

Supply Chain Resilience Strategies Adopted in a Developing Country Following Recent Global Disruptions: An Ethiopian Case

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ABSTRACT

The global supply chain is experiencing numerous disruptions due to natural and man-made causes. The paper aims to explore the supply chain resilience strategies adopted or to be adopted by importers and exporters in Ethiopia following the COVID-19 pandemic, the Ukraine-Russia war, the regional crisis in the Middle East and attacks on vessels around the Red Sea area. The research employed a qualitative approach to deeply understand the subject matter. The study population comprised significant importers and exporters of products such as wheat, edible oil, iron and coffee. Data was collected from 13 importers and 12 importers and exporters using structured and semi-structured interviews. The collected data were analysed thematically and presented using percentages and graphs. The study identified the proactive (knowing the current state of the firm's supply chain, communicating with members of the supply chain, maintaining safety stocks and recognising the importance of risk assessment) and reactive (relying on insurance to secure supply chains and turning towards more robust suppliers) strategies adopted or to be adopted by both exporters and importers. The study recommends the need for competent supply chain managers, questioning the usual practices used in the past, paying due attention to communicating with actors in the chain and fostering flexibility.

Keywords: Disruptions, Resilience, Strategies, COVID-19 Pandemic, Ethiopia

Introduction and Problem Statement

As a developing country, Ethiopia, with over 120 million people, depends on global connectedness to meet the needs of its citizens. Less developed countries rely more on imported products to satisfy their needs, as clearly observed in their trade balances. They also depend on exporting their commodities as a major source of foreign currencies to finance their imports. Such imports and exports employ global supply chains where the complexities and disruptions are higher than ever before. Global supply chains are constantly challenged by risks, uncertainties, unanticipated changes in demand, long lead times and market vulnerability caused by accidents or equipment failures, delays and obstacles in production, natural hazards and pandemics (Lopes et al., 2022; Sodhi & Tang, 2021). The disruptions are constantly evolving and may emanate both from within and outside of the company (Ouabouch, 2015) and may occur at operational or strategic levels (Lopes et al., 2022).

Supply chain resilience is an emerging subject but remains ambiguous as scholars have yet to reach full consensus on its definition. Different scholars have suggested various strategies, though the process of implementing resilience in supply chains remains unexplored.

Increased interconnectedness and greater dependence make the global supply chain more vulnerable. It is undeniable that the COVID-19 pandemic has severely disrupted global supply chains both from the supply and demand sides, which is often described as a supply chain risk (Burt et al., 2021). Lockdown policies, labour shortages, lack of access to inputs, transportation difficulties and contraction in demand due to a decline in income due to the COVID-19 pandemic or its extended duration forced production to get low or shut down, revealing the global economic shock brought by the pandemic.

Then, the Ukraine-Russia war and the consequent economic sanctions on Russia, the regional crisis in the

Middle East and attacks on vessels around the Red Sea all caused increased trouble for the global supply chain in critical sectors, including agriculture, automotive, energy and food, as some countries are highly dependent on supplies from the two countries. The growing use of sanctions impacts supply (Sodhi & Tang, 2021).

Currently, staple foods such as wheat are becoming increasingly expensive and scarce as trade routes are severely disrupted due to the war between Ukraine and Russia. Many countries in the East African region usually import 60–80 per-cent of wheat from Ukraine. With these routes disrupted, the price of bread and other staple foods is rising rapidly, affecting millions of the poorest families most of all (<https://africanewswire.za.com/war-in-ukraine-exacerbating-food-crisis-in-the-horn-of-africa>), accessed on 28th, April, 2024).

Supply chain resilience is defined as “the adaptive capability of a supply chain to prepare for and/or respond to disruptions, to make a timely and cost-effective recovery and therefore progress to a pre-disruption state of operations— ideally, a better state than prior to the disruption” (Tukamuhabwa et al., 2015). According to the National Research Council (2012), supply chain resilience measures the ability to prepare for and provide essential functions during a disruption, and then to recover from and adapt post-disruption into a form better suited to the new present. Supply chain resilience is unique from other supply chain management practices by emphasising recovery from disruptions (Golan et al., 2020).

Managers must implement strategies that enable supply chains to cope with unanticipated disruptions heavily impacting supply chains in order to remain more resilient. Only a limited number of empirical studies have been conducted so far in the process of selecting and implementing strategies appropriate for improving supply chain resilience. Much of such studies are conceptual and theoretical, and; the few empirical studies available are mainly cross-sectional and focused on the context of developed countries.

Previous studies tried to measure supply chain resilience using single indicators such as recovery time (Ivanov et al., 2016; Simchi-Levi et al., 2015; Fattahi et al., 2020), performance loss (Ojha et al., 2018; Torabi et al., 2015; Schmitt & Singh, 2012) and risk control (Fiksel, 2015), which often fails to provide a comprehensive and accurate

picture of resilient supply chains (Yan et al., 2023). Belhadi et al. (2021) use a combination of two indicators: time-to-recover and financial performance-to measure the resilience of a supply chain. A comprehensive supply chain resilience evaluation framework encompassing five dimensions was proposed by Fu et al. (2022).

Another stream of research focused on enhancing supply capacity strategies (Yan et al., 2023). Rehman et al. (2022) identified critical resilience strategies such as the use of multiple-sourcing, fostering risk awareness, implementing industry 4.0, enhancing supplier agility and global diversification in the healthcare supply chain context with a general perspective. The growing importance of building resilient supply chains, specifically in the context of the COVID-19 pandemic, the continued Ukraine-Russia war, the regional crisis in the Middle East and attacks on cargo vessels in the Red Sea area, calls for drawing lessons from importers and exporters who can witness from their experience. To the researcher’s knowledge, studies investigating strategies adopted or to be adopted by importers and exporters from developing countries in general, including Ethiopia, are missing.

Research Questions

To fill the identified gap and draw lessons from the practice of Ethiopian exporters and importers, this study tried to address:

- What strategies were adopted by importers and exporters from Ethiopia following the pandemic, the war, the regional crisis in the Middle East and instability around the Red Sea area to ensure resilience?
- What strategies do importers and exporters from Ethiopia think are worthy of adopting in the future following these disruptions to ensure their resilience?

Research Objectives

The study specifically tried to achieve the following objectives:

- To identify the strategies adopted so far by importers and exporters from Ethiopia following the pandemic, the war, the regional crisis in the Middle East and instability around the Red Sea area.
- To identify the strategies to be adopted by importers and exporters from Ethiopia following such disruptions

Significance of the Study

COVID-19, the Ukraine-Russia war, the continued regional crisis in the Middle East and instability in the Red Sea area have brought severe damage to the global economy and Ethiopia was no exception, both in claiming human life and economic shock. Companies were struggling to ensure their continuity. The study findings will benefit those who have global transactions or intend to have such transactions by using the identified strategies. Furthermore, other researchers may use the findings for more in-depth quantitative analysis.

Literature Review

Global supply chains may be disrupted by various factors, including unexpected increases in labour costs related to outsourcing, trade disputes, port congestions, natural disasters, geopolitical tensions and pandemics (Sodhi & Tang, 2021). Possibly tied to climate change, the impact of natural disasters is growing exponentially (Sodhi & Tang, 2021). They argue for exercising extreme supply chain management in contrast to traditional supply chain risk management.

National Research Council (2012) defines resilience as “the ability to prepare and plan for, absorb, recover from, and more successfully adapt to adverse events. This definition and the works of other scholars (Burt et al., 2021; & Golan et al., 2020) identify four stages of a SC’s resilience. A brief description of these stages is given next based on Burt et al.’s (2021) work.

Plan: At this stage, companies anticipate potential disruptions and then set up action plans for these disruptions. *Absorb:* The supply chain perceives the negative consequences of the disruptions to its maximum capacity immediately following the disruption. *Recover:* The recover stage is where the objective to return to the new normal conditions after a disruption is sought. For instance, the supply chain is expected to recover as quickly as possible by employing mitigation strategies. *Adapt:* The adapt stage is the stage at which the supply chain can learn from the disruption it has experienced and intends to grow to become stronger after the disruption has gone.

Strategies suggested by various scholars include employing redundancy and flexibility (Sodhi et al., 2023),

creating and maintaining flexible culture, re-engineering the supply chain, developing strong relationships and fostering collaboration (Rice & Caniato, 2003). Redundancy can be achieved by maintaining excess capacity in anticipation of future demand. The most basic form of redundancy is through safety stock. Maintaining a dedicated transportation fleet that may sometimes be under-utilized is among the redundancy strategies (Rice & Caniato, 2003). Multi-sourcing of three to four suppliers in different geographical locations is another redundancy strategy (Sodhi et al., 2023). Rice and Caniato (2003) indicated that flexibility helps in creating new capabilities by restructuring existing capabilities within a supply chain to achieve resiliency in a more efficient way. This strategy requires flexible relationships with suppliers/carriers. Flexibility can be achieved by using advanced technologies that enable a flexible manufacturing process to reduce shortages (Sodhi et al., 2023), which is less practical for developing countries.

Just-in-time systems and inflexible manufacturing systems caused shortages of some products during the pandemic (Sodhi et al., 2023). Traditional supply chain resilience principles, such as using excess inventory and capacity, increasing system flexibility and utilising diversified suppliers (Chopra & Sodhi, 2004; Sodhi et al., 2023), were applied to mitigate the risk caused by shortages of such products, specifically in the health sector (Sodhi et al., 2023).

Sheffi and Rice (2005) have mentioned the possibility for incorporating flexibility into contracts through provisions for last-minute contractual changes and new delivery alternatives. They added the use of multiple distribution centres to increase flexibility.

Although vaguer than flexibility, re-engineering the supply chain involves identifying weak points along the critical paths for understanding risks emanating from a particular supplier, setting strategies that have multiple outcomes and re-evaluating the dilemma between efficiency and redundancy (Christopher & Peck, 2004).

An organisation with a culture that values and tends to encourage resiliency within the supply chain is supposed to be more resilient than one that does not (Sheffi & Rice, 2005). Questioning dominant wisdom and predictable business practices are features of a resilient or flexible culture and such culture engages and encourages

employees to participate in efforts that are resilient (Sheffi & Rice, 2005).

Collaboration with other supply chain members improves understanding of the current state and allows knowledge sharing that reduces the uncertainty within the supply chain (Christopher & Peck 2004). Collaboration is essential because resiliency is best achieved at the network, not enterprise, level. Christopher and Peck (2004) revealed that collaboration is useful at both operational and strategic levels, and it could be described simply as interactive communication among actors of a supply chain. An organisation can react to, avoid, or mitigate disruptions by accessing accurate information about an impending or current disruption (Christopher & Peck, 2004).

Forming strong relationships with supply chain partners helps to achieve resilience as it allows information-sharing. Long-term relationships may help ensure continued service in the event of unexpected disruption (Rice & Caniato, 2003). Reliable partners are more likely to help one another due to their strong connection or a need to solidify future business deals with partners.

Having more distribution centres within a distribution network provides opportunities to channel products to the right place to cope with disruptions within the distribution network (Pickett, 2003). Decentralisation of the supply chain operation helps to lower risks arising from having all capabilities fixed along a few links or nodes of the supply chain (Pickett, 2003). Having contingency plans that are ready to implement should they be needed enhances resilience. Another strategy suggested by scholars is building adequate capacity and using spot markets for required transportation services, where such services are purchased and utilised immediately, even though firms end up paying a premium price for such services (Rice & Caniato, 2003). Sodhi and Tang (2021) suggest agility, adaptability and alignment as the three capabilities to improve the triple bottom line (profit, people and planet) if understood more broadly based on the works of Lee (2004).

This study adopts the four main strategies for supply chain resilience (readiness, responsiveness, recovery and adaptability) (Ponomarov & Holcomb, 2009; Stone & Rahimifard, 2018; Dennehy et al., 2021) to form the basis for grouping the core capabilities required in a resilient system.

Material and Methods

Description of the Study Area

Addis Ababa is Ethiopia's capital city and the African Union seat and several countries' embassies. Addis Ababa, Ethiopia's sprawling capital in the highlands bordering the Great Rift Valley is the country's commercial and cultural hub. The city is almost the nation's centre in the foothills of Mount Entoto about 2,500m (8,200ft) above sea level. Addis Ababa is the hub of the nation's transportation network from where most business organisations operate.

Research Design, Approach and Population

The study adopted a qualitative approach to understand better the strategies adopted so far and draw lessons from such experiences. The focus of the study is not on elaborating what is already known; rather, it tries to engage in progressive extensions of existing knowledge as a way of discovering new knowledge (Gioia et al., 2013). The paper reports the informants' actual experiences without imposing prior theories.

A descriptive research design was used that was in line with the study objectives. Importers and exporters were among the study population. Twenty-five organisations were purposively targeted, assuming data saturation would be reached.

Data Source and Collection Method

A structured and semi-structured interview was used as a primary data collection method. Supply chain managers or related office bearers of thirteen importing and twelve exporting organisations participated in the interview. The numbers were deliberately made 13 and 12 to match the country's volume of trade transactions. Given the resources and time allotted for the study, contacts of 25 such importing and exporting organisations were secured to get access to the supply chain managers or related managers working for the selected organisations.

The purpose of the study was clarified to each of them, and then, they were asked if they were willing to participate in the study. All of the contacted companies were willing to participate and channelled the researcher to the right persons in their respective organizations. The researcher

approached supply chain managers or people working in related areas to the study topic. After briefing them about the purpose of the study, the researcher set a formal schedule for a face-to-face interview at their convenience. Three interviewers were carefully recruited, trained and assigned for the data collection. Some useful secondary data sources were employed.

Twenty-five interviews were conducted, with each lasting 45 minutes to an hour. The interview items were prepared based on the study objectives by consulting existing literature. The researcher ensured that the companies interviewed maintained their privacy as promised at the start of the interview.

Data Analysis

Two other individuals were hired to transcribe the interview data independently. The researcher compared for any variations among the transcribed data produced by the two against the interview data and editing was carried out where necessary by consulting the interviewers and the one who did the transcription. The interview data were analysed thematically. Narratives, percentages, figures and tables were used to present the results.

The table below provides summarised information about the study companies.

Table 1: Profile of the Study Organisations and Respondents

Company Type	Position	Experience	Imports	Exports
Importer	Director	> 15 years	Wheat	
Importer & Exporter	Supply Chain Manager	17 years	Raw & Packaging Material, spare parts, farm project expansion (capital expenditures), live plants.	Wine
Importer & Exporter	Production Supervisor	6 years	Dry raisins, sugar, packaging materials and food additives	Bottled wine
Importer & Exporter	Assistant Manager	5 years	New and used cars, tires, chemicals, steel	Pulses, Oil seeds & Spices (White Pea Beans, Red Kidney Beans, Sesame Seeds and others), Coffee
Importer & Exporter	Import & Export Manager	>8 years	Raw materials, packing materials & spare parts	Finished goods (Beer)
Importer	Procurement head	8 years	Chemicals	
Importer	Team leader	8 years	Pharmaceuticals	
Importer	Procurement Officer	6 years	Pharmaceuticals, medical devices & supplies	
Importer & Exporter	Director of Operations	15 years	Spare Parts & Ingredients	Oil seed and Pulses
Importer & Exporter	Finished goods warehouse manager	5 years	Spare Parts, raw materials and packing components	Beer
Importer & Exporter	Senior Foreign Procurement Officer	5 years	Different raw materials and machinery spare parts for manufacturing	Coffee
Importer	Product specialist and sales manager	2 years	Auto spare parts, cleaning machinery and other industrial machines	
Importer & Exporter	Senior Expert	12 years	Solid and liquid soil fertilizers, tractor combiner, furrower and Other Agricultural Equipment	Natural Gum, incense and Myrrh
Importer	Senior Import Officer	2 ½ years	Light and Heavy Construction Materials	
Importer	Import category Manager (oil)	15 years	Crude sunflower and Crude soybean oil, vitamin (A+D3), bleaching Earth and filter Aid, Machinery and spare parts	

Company Type	Position	Experience	Imports	Exports
Importer	Raw material categories manager	2 tears	Chemicals (Soap noodles, SLES, Labsa, Perfumes & chemicals related to soap production) and packaging materials (Wrappers and Lebeles)	
Importer	Admin & finance head	2 years	Veterinary Drugs, Milk processing accessories, machines	
Importer	Graduate Trainee	2years	Raw Materials (Food and Beverage Related)	
Importer	Transport Coordinator	2years	Raw materials, Chemicals, Other	
Importer	Logistics, TPM manager	5+ years	Packaging Materials, Raw materials and Axillar Materials	
Importer	Planner	10years	Raw and packaging materials	
Importer & exporter	Finance & Admin Director	3years	Vehicles, chemicals and Construction materials	Coffee & Sesame
Importer & exporter	Finance Manager	10years	Factory Raw Materials	Green Bean Coffee
Importer & exporter	Import & export manager	4years	Vehicles & spare parts, packaging materials, & stationery materials	Coffee, pulses and oil seeds
Importer & exporter	Import/Export Manager	7+ years	Raw materials for glove production	Finished leather gloves

Thirteen of the 25 interviewees were importers and 12 of them were both importers and exporters. Interviewees' positions include supply chain manager, production supervisor, assistant manager, import & export manager, procurement head, team leader, procurement officer, director of operations, finished goods warehouse manager, senior foreign procurement officer, product specialist and

sales manager, senior expert, senior import officer, import category manager (oil), raw material categories manager, planner, transport coordinator, logistics manager and admin & finance director/head, with experiences ranging from 2–17 years. Thus, the required data was obtained from those individuals who have exposure to the area and possess relevant information.

Findings and Analysis

Table 2: To What Extent did the Pandemic, the Ukraine-Russia War, the Regional Crisis in the Middle East and Instability in the Red Sea Area Affect Your Company's Operations?

Company	Response	Company	Response
A	Unable to reach beneficiaries on time	M	Both exports and imports have been greatly affected.
B	Highly affected	N	Highly affected
C	Yes, it has affected our business	O	100% affected
D	Affected to the extent of suspending work	P	Badly affected
E	High level	Q	<i>Our organization was compassionate for global issues, so that shortage of the right raw materials was a crucial thing</i>
F	Heavily affected	R	Highly affected
G	Highly affected	S	Moderately affected
H	Doesn't affect that much	T	Highly & moderately affected (pandemic & the war)
I	The impact is huge in every sector as we are engaged in different sectors	U	Highly affected (pandemic)
J	It has affected some raw materials distribution	V	Seriously affected
K	Significantly affected	W	Moderately affected
L	It affected our business heavily	X	Moderately affected
		Y	Not that much affected

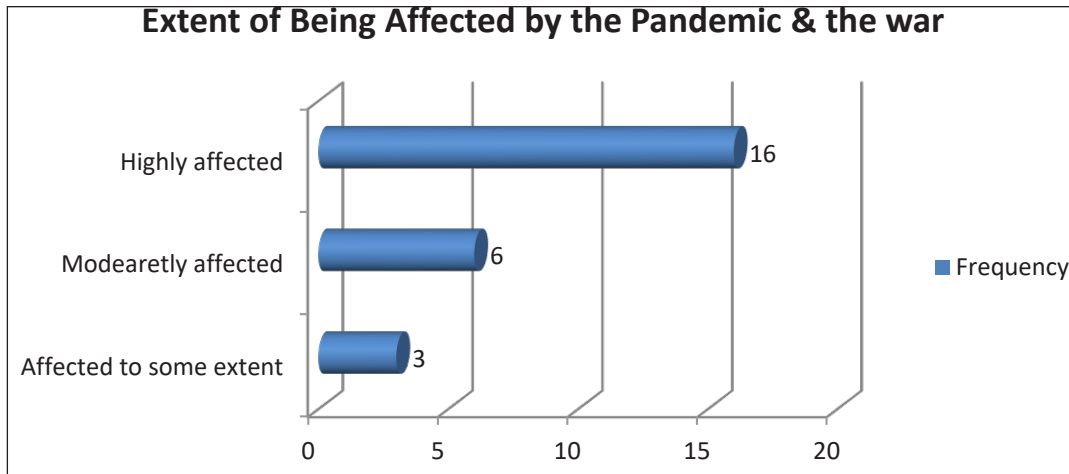
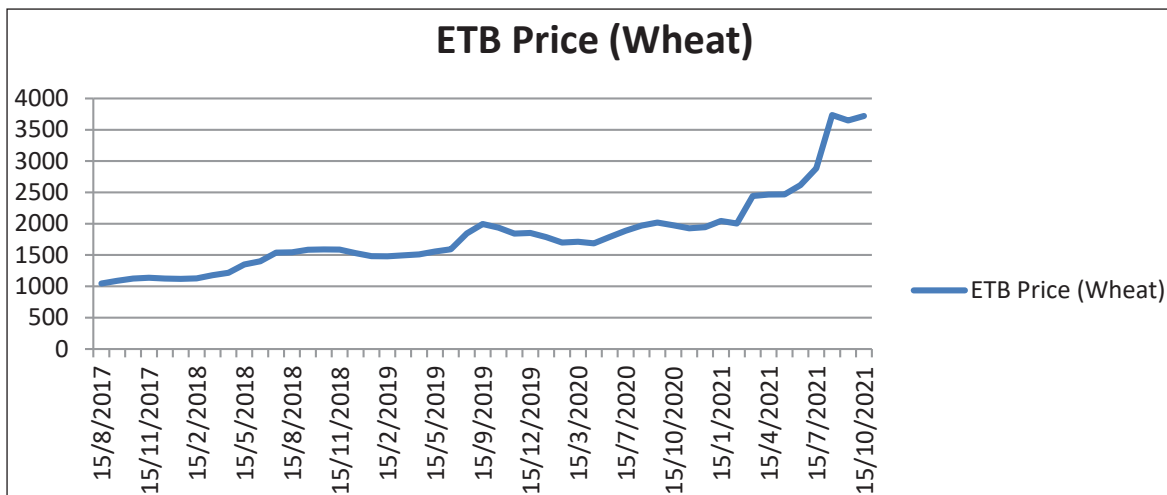


Fig. 1: Summary on the Extent of Being Affected by the Disruptions

Among the interviewees, 16 out of 25 (64%) indicated their company was highly affected by the COVID-19 pandemic, the Russia-Ukraine war, the regional crisis in the Middle East and attacks in the Red Sea area. The effect can be in terms of foreign currency shortages due to travel bans and tourists not coming in; inability to import raw

materials or packaging materials; inability to get access to containers and price increases for global shipping; being obliged to revise production schedules or suspending work, unable to sell and distribute products; contract cancellation by buyers; new formats of documents required; delay and fluctuation in raw material price.



Source: wfp-food-prices-for-Ethiopia

Fig. 2: Trend in Wheat Prices Before and During COVID-19

The above data depicts a significant rise in the price of commodities such as wheat (from Ethiopia's context) starting from March 2020 as countries started banning travel following the spread of COVID-19.

The interviewee from company B replied that the travel industry was the first that was seriously affected following the pandemic, highlighting the fact that their company relies on the foreign currency generated from the travel

industry (e.g., airlines, tourists and exports). Secondly, the increased lead time to get containers and the price increase in the global shipping industry affected the prices of products.

An interviewee from company K noted,

...the COVID-19 pandemic has affected our company's operations significantly. The first problem we faced

with the emergence of the pandemic was the shortage of containers/vessels to transport the necessary raw materials from the port of loading to the port of destination. During the pandemic ... Shipping Lines were not providing sufficient containers/vessels when compared to the pre-pandemic era. For example, vessels carrying different containers arrived at the port of destination. Before they unload the containers, the country's government issued a lockdown to prevent the expansion of the disease.

This affected our operations heavily, because we were relying on those raw materials to continue production and present the final goods to the customers. It affected our production schedule heavily. The other problem faced was regarding documentation, due to COVID-19 some countries had started chamberizing the certificate of origin (COO) online. Due to this fact, when the shipping documents arrived at the bank, banks were not willing to release the shipping documents. The banks claimed that such type of certificate of origin is not acceptable, and they insisted that the supplier should chamberize the COO as they used to do it before. We wasted a lot of time trying to convince the banks that it was not our supplier's interest, rather the government of their country

that enacted such regulation. This also affected our company's operation. We can say the same for export, the major obstacle our company faced for exporting coffee abroad is the unavailability of containers. ... Due to this fact, some of our buyers cancelled contracts, because we could not deliver them within the promised time frame caused by logistical delays.

This respondent further adds,

The Ukraine-Russia war affected our company in one way: the fluctuation of the price of raw materials. At times, our suppliers in Europe were not willing to give us the appropriate offer because, as we all remember, the price of raw materials was changing dynamically.

In addition, interviewee O replied that their company's operations were 100% affected because of the Ukraine-Russian war, as almost all their crude sunflower and crude soybean oil were imported from Ukraine.

Furthermore, interviewee P also saw how the pandemic affected their company's operation badly. Most countries were in lockdown conditions, and getting materials within the expected lead time was not easy. Most shipping companies were closed, and they were forced to pay double for freight ... and almost stock out for their basic materials. Besides, some products were out of market.

Table 3: Do You Think Your Company Managed the Disruptions Adequately?

Company	Response	Company	Response
A	No	M	Somewhat yes
B	Yes	N	Yes
C	Yes	O	Not yet fully managed
D	No	P	Partially, yes
E	Yes	Q	I don't think
F	Yes	R	Partially, yes
G	Yes	S	Yes
H	Partially, yes	T	Partially, yes
I	Yes	U	Yes
J	Somehow, yes	V	No
K	For import, yes for export no	W	Yes
L	Yes	X	No
		Y	Yes

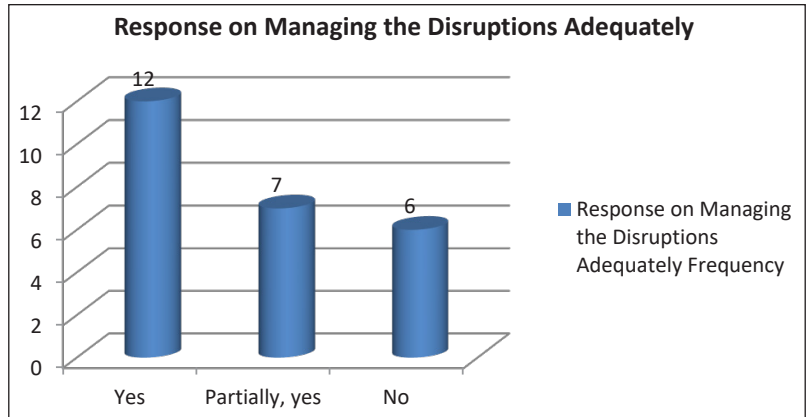


Fig. 3: Summary of the Way Disruptions Were Managed

The interview response summarised in the above figure shows that twelve of the interviewees (48%) believed that their companies managed the disruptions adequately,

seven replied partially yes and six replied not adequately managed. One interviewee saw the company adequately managed the disruptions for imports but not for exports.

Table 4: Management’s Commitment to Supply Chain Risk Following COVID-19

Company	Response	Company	Response
A	More committed	M	Somewhat committed
B	More committed	N	More committed
C	More committed	O	More committed
D	More committed	P	Somewhat committed
E	Somewhat committed	Q	Somewhat committed
F	Somewhat committed	R	More committed
G	Somewhat committed	S	More committed
H	Somewhat committed	T	Somewhat committed
I	More committed	U	More committed
J	More committed	V	Somewhat committed
K	Somewhat committed	W	Somewhat committed
L	More committed	X	Somewhat committed
		Y	Somewhat committed

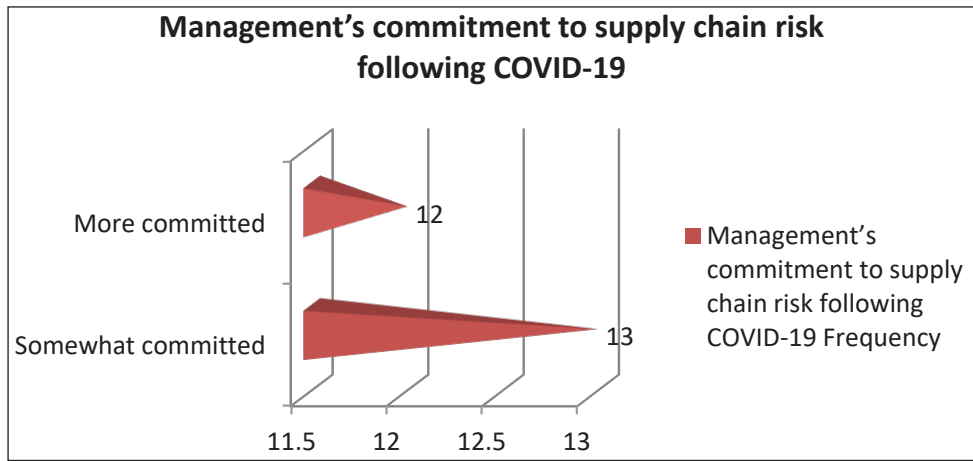
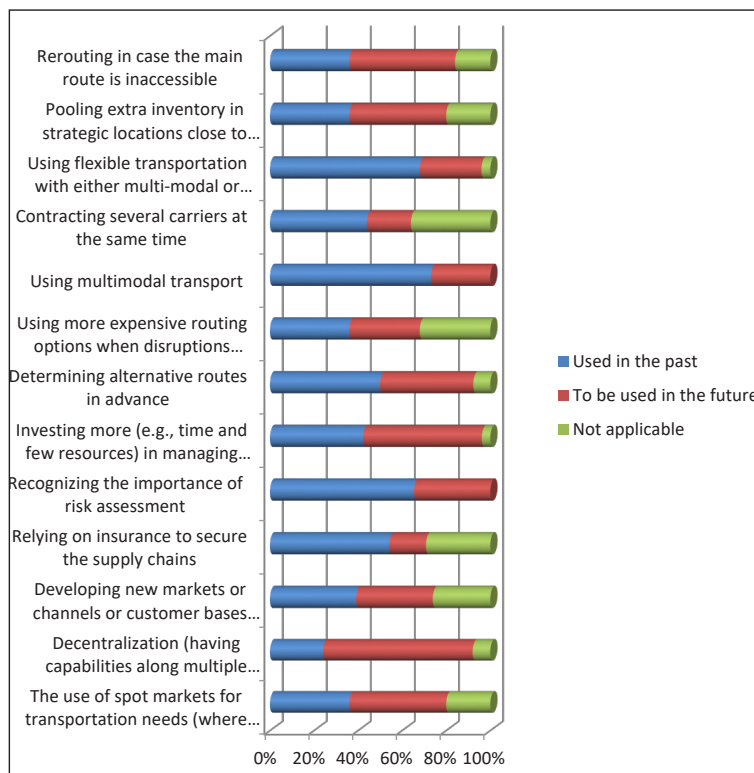
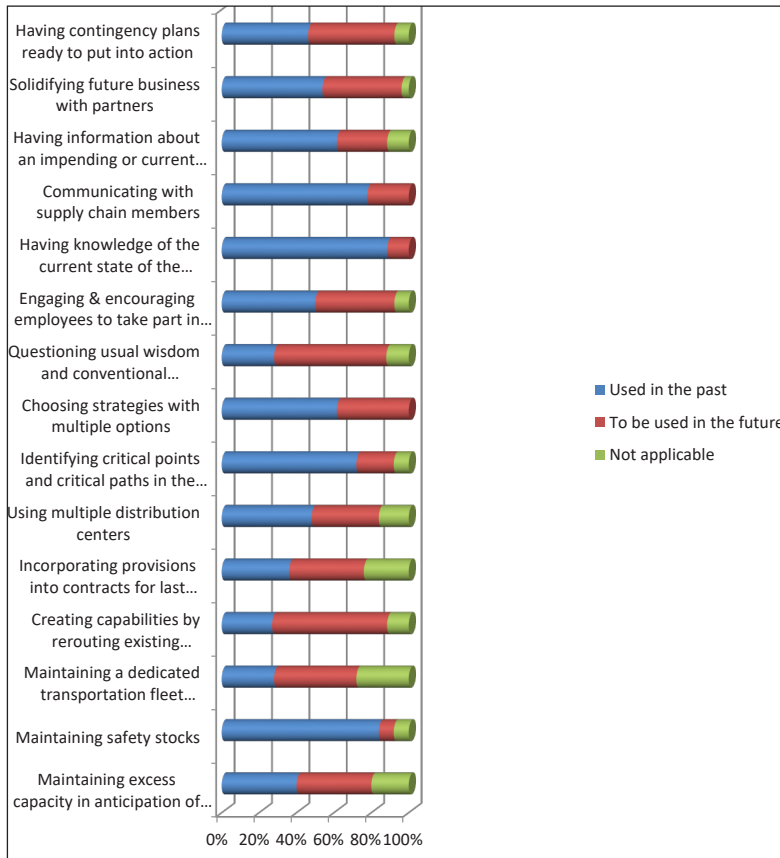


Fig. 4: Summary of Management’s Commitment

The respondents saw that the management team in twelve (48%) of the companies was more committed to supply chain risk following the COVID-19 pandemic, whereas

the management team in thirteen (52%) of the companies was somewhat committed.



Based on the interview data from twenty-five participants, the strategies commonly used in the past following the COVID-19 pandemic, the Ukraine–Russia war, the regional crisis and the Red Sea area situation include:

- Knowing the current state of the supply chain (92%).
- Communicating with supply chain members (84%).
- Maintaining safety stocks (84%).
- Using multimodal transport (76%).
- Maintaining a flexible relationship with suppliers or carriers (72%).
- Identifying critical points and critical paths in the supply chain (72%).
- Recognising the importance of risk assessment (68%).
- Using flexible transportation with either multimodal or multi-carrier transportation (68%).
- Having information about an impending or current disruption (64%).
- Choosing strategies with multiple options (64%).
- Understanding suppliers' risks (60%).
- Relying on insurance to secure the supply chains (52%).
- Having contingency plans ready to put into action (48%).
- Using multiple distribution centres (48%).
- Contracting several carriers at the same time (44%).
- Maintaining a backup supplier to supplement or temporarily replace the leading supplier (44%).
- Turning towards more robust suppliers (40%).
- Substituting a usual raw material with a similar one (40%).
- Developing new markets or channels or customer bases for existing or new products/services (for exports only) (36%).
- Questioning usual wisdom and conventional business practices (60%).
- Increasing availability of alternate suppliers (56%).
- Investing more (e.g., time and resources) in managing supply chain risks (56%).
- Rerouting in case the main route is inaccessible (48%).
- Engaging and encouraging employees to take part in resiliency efforts (44%).
- The use of spot markets for transportation needs (where transportation services are purchased and utilised immediately) (44%).
- Maintaining a dedicated transportation fleet which may not always be fully utilized (44%).
- Reducing supply base (44%).
- Pooling extra inventory in strategic locations close to factories and distributors (44%).
- Maintaining excess capacity in anticipation of future demand (40%).

Some valuable insights can be drawn from the interview data, such as:

- Reducing the supply base as a strategy is not applicable (48%), which contradicts the view highly pursued before the COVID-19 outbreak to take advantage of global connectedness.
- Contracting with several carriers at the same time is a strategy not applicable (36%), which seems an opportunity for the multimodal operators.
- Producing part of our product that we can as a strategy is not applicable (44%), which seems to favour the concept of outsourcing.

Conclusion and Recommendations

Conclusion

Based on the findings from the interview data analysis, the following conclusions are drawn:

Among the strategies used so far, such as knowing the current state of the supply chain, communicating with supply chain members, maintaining safety stocks, recognising the importance of risk assessment, maintaining flexible relationships with suppliers or carriers, having information about an impending or current disruption, identifying critical points and critical

Responses from the majority of the twenty-five interviewees reveal the following as strategies to be adopted in the future following the COVID-19 pandemic, the Ukraine–Russia war, the regional crisis in the Middle East and the Red Sea area scenario:

- Decentralisation (having capabilities along multiple links or nodes) of the supply chain (68%).
- Having multiple suppliers for strategic parts (64%).
- Creating capabilities by rerouting existing capacities, flows, or functions within a supply chain (64%).

paths in the supply chain and using flexible transportation with either multi-modal or multi-carrier transportation, can be taken as a lesson to be drawn and experience to be shared by others.

Among the strategies to be adopted during the time ahead of us, like decentralisation (having capabilities along multiple links or nodes) of the supply chain; questioning usual wisdom and conventional business practices; having multiple suppliers for strategic parts; creating capabilities by rerouting existing capacities, flows, or functions within a supply chain; increasing availability of alternate suppliers; and rerouting in case the main route is inaccessible are worth noting by those who want to ensure continuity of their business.

- Reducing the supply base as a non-applicable strategy contradicts the view that was highly pursued before the COVID-19 outbreak to take advantage of global connectedness.
- Contracting with several carriers simultaneously can be taken as an opportunity by the multimodal operators.
- Producing part of our product that we can as a strategy that is not applicable instils hopes that things will become normal and seems to favour the concept of outsourcing.

Recommendations

Based on the conclusions drawn above, the following recommendations were given:

To enhance the resilience of the supply chain to which they belong or continuity of their business, Ethiopian importers and exporters need to have competent supply chain managers, give attention to enhancing flexibility and communications, question the usual business practices of the past, have alternative sources, build capabilities across the supply chain, maintain safety stocks, recognise the value of risk assessment, build capabilities for assessing risks and proactively identify critical points or paths in the supply chain.

Limitations and Suggestions for Future Research

To enable generalisability, similar studies need to be conducted in other countries with similar contexts. A

similar study with a larger sample size complemented by a quantitative approach will further enhance the usefulness of the current study's findings.

References

- Belhadi, A., Kamble, S., Jabbour, C. J. C., Gunasekaran, A., Ndubisi, N. O., & Venkatesh, M. (2021). Manufacturing and service supply chain resilience to the COVID-19 outbreak: Lessons learned from the automobile and airline industries. *Technological Forecasting and Social Change*, *163*, 120447.
- Breisinger, C., Diao, X., Dorosh, P. A., Mbutia, J., Omune, L., Oseko, E. O., Pradesha, A., Smart, J., & Thurlow, J. (2022). *Kenya: Impacts of the Ukraine and global crises on poverty and food security* (No. 1). International Food Policy Research Institute (IFPRI).
- Bret, L., Dussud, M., Metral, L., Ladier, A. L., & Trilling, L. (2021). Towards a model assessing supply chain resilience strategies. *Procedia CIRP*, *103*, 14-19.
- Burt, S. A., Klump, K. L., Vazquez, A. Y., Shewark, E. A., & Hyde, L. W. (2021). Identifying patterns of youth resilience to neighborhood disadvantage. *Research in Human Development*, *18*(3), 181-196.
- Christopher, M., & Peck, H. (2004). Building the resilient supply chain.
- Dennehy, D., Oredo, J., Spanaki, K., Despoudi, S., & Fitzgibbon, M. (2021). Supply chain resilience in mindful humanitarian aid organizations: The role of big data analytics. *International Journal of Operations & Production Management*, *41*(9), 1417-1441.
- Fattahi, M., Govindan, K., & Maihemi, R. (2020). Stochastic optimization of disruption-driven supply chain network design with a new resilience metric. *International Journal of Production Economics*, *230*, 107755.
- Fiksel, J., & Fiksel, J. (2015). *From risk to resilience* (pp. 19-34). Island Press/Center for Resource Economics.
- Fu, X., Qiang, Y., Liu, X., Jiang, Y., Cui, Z., Zhang, D., & Wang, J. (2022). Will multi-industry supply chains' resilience under the impact of COVID-19 pandemic be different? A perspective from China's highway freight transport. *Transport Policy*, *118*, 165-178.
- Gioia, D. A., Corley, K. G., & Hamilton, A. L. (2013). Seeking qualitative rigor in inductive research: Notes on the Gioia methodology. *Organizational Research Methods*, *16*(1), 15-31.

- Golan, M. S., Jernegan, L. H., & Linkov, I. (2020). Trends and applications of resilience analytics in supply chain modeling: Systematic literature review in the context of the COVID-19 pandemic. *Environment Systems and Decisions*, 40(2), 222-243. Retrieved from <https://data.humdata.org/dataset/wfp-food-prices-for-ethiopia>, accessed in Nov. 2022
- Ivanov, D., Pavlov, A., Dolgui, A., Pavlov, D., & Sokolov, B. (2016). Disruption-driven supply chain (re)-planning and performance impact assessment with consideration of pro-active and recovery policies. *Transportation Research Part E: Logistics and Transportation Review*, 90, 7-24.
- Lopes, J. M., Gomes, S., & Mané, L. (2022). Developing knowledge of supply chain resilience in less-developed countries in the pandemic age. *Logistics*, 6(1), 3.
- National Research Council. (2012). Disaster resilience: A national imperative.
- Ojha, R., Ghadge, A., Tiwari, M. K., & Bititci, U. S. (2018). Bayesian network modelling for supply chain risk propagation. *International Journal of Production Research*, 56(17), 5795-5819.
- Ouabouch, L. (2015). Overview on supply chain resilience. *Materials Management Review*, 11(9), 16-18.
- Pickett, C. B. (2003). *Strategies for maximizing supply chain resilience: Learning from the past to prepare for the future* (Doctoral dissertation, Massachusetts Institute of Technology).
- Ponomarev, S. Y., & Holcomb, M. C. (2009). Understanding the concept of supply chain resilience. *The International Journal of Logistics Management*.
- Rehman, O. U., & Ali, Y. (2022). Enhancing healthcare supply chain resilience: Decision-making in a fuzzy environment. *The International Journal of Logistics Management*, 33(2), 520-546.
- Rice, J. B., & Caniato, F. (2003). Building a secure and resilient supply network. *Supply Chain Management Review*, 7(5), 22-30.
- Schmitt, A. J., & Singh, M. (2012). A quantitative analysis of disruption risk in a multi-echelon supply chain. *International Journal of Production Economics*, 139(1), 22-32.
- Sheffi, Y., & Rice Jr, J. B. (2005). A supply chain view of the resilient enterprise. *MIT Sloan Management Review*, 47(1), 41.
- Simchi-Levi, D., Schmidt, W., Wei, Y., Zhang, P. Y., Combs, K., Ge, Y., Gusikhin, O., Sanders, M., & Zhang, D. (2015). Identifying risks and mitigating disruptions in the automotive supply chain. *Interfaces*, 45(5), 375-390.
- Stone, J., & Rahimifard, S. (2018). Resilience in agri-food supply chains: a critical analysis of the literature and synthesis of a novel framework. *Supply Chain Management: An International Journal*.
- Sodhi, M. S., & Tang, C. S. (2021). Extending AAA capabilities to meet PPP goals in supply chains. *Production and Operations Management*, 30(3), 625-632.
- Sodhi, M. S., & Tang, C. S. (2021). Supply chain management for extreme conditions: Research opportunities. *Journal of Supply Chain Management*, 57(1), 7-16.
- Sodhi, M. S., Tang, C. S., & Willenson, E. T. (2023). Research opportunities in preparing supply chains of essential goods for future pandemics. *International Journal of Production Research*, 61(8), 2416-2431.
- Torabi, S. A., Baghersad, M., & Mansouri, S. A. (2015). Resilient supplier selection and order allocation under operational and disruption risks. *Transportation Research Part E: Logistics and Transportation Review*, 79, 22-48.
- Tukamuhabwa, B. R., Stevenson, M., Busby, J., & Zorzini, M. (2015). Supply chain resilience: Definition, review and theoretical foundations for further study. *International Journal of Production Research*, 53(18), 5592-5623.
- Tukamuhabwa, B., Stevenson, M., & Busby, J. (2017). Supply chain resilience in a developing country context: A case study on the interconnectedness of threats, strategies and outcomes. *Supply Chain Management: An International Journal*.
- Yan, X., Li, J., Sun, Y., & De Souza, R. (2023). Supply chain resilience enhancement strategies in the context of supply disruptions, demand surges and time sensitivity. *Fundamental Research*.
- Yao, Y., & Meurier, B. (2012). Understanding the supply chain resilience: A dynamic capabilities approach. <https://africanewswire.za.com/war-in-ukraine-exacerbating-food-crisis-in-the-horn-of-africa/>