

## Are Supply Chains Proactive? Understanding Challenges in Combatting Emerging Pandemics, Lessons from the Covid 19: A Literature Review

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**ABSTRACT:** The supply chain is an important pillar in delivering value to the utmost consumer in any sector. Where there are disruptions in the chain more so global supply chains, the world productive sectors will be rendered to jeopardy and meeting objectives of right quality, time, quantity, place and price will remain thought of. Supply chains remain imperative in fighting emerging pandemics but while this is so, diversification of a robust chain coupled with stringent parties able to deliver continues to be a major setback to many economies due to emerging pandemics. The 2020 online report of Ernst & Young LLP indicated that at least 72% of supply chains reported negative effects due to Covid 19 as firms closed operations, products failed to be delivered and prices soared high. In the IMF report of 2021, the global GDP of countries dropped by 3.9% between 2019 and 2020, with 32 of the 53 PEPFAR countries experiencing reductions in their GDP. Yet in literature, researchers remain silent on the challenges facing supply chains and whether chain firms are proactive in managing future pandemics remains a dire question given that scholars have concentrated on the effects of the pandemic. The purpose of the paper was to explore the challenges facing supply chains in combating emerging pandemics drawing experience from the recent novel corona virus. Based on the broken windows theory and desk study review methodology, we aver that High Costs, Supply Chain Complexity, Non-Visibility of Supply Chains, Emerging risks and Supply Chain Volatility are domineering challenges faced by chains in fighting emerging pandemics. We suggest a model of ramifications to the challenges and show that firms will need to be proactive in the future for emerging pandemics by observing key practices 1. Regionalizing the Supply Chain 2. Digitalizing the supply chain 3. Rethinking transparency & resilience. 4. Redesigning the Supply chain strategic architecture. We conclude that if supply chains have to be tools in fighting emerging pandemics, then stakeholders must recognize and mitigate these challenges. We further recommend stakeholders to pay attention in allocating resources to solve these challenges.

**KEYWORDS:** Supply Chain High-Cost Supply Chain Complexity Cross Border Restrictions Supply & demand shocks

### 1. INTRODUCTION AND BACKGROUND

The Corona virus, otherwise called Covid 19 has shifted the norms of life and significantly affected supply chains internationally. Virtually almost all countries of the world registered presence of the pandemic, with many still reeling from its pains and shocks. The virus first emanated in Wuhan town of China, but questions still exist on the exact causes of the virus. Some reports show that the virus could have been present in China from late 2018 and early 2019 but was not identifiable. Whether this is true still leaves us bewildered. Other sources point to the fact that Covid 19 was first traced in China in the late months 2019, in around November and December. Even if this was to stand, Covid 19 was publicized and became common in many countries in around February-March 2020. In East African Countries, the virus was first announced on March 12<sup>th</sup> March 2020. In Uganda, it was first announced on 21<sup>st</sup> March 2020, Tanzania on 16<sup>th</sup> March 2020.

**Table 1.1 1st Cases of Covid 19 in Eastern Africa**

Country	First Case	City
Kenya	12th March	Nairobi
Uganda	21st March	Kampala
Tanzania	16th March	Dar es Salaam
Rwanda	14th March	Kigali
Burundi	31st March	Bujumbura

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Somalia	16th March	Mogadishu
Djibouti	18th March	Djibouti City
Democratic Republic of Congo (DRC)	10th March	Kinshasa
South Sudan	5th April	Juba
Ethiopia	13th March	Addis Ababa
Eritrea	21st March	Asmara

In the last months of 2020, the number of cases of the novel virus had reached over 80 million and risen to above 128 million in 2021 (Pujawan & Bah 2022). According to the online worldometers information (2022), the corona virus cases up to the 3<sup>rd</sup> of November 2022 were over 636 million people, with 6.6 million deaths of victims. The number of recovered cases up to the said date stood at over 6.1 million people (Worldometers information, 2022).

Business organizations, including both local and multinational, have faced a record wave of challenges and problems due to the emergency of pandemics in the recent past. The range of the challenges subjected to these organizations has however been dependent on the severity of the emerging pandemic in question. The imminent negative effects of epidemics and pandemics may be spun from reducing the efficiency and effectiveness to increased lead times. Many economies in the world have contracted with the global supply chains heavily disrupted and unable to meet their objectives of the right time. Many nations have witnessed closure of supply chains like stores, food outlets, retail outlets and a considerable reduction in production activities.

It is safe to allude that in the past 2 and ½ years, just what could go wrong among supply chain firms did exactly that. The Covid 19 has resulted in volatilities that have quickly misaligned demand and supply, resulting in the demand and supply shocks and this greatly affected economy of nations. According to the International Monetary Fund, IMF report 2021, the median global GDP for all countries dropped by 3.9% from 2019 to 2020 in the world, becoming the worst economic recession to be recorded since the great depression. Furthermore, 32 of the 53 United States President's Emergency Plan For Aids Relief (PEPFAR) countries experienced reduction in their GDP income between 2019 and 2020, with majority of the countries having not fully recovered from global economic loss.

**Table 1.2. Percentage change in GDP of PEPFAR Countries in the Covid 19 era**

PEPFAR Country	% Change in GDP between 2019 and 2020
Angola	-30.9%
Botswana	-9.2%
Brazil	-23.1%
Burkina Faso	8.7%
Burundi	0.9%
Cambodia	-7.0%
Cameroon	2.4%
Democratic Republic of the Congo	-3.4%
Côte d'Ivoire	4.6%
Dominican Republic	-11.4%
El Salvador	-8.4%
Eswatini	-11.0%
Ethiopia	4.3%
Ghana	0.2%
Guatemala	0.8%
Guyana	5.7%
Haiti	-1.9%
Honduras	-5.0%
India	-7.3%
Indonesia	-5.4%
Jamaica	-11.7%
Kazakhstan	-5.7%
Kenya	2.0%
Kyrgyz Republic	-12.7%
Lao P.D.R.	0.3%
Lesotho	-10.3%
Liberia	-1.4%
Malawi	7.4%
Mali	1.2%
Mozambique	-8.8%
Myanmar	18.1%

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Namibia	-14.8%
Nepal	-0.6%
Nicaragua	-0.0%
Nigeria	-4.2%
Panama	-20.7%
Papua New Guinea	-6.2%
Philippines	-4.1%
Rwanda	-0.2%
Senegal	5.9%
Sierra Leone	2.0%
South Africa	-13.5%
South Sudan	-3.3%
Tajikistan	-1.5%
Tanzania	5.9%
Thailand	-7.8%
Togo	5.1%
Trinidad and Tobago	-7.0%
Uganda	0.4%
Ukraine	0.9%
Vietnam	4.7%
Zambia	-17.1%
Zimbabwe	11.9%

Source: Adopted from IMF report, 2021

The future recovery of all PEPFAR countries still remain shrouded in uncertainty. While it is indicated that many of the countries will have fully recovered by 2024 and their economies back, it is important to note that the capability of supply chains to manage pandemics in the future will be useful in everthing severe effects. This will call for the chains to recognize challenges they face in providing effective solutions to the pandemics.

The focus of a glut of studies on supply chains and pandemics (Covid 19 and others) have witnessed a dramatic shift from timed purchasing under constraints of pandemic (Prentice *et al.*, 2020) to the impacts of pandemics on supply chains (Aday & Aday, 2020), sustainability of supply chains under pandemics (Sarkis, 2020), frameworks of supply chain and Covid 19 (Magableh, 2021) to supply chain performance and economic growth under the Covid 19 (Goel, Saunoris & Goel, 2021). Substantial work has been written and documented on supply chains and pandemics. In the realism that Covid 19 has spread massively and orchestrated much volatilities to the supply chain, it is no secret that majority of the researchers and scholars have paid attention to the Covid 19 (Grida, Mohamed & Zaied, 2020; Butt, 2021; Xu, Elomri, Kerbache & El Omri, 2020; Sharma, Shishodia, Kamble, Gunasekaran & Belhadi, 2020; Hobbs, 2020; Javorcik, 2020; Guan, Wang, Hallegatte, Davis, Huo, Li, 2020). In all this, majority of the studies centered on the effects and impacts of covid 19, Risks of Supply Chains in Covid 19 and the Sustainability of supply chains. None of these effectively disclosed the challenges of supply chains in emerging pandemics basing on Covid 19 nor provided suggestive solutions to the challenges facing supply chains. Thus, information on the challenges facing supply chains in emerging pandemics under Covid 19 and the solutions to the challenges is therefore lacking. The current study paper hopes to bridge this gap by; through a collegiate conceptual framework and collegiate desk study literature review, establish the challenges of supply chains in emerging pandemics drawing from the Covid 19 and offer a model of ramifications in mitigating the challenges.

## 1.2 Objectives of the Study

The objective of the study was to identify the challenges facing supply chains in combatting emerging pandemics and to suggest a model of ramifications in mitigating the challenges.

## 2. THEORETICAL REVIEW

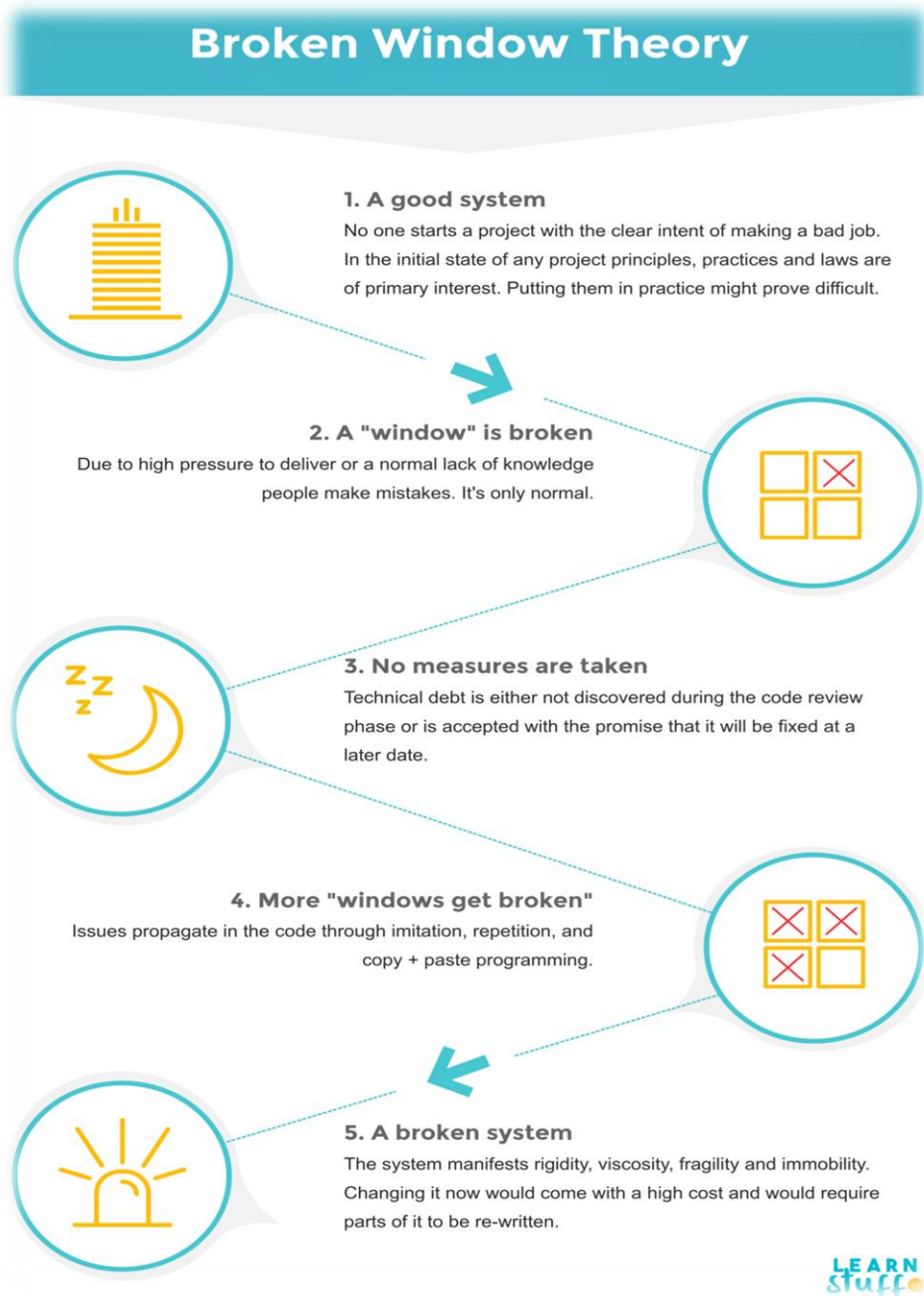
### 2.1 Broken Windows Theory

James Wilson and George Kelling coined the Broken Windows Theory (BWT) in 1982 from the roots of criminal studies. In the 1990s, the theory became popular in practice following the works of police commissioners William Bratton and Rudy Giuliani of New York. The theory suggests that smallest minor signs of crime, public unrest and anti-social behavior inspires serious crimes and unrest that may be difficult to combat. Policing methods which target smallest and negligible crimes such as illegal hawking, vandalism, fighting, public smoking help to create a lawful society, serene peaceful environment and prevent escalation of the minor crimes into serious crimes (Wilson & Kelling, 1982)

The theory became a subject of concern among scientists and researchers. In the wake of the decade up to 2013, the theory was widely adopted in social sciences and management to inform policy makers and managers on how to recognize and manage

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problems and challenges bedeviling their firms. Of importance, the theory establishes that firms must be quick to identify challenges and problems at early stages and develop cautionary measures with the aim of preventing escalation of the challenges into serious predicaments that could deem impossible to manage. Bratton and Kelling agreed that in police practices, the belief of broken windows should never be taken to imply zealotry, zero tolerance or rather zero on problems and challenges but rather as a way of instilling positive change in culprits and training individuals on avoiding minor crimes in a bid to avoid escalation into serious punishable offences (William & Kelling, 2014).



Source: (Adopted from Wilson & Kelling, 1982)

Figure 2.1 The Broken Windows Theory

In resonance to Wilson & Kelling (1982), social scientists, researchers and law enforcers have agreed that when a window of a building in say, metropolis or even in rural set ups is broken and no necessary attention is given to repair it, all the other windows will be broken. This can be the case in good neighborhoods just like in conflicting neighborhoods. The theory establishes that breaking windows does necessarily take place on large scale or massively because the location of the building is in environments inhabited by window breakers or window-breaking is loved by the neighbors, but because the presence of a one broken window is an indication that there is no serious attention and therefore breaking others will result to nothing but rather a culture of fun. According to William & Kelling (2014), the remedy to evade escalation from a broken window is to address the challenge when it

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is small. Individuals must undertake the earnest and earliest decision to repair the window. This must be done over the shortest time possible, say hours, few days or a week. The essence is to subvert the belief from the public that breaking the window is a normal undertaking which attracts no serious concerns. Cleaning up a small minor breakage will reduce the frequency of more damage to accrue. Problems and challenges are least likely to happen and inhabitants in neighborhoods will not flee but reside. The theory thus establishes two important assertions: recognizing and solving minor challenges improves quality of life in neighborhoods and major crime is prevented on recognizing and solving minor crimes (William & Kelling, 2014).

The broken windows theory is important in informing challenges that supply chains face in combatting emerging pandemics. The challenges bedeviling chains must and need to be averted in earnest if managing future pandemics will hold. The Covid 19 significantly exposed supply chains ineffectiveness and resulted in massive losses. Continued lockdowns meant that there was momentary stop in flow of materials, disrupting production and delivery to the end user as a result. While this holds, researchers such as Pujawan & Bah (2022) are of the view that the Covid 19 pandemic did not necessarily results in new challenges among supply chain firms. Thus, the organizations must be quick in identifying and managing challenges in order to better be prepared in handling subsequent challenges. In order to achieve this, firms must continuously be proactive. This could mean adoption of proactive strategies: Firstly, adoption of innovations and technologies, adopting sustainability practices, Rethinking resilient supply chain and regionalizing supply chains

### **3. METHODOLOGY AND DESIGN**

The paper looked at the challenges facing supply chains in the wake of Covid 19. The purpose of the paper was to enable practitioners, policy makers and managers recognize that supply chains must be proactive in managing presenting challenges as a preparation in managing future pandemics drawing from the novel Covid 19. In order to achieve this, the study adopted a desk study review methodology where relevant documents and articles were reviewed on the subject matter. The extant literature was mined by following the key words: Supply chains, High Cost, Supply Chain Complexity, Cross Border Restrictions, Supply & demand shocks and Covid 19. From this, we provided a mode of mitigative strategies that supply chain firms may follow in building proactiveness for future emerging pandemics.

### **4. CHALLENGES FACING SUPPLY CHAINS**

In the words of Gu & Huo (2017), a supply chain as a network of concerned entities and people working together either directly or indirectly, to deliver required products (goods or services) to the final buyer. This could be across different regions i.e. counties, nations as well as economies. A study by Ha, Jun, Ok (2018) however mentioned that a cognitive reference to a supply chain is an association between an organization and her suppliers in different places to produce and distribute goods to their customers. From these arguments, it can be deduced that a supply chain basically serves as an arrangement between the company, her suppliers and final consumers in ensuring the latter obtains maximum value. Against a backdrop of the Covid-19 pandemic, the supply chain faces myriad challenges in delivering this auspicious value in a number of ways:

#### **4.1 High Costs**

Increasing costs is a top notch setback in any economy. In combating the Covid-19 pandemic, alignment and diversification of supply chains means re-looking at the spend cost. Profit margins have reduced, stakeholders are under immense pressure to deliver final value but then presented with lean budgets. Costs are creeping up across the supply chain and affecting all parties. Additionally, parties in the supply chain, more so suppliers, are pinned to the wall in leveraging costs and have to make a choice between continuous value delivery and cost mitigation. For instance, a study by Mason & Kwak (2016) resonates that multifaceted international logistics emanating from shutting up of transportation modes have led to higher charges in storage & inventory, delivery, counter trade and management of products.

#### **4.2 Supply Chain Complexity**

Supply chain complexities present an enormous upheaval for economies fighting Covid-19 globally. With shut economies and a ban on transportation, fewer parties are able to aptly take on their roles and thus sink the network. Turning to e-commerce selling structures means selling directly to final consumers, but then this requires fast mile agile delivery, formidable local logistics and resilient supply chains. In the present pandemic situation, augmenting this infrastructure is a dream come true to virtually almost all countries of the economy affected by Covid-19. Notwithstanding this, the final consumer in this economies still need value, which remotely becomes modest over time. Drop shipping retailers require fast international services to operate if agile delivery to final consumers remains imperative (Mejjaoui & Babiceanu, 2018; Mishra, Henry, Sekhari & Ouzrout, 2018).

#### **4.3 Non-Visibility of Supply Chains**

The diminishing supply chain visibility is another drive of the chain to non-performance and thus inability to combating emergent pandemics. Virtually almost all parties to the supply chain are becoming invisible and retardant, with key roles and attention shifted

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to customized ways of mitigating the economy e.g. the ‘working from home’ analogy. With such precedence, it is near fallacy to assure a ready market for company and supplier goods and services. The working from home coined notion drives away desire for purchase with little contact amongst parties in the chain, more so final consumers. Lack of visibility adds the difficulty in report, business intelligence commemorating to obstacle sound decision making. According to Swift, Guide & Muthulingam (2019), there is reduced market forces, with suppliers and agencies showing negligence for delivery, and thus organizations are immensely affected. In this regard, devising effective means of the supply chain workforce to effectively tackle global pandemics remains near impossibility.

### **4.4 Emerging risks**

Fourthly, evidence from studies by Giannakis & Papadopoulos, 2016; Qazi, Dickson, Quigley & Gaudenzi, 2018 and Jahre (2017) suggest that unforeseen risks in the supply chain is a major challenge of supply chains in their quest to providing value. Amidst global complexities, economic pressures (a need for companies to sustain the economy) and trade disputes among parties in the chain as well as among nations; all these have put pressure on the supply chain. Mejjouli *et al.* also pens that such pressure often easily turns into risks that snowballs through the entire supply chain, making it vulnerable and thus inability of its parties to effectively contend with global pandemics. Company organizations, manufactures, retailers, suppliers, logistics, clients and final consumers are spread across different borders, boundaries and time zones which require profound coordination. In the wake of pandemics such as Covid-19, this is seldom and as such, presents an immense drawback to sustainably fight the pandemic. Economies resort to mitigate this by adding more steps to the supply chain. With the aim of mitigating the chain risks, they in turn add exponential to the upstream and downstream parties, presenting even more collinear hardship (Mason & Kwak, 2016).

### **4.5 Supply Chain Volatility**

Moreover, volatility and ineffective supply chain sustainability is a hinge back to augmenting supply chain parties able fight global pandemics. Volatility do not only create disruptions to a particular party in the chain but also ripples down to the entire network. As economies adopt protectionist policies, political circumference are introducing tariffs and charges across economy borders, typically resulting to delays, addition fees and customs processing time. Gu & Huo (2017) writes that administrative bottlenecks results to an inflexible supply chain. This in no doubt casts a dry spell to the supply chain.

## **5. MODEL OF RAMIFICATIONS**

### **5.1 Regionalizing the Supply Chain**

For many years, the discussion around international sourcing have taken a center stage among researchers as companies sought to enjoy overseas quality and reduced costs (Xu *et al.*, 2020). The chief motives for companies venturing in global sourcing span from building global supplier relationships to the sharing of knowledge and resources with ‘best in the industry’ However, international sourcing has the problem of widening the risk base as well as increasing supply chain volatilities (Mason & Kwak, 2016). Furthermore, some researchers have suggested that global sourcing can have the blatant risk of disclosing a firm’s competitive strategies and plans to her competitors. In the same vein, Swift *et al.* (2019) showed that the need to save costs should not be the main motivation of venturing in global markets.

The long spell of the Covid 19 has made supply chain managers and policy makers to rethink about the shape of their supply chains. The challenges and problems with global flow of goods and services orchestrated by the Covid 19 have activated the need to consider the global sources of supply. Supply chain firms must consider reskilling their local supply chain force into a formidable source that will be able to deliver amid volatilities. For instance, Samsung has invested a total of \$238 million in 9 middle- sized firms from 2020, meant to develop materials and equipment for chip in South Korea (Informineo, 2022). The move is aimed at cutting down overseas procurements and beefing up capacity of the local suppliers. Tesla Plc is designing lithium supply chain firm in the USA by procuring lithium ore meant for manufacturing of lithium batteries within the US borders and this will reduce overreliance on lithium producing countries.

While this is plausible, concentrating on the local supply base may present various challenges (Mejjouli & Babiceanu, 2018; Mishra, *et al.*, 2018). Many supply chains, due to cost implications, quality objectives, domestic non availability and domestic insufficiency have for a long time considered overseas market sources as alternatives for components and materials. Outright replacement of global sources with local sources require serious policy implications and commitment of the top management in nurturing the local supply sources. In the midst of emerging pandemics, supply chains will need to consider regionalizing their supply chains in order to avert the challenges and volatilities that could be caused by emergent pandemics in the future. In the realism of this, it is important to note that regionalization of supply chains will results into shortened lead times, offer better resilience (Pujawan & Bah, 2022) and the development of local companies that may possibly become long term supplier partners and serious contentions of competitive scales.

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### 5.2 Digitalizing the Supply Chain

Digitizing the supply chain has considerable to firms spanning from better decision making, streamlining supply chain functions, continued customer engagements, improved record keeping to averting volatilities (Gezgin, Huang, Samal & Silva, 2017). It is reported that the low rate of supply chain digitization uptake can be traced back to the technologies that firms have had until recently. Supply chain management became among the first functions to undergo digital transformations, as technology sensitives designed and came up with applications that could make use of Enterprise Resource Planning Systems (ERP). These applications and technologies concentrated on three areas: streamlining operations (procurement planning, tracking), supporting chain major activities (record keeping, warehousing) and complementing decision making. In the wake of this, these technologies and applications failed to deliver the transformation capacity of supply chain management: linking cross functional works (inventory management, routing and scheduling), matching demand and supply, activating purchasing problems through a dwell on ERP systems among others (Gezgin *et al.*, 2017).

The emergency of Covid 19 has provided breeding ground for managers to consider digitizing their chain activities. Latest technologies and innovation practices can provide the means through which managers may lengthily change the working of their supply chains. Many companies have started resorting to innovative solutions to their supply chain predicaments. According to an online report by Informineo, 2022, Tesla Plc for example, have solved their shortage of chips (made possible by Covid 19 global volatilities) by rewriting their software to accept alternative ships manufactured locally in the host country, the US. A leading US healthcare firm, Cardinal Health, has adopted tracking software to monitor shipment of the merchandise among the distribution centers. Innovations can help supply chains forecast their demand and supply in order to mitigate future disruptions. An effectively and digitally transformed supply chain implies that managers must reconsider the outlook of the firms in the midst of competitions and changing customer expectations. Previous researchers such as Pujawan & Bah (2022), in quoting Kumar *et al.* (2020) have the opinion that processes and activities in the supply chain must be digitized since digitization provides more immunity in the event of disruptions. For instance, manufacturing capacity must be changed to digital manufacturing. Covid 19 has resulted in heavy volatilities in the chain and as the international flow of goods becomes endangered, researchers have suggested that technologies and innovations will help clip players in the chain together, and this will result into a more agile and resilient chain

### 5.3 Rethinking Transparency & Resilience

The need for clear communication among supply chain partners in the midst of pandemics implies that supply chains must rethink the meaning of transparency and resilience (Ada, Sagnak, Kazancoglu, Luthra & Kumar, 2021). The concepts of resilience and transparency seek to ground a clearly communicative supply chain that can withstand forces of disruptions and main supply and delivery to the final consumers. The emergency of novel corona virus has made supply chains more dispersed, disrupted, complex and uncoordinated and this means that stakeholders and managers are increasingly interested in managing transparent chains. Further, many supply chains have grown across many country borders as companies open visibility in tapping in new potential markets. Additionally, stakeholders have a pressing need to go beyond ensuring transparency measures but also rethink on how their supply chains will remain buoyant in the storms of future pandemics.

In the words of Kashmanian (2017), companies can ensure that their there is coordinated flow of communication among chain members through supply chain mapping, traceability, third party certification, goal setting and reporting structure. Transparency in supply chains imply clear communications to easily recognize flow of resources and goods across parties. In achieving this, managers will need to know:

- i. The raw materials for material build and design, the how and their make and design
- ii. The source of the raw materials, process of production and who produces them
- iii. Whether the materials sourced are from suppliers with sustainability policies
- iv. The resilience of the supply chain to withstand volatilities

Therefore, to withstand future disruptions emanating from emerging pandemics, supply chains must be transparent and resilient. A system of open communication among chain members must be cultivated. Forecasting and continuous matching of demand and supply will help inform the resilience of supply chains. Companies must rethink transparency and resilience as tools averting future volatilities. Firms must review the supply chain footprints and consider alternative sources of supply to ensure resilience in flow of products to the end customers. In achieving this, managers must undertake to answer two important questions:

- i. Do we have alternative supply markets?
- ii. Does the company ensure that there is no on supplier geographical concentration?

Diversification of sources of supply through firm practices such as buffer supplier prequalification will help firms to evade future challenges emanating from future cross boarder lock downs. Additionally, managers must ensure that their supply base is not geographically centered. Even the customer base must be segmented such that the company enjoys geographically dispersed consumer base in a bid to ensure continuous sales. In all this, the resilience of supply chain firms to withstand future disruptions can be pegged on vendor geographical concentration and building alternative supply markets.

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### 5.4 Redesigning the Supply Chain Strategic Architecture

Managers must redesign the shape and strategies of their supply chains. The novel corona virus caused massive disruption with goods failing to be delivered to their intended customers. Disruptions caused by the virus meant that meeting procurement objectives of the right quality, right quantity, right place, right time and right source remained a dilemma. In order to mitigate this, managers must reimagine their supply chain strategies. The supply chain strategies must change the normal global trade flow of materials (raw materials and goods). Given that the traditional flow of materials is highly affected by volatilities and disruptions, firms must sign new trade agreements meant to cushion parties from adverse effects of future pandemics. Overseas markets for procurement must agree to give incentives and discounts to help their chain customers mitigate disruptions.

In mitigating the impacts of the novel corona virus, managers must reimagine and redesign their performance models. Special attention must be given to the functions, activities and process that need to be done regionally, locally and globally. In the words of Pujawan & Bah (2022), supply chains for instance, need to develop agile capabilities in highly disruptive environments to mitigate short lived volatilities. Agile chains may provide avenues for extra resources to cater for extra feedback when required, extra speed of flow of materials when needed. However, given that volatilities keep shifting and remain highly dynamic, a supply chain must not be built as either agile or lean. It must be built as a combination of both agile and lean practices.

**Table 5.1 Model of Ramifications for Supply Chain Challenges in emerging pandemics**

Model of Ramifications		
Strategy	Implicative measures for supply chains	Literature
Regionalizing the Supply Chain	<ol style="list-style-type: none"> <li>1. Diversify the local supply</li> <li>2. Local sourcing to shorten chains and avert global volatilities</li> <li>3. Building skills and capacity of local supply</li> <li>4. Insourcing to build capacity</li> </ol>	Mason & Kwak, (2016); Swift <i>et al.</i> , (2019); Mejjaouli & Babiceanu, 2018; Mishara <i>et al.</i> , 2018; Pujawan & Bah (2022)
Digitizing Supply Chains	<ol style="list-style-type: none"> <li>1. Innovation practices to restructure the flow of supply chains</li> <li>2. Technologies of efficient communication among chain partners</li> <li>3. Build-in technology for products and services</li> <li>4. Digitizing processes and activities</li> </ol>	Gezgin <i>et al.</i> , (2017); Grida <i>et al.</i> , (2020); Guan, <i>et al.</i> , (2020); Ha, <i>et al.</i> , (2018) Hobbs, (2020); Jahre (2017).
Rethinking transparency and resilience	<ol style="list-style-type: none"> <li>1. Clear communication for stakeholders in the supply chain and customers</li> <li>2. Sustainability in cost and operations to enhance resilience</li> <li>3. Accountability of firm owners and stakeholders</li> <li>4. Building alternative supply markets</li> <li>5. Ensure vendor and supplier geographical deconcentration</li> <li>6. Buffer supplier prequalification</li> </ol>	Ada <i>et al.</i> , (2021), Kashmanian (2017)
Redesigning supply chain strategic architecture	<ol style="list-style-type: none"> <li>1. Hybrid agile and lean practices</li> <li>2. Deciding on the local and global activities to be carried out</li> <li>3. Reimagining achievement of continuous flow at the expense of cost and quality in global markets</li> </ol>	Butt, A. S. (2021); Goel <i>et al.</i> , (2016); Qazi <i>et al.</i> , (2018); Xu



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4. Altering internal trade flows through new agreements *et al.*, (2020); Giannakis & Papadopoulo s (2016)
5. Local country incentives to spur local sourcing
6. Development and adoption of omnichannels to diversify supply

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Source: (Conceptualization & Modelling, 2022)

### CONCLUSION

The novel corona virus has had devastating effects on global supply chains and resulted in enormous problems and meeting the objectives of right price, time, quality, place, quantity and source being a thought of. In the aftermath of these is unprecedented economic shutdowns for many economies across the global. The future of supply chains as tools in managing future emerging pandemics has a daunting question with no imminent answers. This paper has established the challenges of supply chains in their quest as tools of managing pandemics through a desk study review methodology in the lens of the broken windows theory. Five key aspects have been identified under this: High Costs, Supply Chain Complexity, Non-Visibility of Supply Chains, Emerging risks and Supply Chain Volatility. The choice of Covid 19 as a reference was informed by the fact that the virus spread massively and orchestrated much volatilities to the supply chain, with many current literature paying attention to it. Hitherto, we indicate that supply chains remains pivotal in mitigating future pandemics. To this effect: four key issues are suggested as models of ramifications: Regionalizing the Supply Chain, Digitizing Supply Chains, Rethinking transparency & resilience and Redesigning supply chain strategic architecture. However, more effort needs to be directed to this lens and this study will be an important cornerstone in providing direction and background. We provide interesting arguments on viewing supply chains as mitigative tools for future pandemics, but then acknowledge that stakeholders must recognize the challenges bedeviling the firms.

### REFERENCES

- 1) Ada, E., Sagnak, M., Kazancoglu, Y., Luthra, S., & Kumar, A. (2021). A framework forevaluating information transparency in supply chains. *Journal of Global Information Management (JGIM)*, 29(6), 1-22.
- 2) Aday, S. & Aday, M., S. (2020). Impact of COVID-19 on the Food Supply Chain. *Food Quality and Safety* 4 (4):167–180. doi:10.1093/fqsafe/fyaa024
- 3) Butt, A. S. (2021). Strategies to mitigate the impact of COVID-19 on supply chain disruptions: a multiple case analysis of buyers and distributors. *The International Journal of Logistics Management*.
- 4) Gezgin, E., Huang, X., Samal, P., & Silva, I. (2017). Digital transformation: Raising supply-chain performance to new levels. *McKinsey & Company*, 1-10
- 5) Giannakis, M., & Papadopoulos, T. (2016). Supply chain sustainability: A risk management approach. *International Journal of Production Economics*, 171, 455-470
- 6) Goel, R. K., Saunoris, J. W., & Goel, S. S. (2021). Supply chain performance and economic growth: The impact of COVID-19 disruptions. *Journal of Policy Modeling*, 43(2), 298-316
- 7) Grida, M., Mohamed, R., & Zaied, A. N. H. (2020). Evaluate the impact of COVID-19 prevention policies on supply chain aspects under uncertainty. *Transportation Research Interdisciplinary Perspectives*, 8, 100240
- 8) Gu, M., & Huo, B. (2017). The impact of supply chain resilience on company performance: a dynamic capability perspective. In *Academy of Management Proceedings* (Vol. 2017, No. 1, p. 16272). Briarcliff Manor, NY 10510: Academy of Management
- 9) Guan, D., Wang, D., Hallegatte, S., Davis, S. J., Huo, J., Li, S., ... & Gong, P. (2020). Global supply-chain effects of COVID-19 control measures. *Nature human behaviour*, 4(6), 577-587
- 10) Ha, C., Jun, H. B., & Ok, C. (2018). A mathematical definition and basic structures for supply chain reliability: A procurement capability perspective. *Computers & Industrial Engineering*, 120, 334-345
- 11) Hobbs, J. E. (2020). Food supply chains during the COVID-19 pandemic. *Canadian Journal of Agricultural Economics/Revue canadienne d'agroeconomie*, 68(2), 171-176
- 12) Jahre, M. (2017). Humanitarian supply chain strategies—a review of how actors mitigate supply chain risks. *Journal of Humanitarian Logistics and Supply Chain Management*
- 13) Javorcik, B. (2020). Global supply chains will not be the same in the post-COVID-19 world. *COVID-19 and trade policy: Why turning inward won't work*, 111
- 14) Kashmanian, R. M. (2017). Building greater transparency in supply chains to advance sustainability. *Environmental Quality Management*, 26(3), 73-104

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- 15) Kelling, G., Coles, C. (1997). *Fixing Broken Windows: Restoring Order and Reducing Crime in Our Communities*, ISBN 978-0-684-83738-3
- 16) Magableh, G. M. (2021). Supply chains and the COVID-19 pandemic: A comprehensive framework. *European Management Review*, 18(3), 363-382
- 17) Mason, R., & Kwak, D. W. (2016, September). Examining the application to practice of a theoretical risk management framework in strategic supply chain logistics. In *Annual Logistics Research Network Conference* (pp. 1-9)
- 18) Mejjaouli, S., & Babiceanu, R. F. (2018). Cold supply chain logistics: System optimization for real-time rerouting transportation solutions. *Computers in Industry*, 95, 68-80
- 19) Mishra, D. K., Henry, S., Sekhari, A., & Ouzrout, Y. (2018). Traceability as an integral part of supply chain logistics management: an analytical review. *arXiv preprint arXiv:1811.06358*
- 20) Prentice, C., Chen, J. & Stantic, B. (2020). Timed Intervention in COVID-19 and Panic Buying. *Journal of Retailing and Consumer Services* 57: 102203.doi: 10.1016/j.jretconser. 2020.102203
- 21) Pujawan, I. N., & Bah, A. U. (2022, January). Supply chains under COVID-19 disruptions: literature review and research agenda. In *Supply Chain Forum: An International Journal* (Vol. 23, No. 1, pp. 81-95). Taylor & Francis.
- 22) Qazi, A., Dickson, A., Quigley, J., & Gaudenzi, B. (2018). Supply chain risk network management: A Bayesian belief network and expected utility-based approach for managing supply chain risks. *International Journal of Production Economics*, 196, 24-42
- 23) Sarkis, J. (2020). Supply chain sustainability: learning from the COVID-19 pandemic. *International Journal of Operations & Production Management*
- 24) Sharma, R., Shishodia, A., Kamble, S., Gunasekaran, A., & Belhadi, A. (2020). Agriculture supply chain risks and COVID-19: mitigation strategies and implications for the practitioners. *International Journal of Logistics Research and Applications*, 1-27
- 25) Swift, C., Guide Jr, V. D. R., & Muthulingam, S. (2019). Does supply chain visibility affect operating performance? Evidence from conflict minerals disclosures. *Journal of Operations Management*, 65(5), 406-429
- 26) William, B., Kelling, G. (2014). Why we need Broken Windows policing. *City Journal*. Retrieved 18 December 2017
- 27) Wilson, J., Q., Kelling, G., L. (1982). Broken Windows. [www.theatlantic.com](http://www.theatlantic.com). Retrieved 29 October 2022
- 28) Xu, Z., Elomri, A., Kerbache, L., & El Omri, A. (2020). Impacts of COVID-19 on global supply chains: Facts and perspectives. *IEEE Engineering Management Review*, 48(3), 153-166