess the effects of supply chain resilience strategies on humanitarian relief operations in Zimbabwe. Descriptive research design therefore enabled the researchers to acquire information pertaining to the existing position of the supply chain resilience strategies and how they help to enhance the operations of humanitarian organisations during pandemics. Kothari (2003) defines descriptive research as an examination of the way in which information-gathering is conducted.

The study's target population was made up of supply chain management professionals working in 30 humanitarian relief organizations that are operating in Zimbabwe. The Krejcie and Morgan (1970) model which is a table that researchers use to determine a sample size when all the factors are taken into account was used to determine the sample size. Therefore, the sample size used in this study is 28.

Stratified sampling was used to split the humanitarian organisations into four sub groups which are food, safety and farming, water, cleanliness and sanitariness, healthiness, nutrition, and safety. Convenient sampling was used to select those cases that are easiest to get information

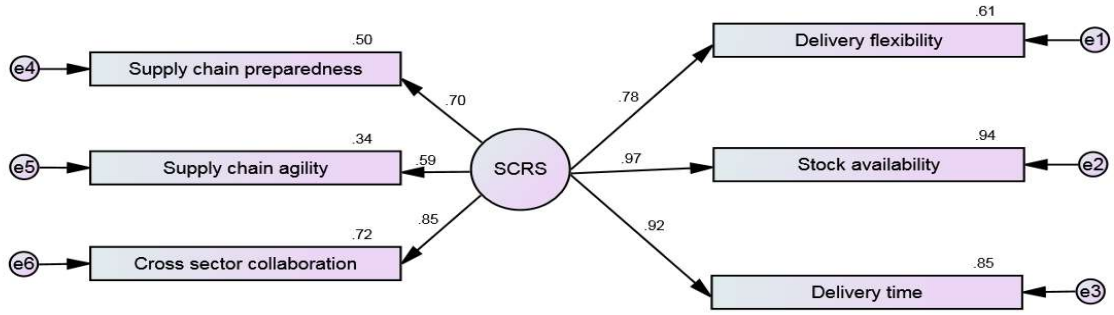
for the sample (Saunders, 2005). This method was used to select the sample convenient to the researcher from the strata in order to collect data.

A questionnaire was developed and used to collect data. The questionnaires had closed-ended questions and were distributed in procurement and supply departments of humanitarian organisations. Questionnaires were used because they are cost effective, free from interviewer bias, allows the use of a large sample, and provides a sense of anonymity for the respondents.

Telephone interviews were carried out to gather qualitative data for the study. Telephone interviews were carried out since it was very difficult to carry out face to face interviews because of the Covid-19 pandemic. The researchers made use of partly organised interviews that consisted of themes and important requests (Saunders, Lewis, and Thornill, 2016). Similarly, open-ended questions were utilised for the interviewees to elucidate their responses (Henderson and Bialescki cited in Lantai, 2012).

Model and estimation procedure

It was essential for the researchers to use an advanced data analytic package in order to have a thorough analysis of the findings of the study. This gave the researchers the opportunity to use the Structural Equation Model to scrutinise the relations amongst the supply chain resilience strategies and the operations of charitable establishments. This also helped in measuring the soundness of the constructs. The software which was used enabled the researchers to use the bootstrapping method to test the level of significance based on standard errors of estimation functions. It also enabled the use of the maximum likelihood estimation. Below is an illustration of the proposed model (Structural Equation Model with Standardized Regression Weights)



Source: Created by Authors (2022)

Ethical considerations

The rights of the participants were respected in this study. Participants were made to be up-to-date with the purpose of the research. So, the researchers informed all the participants about the reason why the study was being conducted and what the participants were expected to do in order to make it easy for the study to conducted. This was corroborating with Kumar (2005) who posits that the researcher must inform the participants about the purpose of the research.

The recordings of the responses from interviews were kept safe in order to prevent unauthorised access to the data. The researchers made sure that data which was collected from the participants through interviews was not accessible and to any other person. The data which was collected from the study field was also used to generate the results this study only. This was in tandem with Patten (2009) that academics have a duty not to disclose the data and material to other people especially for the purpose which it is not intended for.

The participants were told not to disclose their names on for anonymity purposes. According to Morrison et al (2011), anonymity of respondents is important in order to protect the identity of those who participate in a study. In this study, therefore the distinctiveness of the participants was kept secret by means of using pseudo names.

Before the researchers started to carry out the study, he sought the informed consent of the researcher participants in humanitarian to allow the data collection process to be carried out without problems. The participants of the study were also assured by the researcher that their responses will be used solely for academic purposes. This was in line with Henning, (2004) who opines that participant must be assured that the information they provide the researcher will be protected.

Results and discussion

Table 1 beneath shows the regression weights on the effects of supply chain resilience strategies on operations of humanitarian aid operations in the context of the Covid-19 period in Zimbabwe.

Table 1 Standardised regression weights: Two tailed test

Parameter			Estimate	Lower	Upper	P
Stock availability	<---	Supply Chain Resilience Strategies	.971	.799	1.007	.018
Delivery flexibility	<---	Supply Chain Resilience Strategies	.781	.609	.909	.005
Delivery time	<---	Supply Chain Resilience Strategies	.920	.828	.964	.030
Supply chain agility	<---	Supply Chain Resilience Strategies	.587	.296	.820	.020
Supply chain preparedness	<---	Supply Chain Resilience Strategies	.704	.432	.853	.015
Cross sector collaboration	<---	Supply Chain Resilience Strategies	.851	.647	.937	.013

Source: Fieldwork (2022)

The effect of disaster preparedness on delivery flexibility of humanitarian supply chains during the Covid-19 period

The findings on table 1 above show that supply chain preparedness has a positive and significant effect on delivery flexibility. The table shows that there is a positive standardised coefficient with a value of 0.781 which is statistically significant at $p < .05$ (0.005). The results support the first hypothesis: $\mathbf{H_1}$: Supply chain resilient strategies have a positive effect on delivery flexibility in humanitarian operations. Therefore, this means that supply chain preparedness is important for delivery flexibility in humanitarian supply chains during the Covid-19 lockdown period in. The results are in tandem with the findings in a study by Singh, Gupta and Gunasekaran (2017) that, supply chain preparedness has a positive and significant effect on operations of humanitarian supply chains. The results also agree with the findings from the interview with a key informant working in a procurement department at a charitable organisation in Harare. The informant responded that "It *is noble for supply chain professionals working in humanitarian aid organisations to be proactive during the Covid-19 lockdown period. Our organisations succumbed to several challenges to obtain supplies from supply markets during the Covid-19 lockdown period. Therefore, in future, procurement professionals must be proactive and implement supply chain resilient strategies in order to minimise the shortage of supplies that are needed for our operations during similar situations.* (Procurement Manager at Harare, 15 June 2022).

The effect of supply chain agility on stock availability in humanitarian supply chains during the Covid-19 period.

The results on table 1 above show that there is a positive standardised coefficient with a value of 0.971 which is statistically significant at $p < .05$ (0.018). The results support the second hypothesis: $\mathbf{H_2}$: Supply chain resilient strategies have a positive effect on material availability in humanitarian operations. Therefore, the results imply that supply chain agility has a positive and significant effect on stock availability in charitable organisations in Zimbabwe. The results agree with the findings in a study by Paul and Chowdhury (2020) that supply chain agility has a positive and significant effect on operations of charitable aid organisations during the Covid-19 lockdown period.

The above findings corroborate with the interview results from another key informant who indicated that, "*During the Covid-19 lockdown period most humanitarian aid organisations including the organisation I work for suffered stockouts because of trade restrictions which interrupted supply chains. I suggest that out procurement departments must put in place supply chain resilient strategies that enable our organisations to be agile enough so that we won't run out of stock*" (Procurement Officer at Harare, 11 June 2022).

The results also agree with the findings from the interview which was carried out with another key informant who works for a renowned humanitarian aid organisation in Harare. The informant said "*During the Covid-19 lockdown period, having a resilient supply chain has helped us not to run out of stock. The supply chain resilient strategies we are using are reliable and suitable for the Covid-19 lockdown period, we have not run out of stock.*" (Procurement Officer, 22 June 2022)

The effect of cross sector collaboration on delivery time in humanitarian supply chains during the Covid-19 period.

The results on table 1 show that cross sector collaboration has a positive and significant effect on response time in humanitarian organisations. This is shown by a positive standardised coefficient with a value of 0.920 which is statistically significant at $p < .05$ (0.030). The results support the third hypothesis: H_3: Supply chain resilient strategies have a positive effect on relief response time in humanitarian operations. The results mean that cross sector collaboration especially has helped to improve the response time of humanitarian organisations to their clients. The findings are in tandem with the findings in a study by Mokhlesi J., (2004) that cross sector collaboration contributes much to operational performance of humanitarian aid organisations.

The results concur with the findings from an interview which was carried out with another key informant at a humanitarian organisation in Harare. The informant responded as follows; "*Cross-sector collaboration where humanitarian organisations and the government of Zimbabwe work together assist humanitarian organisations to operate verry well during the Covid-19 period. For instance, as the government of Zimbabwe knows very well that humanitarian organisations support its agenda on socio-economic and health goals, the government of Zimbabwe must offer humanitarian organisations support through good policies during the Covid-19 lockdown period.*" (Procurement Manager at Harare, 16 June 2022).

Convergent validity of the measurement model

Convergent validity was assessed on the measurement model. Therefore, convergent validity and the average variance extracted were calculated and examined (Fornell and Larcker, 1981). Table 2 beneath expresses the considered average variance extracted.

Table 2 Average Variance Extracted (AVE)

Indicator Variables		Latent Variables	Standardised Loadings	Sum of the Squared Standardised Loadings	Number of Indicators	AVE
Agility	<---	Supply Chain Resilient Strategies	0.618			
Supply	<---	Supply Chain Resilient Strategies	0.671			
Sector	<---	Supply Chain Resilient Strategies	0.879	1.604806	3	0.53494
Delivery	<---	Humanitarian Aid Operations	0.799			
Stock	<---	Humanitarian Aid Operations	0.974			
Time	<---	Humanitarian Aid Operations	0.921	2.435318	3	0.81177

Source: Fieldwork (2022)

The discoveries in table 4.2 overhead displays the average variance extracted. The outcome shows that the rate on all pointers is more than 0.50. The outcomes specifically shows that the rates on all the foreshown variables have the rates of 0.534 and 0.811, respectively. This therefore means that the outcomes are reliable because they exhibit the evidence that there is convergent validity amongst the latent variables. The outcome is in tandem with Hair et al., (2010), who advocate that the average variance extracted rate which is more than 0.50 shows that there is convergent validity amongst latent variables.

Conclusion and recommendations

Based on the findings of the study, it can be concluded that supply chain preparedness certainly influences delivery flexibility in charitable organisations. This therefore means that disaster preparedness improves the level of delivery flexibility of humanitarian aid to the vulnerable people in the affected areas. It can also be concluded that supply chain agility is a supply chain resilience strategy that helps humanitarian organisations to ensure that there is stock availability in order to support their operations. This therefore means that when humanitarian organisations are agile enough, they won't run out of stock in a situation where there are severe supply chain disruptions because of the Covid-19 pandemic. Lastly, the researchers can conclude that cross sector collaboration is very important in making sure that charitable organisations respond swiftly to the needs of their clients. Cross-sectoral collaboration by means of the collaboration between the government and charitable organisations produces greater results where the government supports the operations of charitable organisations through the implementation of supportive policies. This is very helpful for charitable organisations to have all the requisite procurement requirements on time and to respond to the needs of societies swiftly.

The researchers made the following recommendations:

- Procurement and supply departments in humanitarian aid organisations should implement supply chain resilience strategies such as supply chain preparedness, supply chain agility and cross sector collaboration in order to ensure that their organisations are resilient to supply chain disruptions during the Covid-19 lockdown period.
- Procurement and supply departments in humanitarian aid organisations in must implement other supply chain resilient strategies which are not mentioned in this study and must put in place supply chains plans for unforeseeable and unavoidable occurrences such as the Covid-19 pandemic and other disasters that may emerge in the future.
- Humanitarian aid organisations must train their staff in order to equip them with appropriate skills on supply chain resilience in order to ensure that their operations are not interrupted due to supply chain disruptions precisely during disasters.

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