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## Article

# The effect of supply chain resilient strategies on operational performance of humanitarian organisations in Zimbabwe during the Coronavirus period

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## OPERATIONS, INFORMATION & TECHNOLOGY | RESEARCH ARTICLE

# The effect of supply chain resilient strategies on operational performance of humanitarian organisations in Zimbabwe during the Coronavirus period

Dumisani Mawonde<sup>1\*</sup>, Bindu Samuel<sup>2</sup>, Josphat Nyoni<sup>1</sup> and Allan C. Muzenda<sup>1</sup>

**Abstract:** The outbreak of the Coronavirus pandemic disrupted global supply chains, creating acute shortages of goods and services to support the operations of many organisations. In Zimbabwe, this situation affected the operations of humanitarian organisations since the pandemic disrupted the supplies of procurement requirements on time for the purposes of humanitarian aid. This study therefore examined the effects of supply chain resilience strategies on operational performance of humanitarian organisations in Zimbabwe during the Coronavirus period. A pragmatic research philosophy and a descriptive survey research design were employed. A sample of 28 supply chain management professionals was randomly selected from a targeted population of 30 in humanitarian organisations in Harare and only 25 responded, whereas interviews were conducted with five supply chain management professionals. Quantitative data was scrutinised by means of SPSS and AMOS programs (versions 22.0), while qualitative data from interviews was analysed using thematic scrutiny. Structural Equation Modelling (SEM) was used to determine the results, and the convergent validity of the measurement model was tested. The study findings show that supply chain resilience strategies had a significant positive effect on operational performance in humanitarian organisations during the Coronavirus period. The study concluded that in Zimbabwe, humanitarian organisations are familiar with supply chain resilience strategies and that supply chain resilient strategies that were analysed have a positive and significant effect on stock availability, delivery flexibility, and delivery time. The study recommends humanitarian organisations to be agile in supply chains, to embrace cross-sector collaborations, and to plan and prepare for unforeseeable supply chain disruptions as this improves their operational performance during the pandemics.

**Subjects:** Supply Chain Management; Supply Chain Management; Supply Chain Management

**Keywords:** supply chain resilience; Coronavirus; supply chain disruption; operational performance

## 1. Introduction

The outbreak of pandemics instigates social-economic challenges the world over (Ivanov, D., 2020). The unforeseen outbreak of pandemics triggers many problems that affect humanity and economic activities. For instance, there was an outbreak of influenza in the United States of America (USA) in 1918. The influenza was short-lived, but it decimated so many lives that it resulted in a ripple effect where there was a shortage of manpower in manufacturing industries. 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 of public-private partnerships in planning and cooperation, nonetheless, the USA was not prepared to fight the epidemic, which severely affected societies and the economy.

Recently, in the year 2019, cases of the new Coronavirus were initially discovered in Wuhan, Hubei, China, and it became widespread in the world in the year 2020 (Queiroz, M, M., et al., 2020). The outburst of the Coronavirus came with several challenges, mostly the disturbance of supply chains, mainly humanitarian supply chains (Wamba et al., 2020). Since many countries depended on supplies from foreign and overseas markets, the coming of Coronavirus exposed them to supply chain disruptions. Notably, during the peak of the Coronavirus, the disruption of global supply chains was attributed to the measures such as lockdown and movement restrictions, which were put in place to avert the continual spreading of the virus (Ahairwe & Tondel, 2020).

Since many countries in Africa rely on humanitarian aid support to attain their socio-economic goals, 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 spread of the Coronavirus, such as the closure of economies and trade restrictions, severely disrupted global supply chains, which affected humanitarian organisations. This precisely affected the operations of many humanitarian aid organisations that are operating in Africa as they could not have easy access to the supply of goods and services from foreign and overseas markets.

In West Africa, some countries were quick to take strong prevention and mitigation measures to halt the spread of the Coronavirus (Mbaye & Benjamin, 2020). However, the closure of borders and markets through curfews and limited internal movements had an immense impact on supply chains in the region and threatened livelihoods (Mbaye & Benjamin, 2020). According to the World Bank Report concerning the effect of COVID-19 on West African value chains, 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 borders, movement restrictions, and curfews have led to substantial supply chain disruptions, and this has created an immense challenge for humanitarian organisations, where it has become very difficult for them to import food, drugs, and other important materials (World Bank, 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 Coronavirus 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 as there was an unprecedented rise in food prices in some countries, and this also led to problems of conflict and political instability.

Southern Africa was not spared from the scourge of the Coronavirus as the pandemic affected the operation of economies in many countries in that region. Like in many countries across the globe, in an attempt to thwart the further spread of the Coronavirus, countries in Southern Africa implemented many measures, including movement restrictions. Zimbabwe adopted strong prevention and mitigation measures to curb the spread of the Coronavirus. Therefore, the measures that were implemented in Zimbabwe were similar to those that were implemented in West Africa, including the closure of borders and markets, the implementation of curfews, and limited internal movements. These measures had an immense impact on the economy as both local and

international trade were stopped, which led to both local and international supply chain disruptions. As well, in Southern Africa, Zimbabwe is one of the countries whose economy relies heavily on imports from foreign and global markets and support from humanitarian organisations (Mhlanga & Ndhlovu, 2020). So, the measures that were implemented by the Government of Zimbabwe to combat the spreading of the Coronavirus created huge shortages of food, medical drugs, and other paraphernalia, which led to a sharp increase in prices, hunger, and loss of livelihood. As humanitarian organisations are considered very essential in Zimbabwe's economy, the disruption of global supply chains due to the 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 that were put in place to prevent the further spread of Coronavirus (Zimbabwe Congress of Trade Unions, 2020). According to Mhlanga and Ndhlovu (2020), several humanitarian organisations suffered huge shortages of resources they habitually use to provide aid to communities in both urban and rural areas. These shortages were created due to the fact that the government closed-economic activities and implemented movement restrictions across the entire country. The main objective of the study was to examine the extent to which supply chain resilience strategies were able to support the operational performance of humanitarian organisations during the period of the Coronavirus pandemic. The main focus was to examine how various supply chain resilient strategies that were adopted by humanitarian organisations were able to support higher performance despite the various negative effects of the pandemic on supply chain activities. The output of the study was thus to identify the most effective supply chain resilient strategies in periods of pandemics in the context of developing countries. The adoption of such strategies therefore enables humanitarian organisations to obtain adequate supplies of procurement requirements to keep their operations running in periods of pandemics.

## **2. Literature review**

A systematic literature review was done to select the relevant scholarly work for this study. The main aim of the systematic review was to identify and evaluate all relevant literature on supply chain resilience strategies in terms of their capacity to support the performance of organisations in periods of crisis and pandemics (Saad, M. H., et al., 2021). Using various inclusion and exclusion criteria, a total of 30 relevant scholarly articles were reviewed to identify supply chain resilience strategies proposed by various authors and scholars. The main inclusion criteria were on the concept of supply chain resilient strategies and its applicability to support the supply chain performance of humanitarian organisations. In addition, the other inclusion criteria were the period of the scholarly work. Work that is less than 10 years old was included in the search criteria. An evaluation of the selected literature was done, and it emerged that various supply chain resilient strategies were available for organisations but their effectiveness varied with the context in which they are applied. It is also evident that some supply chain resilient strategies are only effective in certain conditions. This created a research gap in terms of examining the effectiveness of supply chain resilient strategies in the context of Zimbabwe during the Coronavirus period.

### **2.1. Supply chain resilience**

The operations of humanitarian aid organisations are very critical because many lives depend on them. Since there are many uncertainties that affect the business environment world over, organisations must be proactive in their decision-making in order to avoid interruptions in their operations. For instance, the unforeseen outbreak of the Coronavirus negatively seized the activities of upstream supply chain players including manufacturers and suppliers and this also negatively affected the operations of many organisations downstream of the supply chains. Therefore, supply chain departments in many organisations must be capable of preparing for unforeseen occurrences, attending to interruptions, then improving on or after them by upholding continuity of processes at the desired level of connectedness and control over structure and function (Folke, 2006; Tendall et al., 2015). Precisely, humanitarian aid organisations must always have supply chain resilient strategies in order to keep their operations uninterrupted in unforeseen supply chain

interruptions. The concept of supply chain resilience is so new in supply chain management that many organisations must embrace it Queiroz et al. (2020). In order for humanitarian aid organisations to be resilient in their supply chains, they are expected to use the following strategies:

### *2.1.1. Supply chain preparedness*

The operations of humanitarian organisations are oftentimes affected by supply chain disruptions during pandemics. During the Coronavirus pandemic, these disruptions caught humanitarian organisations unaware as most of them lacked proactive procurement plans in place as a disaster preparedness strategy. According to Issa (2018) it is important for humanitarian organisations to adopt procurement planning in disaster management. This is supported by Kumar et al. (2022) who posit that procurement planning and preparedness in humanitarian supply chain management is very important as it ensures a steady supply of goods and services to support the operations of humanitarian organisations. Therefore, in humanitarian organisations, procurement planning is deemed an important supply chain resilient strategy as it assists humanitarian organisations not to experience supply disruptions and delays as this disturbs their operations and affects the recipients of aid.

### *2.1.2. Supply chain agility*

Humanitarian aid organisations that are agile within supply chains effectively respond to the needs of their clients during pandemics. Most humanitarian organisations that have successfully carried out their operations during pandemics because of their swiftness in obtaining the necessary procurement requirements from suppliers. Such humanitarian organisations manage to deliver the aid to their clients promptly because of agile supply chain decisions they made. On the other hand, lack of agility in humanitarian aid organisations causes serious delays in the receipt of materials, goods, and services from suppliers which in turn causes many challenges to the operations of humanitarian organisations in Zimbabwe. The situation was worsened by the outbreak of Coronavirus and the implementation of the lockdown measures. However, this was an awakening call for many humanitarian organisations to identify and put in place strategies in order to make their supply chain departments agile. According to Holcomb and Ponomarov (2015), humanitarian organisations with agile supply chains successfully respond to the needs of their clients, i.e., they respond swiftly to unstable requests and short product life cycles. Therefore, this calls for humanitarian organisations to be able to predict the future and its changes before implementing agility strategies in their supply chains. .

### *2.1.3. Cross-sector collaboration*

Cross-sector collaboration (CSC) has been a key strategy that has been well thought out to improve the performances of humanitarian organisations during the Coronavirus pandemic (Biddell Caitlin et al., 2022; Kim et al., 2022). The collaboration between the Government of Zimbabwe and humanitarian organisations is premised on the common goals they share to support socio-economic development in the country (Regional Inter Sector Coordination Group., 2020). The government recognises the efforts of the charitable organisations on socio-economic goals through the provision of humanitarian aid to the vulnerable and less privileged groups in different societies in Zimbabwe. This, therefore, moved the government to relax stringent restrictions for humanitarian aid organisations to operate flexibly during the peak of the Coronavirus 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.

## **2.2. Metrics for the performance of humanitarian operations**

For this study, the researchers have followed the leads of Roh et al. (2022) and Negi (2022) who postulated that the major performance measures of humanitarian operations are reliability, responsiveness, cost, agility, and dialogue with authorities. The operations of humanitarian organisations are worth getting more attention and support from key stakeholders because they provide relief for human woes during disasters.

### 2.2.1. Delivery flexibility

The operations of humanitarian organisations must be flexible enough in responding to a disaster (Abidi et al., 2020; Roh et al., 2022). This means that humanitarian operations must be flexible to have the minimum response time and the arrival of suppliers to the disaster site. Therefore, humanitarian aid is also the coming period of the organisation’s initial provisions to the catastrophe location. Organisations must manage well the gone time among the beginning of the calamity

### 2.2.2. Stock availability

The operations of humanitarian organisations are supported by sufficient levels of stock of materials, goods, and other essential products. This means humanitarian organisations always keep enough stock to support their operations in providing aid to the vulnerable people.. Humanitarian organisations are always working to ensure that they are safe from supply inconsistency and the supply chain disruptions by holding enough stock in their storage facilities such as warehouses. This has prompted humanitarian organisations to be agile enough to ensure that their operations are not being negatively affected by the shortage of stock of critical materials and goods.

### 2.2.3. Response time

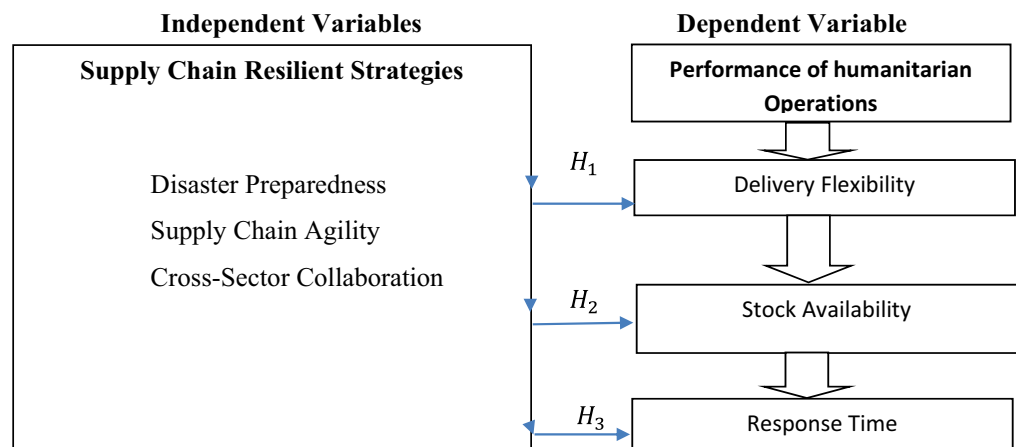
In humanitarian supply chains, response time is an important aspect of operations performance. In humanitarian organisations, response time is a key operations performance measurement metric. It is important to know that for organisations that have the responsibility of providing relief services to the 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 relieve organisation calculation, purchasing and distribution approaches, vendor site, means of carriage, analysis situs, protection, set-up, and policymaking.

## 2.3. Conceptual framework

The major dependent and independent variables with regard to supply chain resilient strategies postulated in theory and their relationship are depicted in Figure 1. More specifically, the study is based on a conceptual framework that 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, while 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:

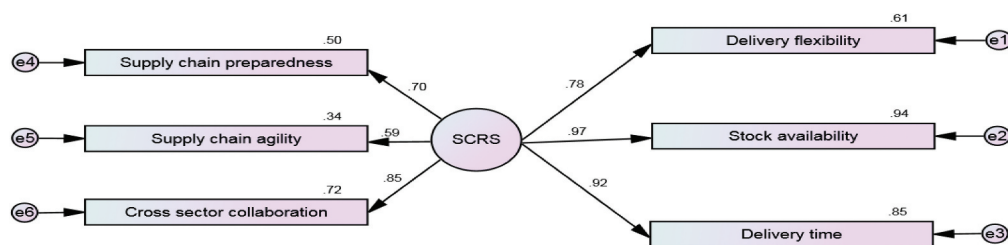
**Figure 1. Conceptual Framework.**

Source: Authors (2022).





**Figure 2. Structural equation Model.**



## 2.4. Hypotheses

The following are the hypotheses of the study:

**H1:** Supply chain resilient strategies have a positive effect on delivery flexibility in humanitarian operations.

**H2:** Supply chain resilient strategies have a positive effect on stock availability in humanitarian operations.

**H3:** Supply chain resilient strategies have a positive effect on relief response time in humanitarian operations.

## 3. Research methodology

This study followed a pragmatic philosophy. The pragmatic philosophy was used 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 catastrophic 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 was not 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 organisations 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 subgroups which are food, safety and farming, water, cleanliness and sanitariness, healthiness, nutrition, and safety. Also, convenient sampling was used to select the cases that are easiest to get information for the sample (Saunders et al., 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 with closed-ended questions were distributed in procurement and supply departments of humanitarian organisations. Questionnaires were used because they are cost-effective, free from interviewer bias, allow the use of a large sample, and provide 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. Similarly, open-ended questions were utilised for the interviewees to elucidate their responses.

### **3.1. Model and estimation procedure**

It was very essential for the researchers to use an advanced data analytics 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 among 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 maximum likelihood estimation. Below, on figure 2, is an illustration of the proposed model (Structural Equation Model with Standardised Regression Weights).

### **3.2. 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 be 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 were collected from the participants through interviews were not accessible to any other person. The data which were collected from the study field were also used to generate the results of this study only. This was in tandem with Patten 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 for anonymity purposes. According to Morrison et al., 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 work 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 who opines that participants must be assured that the information they provide the researcher will be protected.

## **4. Data presentation, interpretation, and discussion**

Below are the presentation, interpretation, and discussion of the findings of the study.

### **4.1. Results of proposed structural equation model**

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

#### **4.1.1. The effect of disaster preparedness on delivery flexibility of humanitarian supply chains during the Coronavirus period**

The findings in Table 1 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:

**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).

$H_1$  :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 Coronavirus lockdown period in. The results are in tandem with the findings in a study by Singh et al. (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 an 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 Coronavirus lockdown period. Our organisations succumbed to several challenges to obtain supplies from supply markets during the Coronavirus 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).

#### 4.1.2. The effect of supply chain agility on stock availability in humanitarian supply chains during the Coronavirus period

The results in Table 1 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:  $H_2$  :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 that supply chain agility has a positive and significant effect on operations of charitable aid organisations during the Coronavirus lockdown period.

The above findings corroborate with the interview results from another key informant who indicated that, “During the Coronavirus lockdown period most humanitarian aid organisations including the organisation I work for suffered stock outs because of trade restrictions which interrupted supply chains. I suggest that our 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 Coronavirus 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 Coronavirus lockdown period, we have not run out of stock.” (Procurement Officer, 22 June 2022)

#### **4.1.3. The effect of cross-sector collaboration on delivery time in humanitarian supply chains during the Coronavirus period**

The results in 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 in particular 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 Mokhelesi J. that cross-sector collaboration contributes much to the 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 very well during the Coronavirus 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 Coronavirus lockdown period.” (Procurement Manager at Harare, 16 June 2022).

#### **4.2. 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. Table 2 beneath expresses the considered average variance extracted.

The discoveries in Table 2 overhead display the average variance extracted. The outcome shows that the rate on all pointers is more than 0.50. The outcome specifically shows that the rates on all the foreshown variables have the rates of 0.534 and 0.811 correspondingly. This therefore means that the outcomes are reliable because they exhibit the evidence that there is convergent validity among the latent variables. The outcome is in tandem with Hair et al., (2010) advocate that the average variance extracted rate which is more than 0.50 shows that there is convergent validity among latent variables.

### **5. Summary of research findings**

This study was conducted with the aim of analysing the effects of supply chain resilience strategies on operational performance of humanitarian organisations during the Coronavirus period in Zimbabwe. The study used a pragmatic research philosophy and a structural equation model. The researchers found that supply chain resilience strategies have a positive and significant effect on stock availability, delivery flexibility, and delivery time. Therefore, the findings indicate that the supply chain resilience strategies that were used in this study have a positive and significant effect on operations of humanitarian organisations during the Coronavirus period.

#### **5.1. Conclusions, limitations, and future recommendations**

Below are the conclusions and limitations of this study and future recommendations.

##### **5.1.1. Conclusions**

In conclusion, based on the findings of this study, supply chain preparedness certainly influences delivery flexibility in humanitarian organisations. It can also be concluded that disaster preparedness improves the level of delivery flexibility of the aid to the vulnerable people in affected areas. Furthermore,

**Table 2. Average variance extracted (AVE)**

Indicator Variables		Latent Variables	Standardised Loadings	Sum of the Squared Standardised Loadings	Number of Indicators	AVE
Supply chain agility	<-	Supply Chain Resilient Strategies	0.618			
Supply chain preparedness	<-	Supply Chain Resilient Strategies	0.671			
Cross-sector collaboration	<-	Supply Chain Resilient Strategies	0.879	1.604806	3	0.53494
Delivery flexibility	<-	Humanitarian Aid Operations	0.799			
Stock availability	<-	Humanitarian Aid Operations	0.974			
Delivery time	<-	Humanitarian Aid Operations	0.921	2.435318	3	0.81177

Source: Fieldwork (2022).

humanitarian organisations that are agile within supply chains always have enough stock to respond to the needs of the vulnerable people during disasters. This therefore means that humanitarian organisations that are agile within supply chains do not run out of stock to support their operations during disasters. Lastly, it can be concluded that cross-sector collaboration is very important in making sure that humanitarian organisations respond swiftly to the needs of the vulnerable people during disasters. In this paper, cross-sector collaboration by means of the collaboration between the government and humanitarian organisations produces greater results as the government supports the operations of humanitarian organisations through implementing supportive policies. Government support for humanitarian organisations is very important as it enables them to carry out their operations without challenges and respond to the needs of vulnerable communities.

### 5.1.2. Limitations

Despite the fact that the use of the inclusion and exclusion criteria to select current and relevant literature was very important in this study, to some extent, the inclusion and exclusion literature selection criteria was a limitation to this study. The inclusion and exclusion criteria restricted the researchers to focus on limited scholarly work on the area of supply chain resilience and operational performances of humanitarian organisations during Coronavirus. Scholarly work that is less than 10 years old on the area of supply chain resilience and operational performances of humanitarian organisations during Coronavirus was very limited. However, future researchers on the same area of supply chain resilience and operational performances of humanitarian organisations during pandemics must use scholarly work that is more than 10 years old and other literature selection criteria to avoid being limited on the literature to use.

### 5.1.3. Future recommendations

Humanitarian organisations are encouraged to consider planning and preparing ahead of possible supply chain disruptions that are caused by pandemics. Strategies such as supply chain preparedness, supply chain agility, and cross-sector collaboration must be embraced in order to be resilient to supply chain disruptions during pandemics, particularly the Coronavirus pandemic. Moreso, humanitarian organisations must study, select, and implement other helpful supply chain resilient strategies which were not mentioned in this study in order to avoid their operations from being affected by supply chain disruptions during the Coronavirus pandemic and other pandemics that may emerge in the future. Lastly, it is recommended that humanitarian organisations must train their supply chain management staff and impart them with appropriate knowledge in the area of supply chain resilience in order to ensure that they assist the operations in their organisations not to be affected by supply chain disruptions precisely during the Coronavirus pandemic and in future pandemics.

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