

Global Supply Chain Resilience: Offshoring, Nearshoring or Reshoring Post COVID Pandemic

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Abstract

Global supply chain (GSC) trade has developed over the last 30 years. It assigns a primary responsibilities of product design and production to be placed offshore. Decisions are used to be undertaken cross-border to ensure smoothness of material and information flow and ensure the product' completion.

Nowadays, with Post pandemic and global chain activities disruption, There is an emergent call to get the production facilities contributing in global chain out of China post pandemic outbreak. *“If you have most of your suppliers in Wuhan, then you had a problem. But if you diversify, then you’ll be able to respond better.”* Experts claim. The pandemic has highlighted the fragility of global reliance in Chinese Production. It lead us to key argument” Does the Reshoring to home country ensure supply chain resilience?” or fragility of global chain was not engraved with the severity of the impact of COVID-19. Shall the

decisions makers restructure the global value chain as subsequent effect of pandemic?. This study investigate how can global value chain react Post pandemic and which alternatives they have either to keep off-shoring their activities or relocating their activities nearshoring or reshoring it back home.

The study explores multi-industry experience to figure out the adopted approach to react to pandemic disruptions. The study propose a comprehensive model for decision makers to consider their alternatives post pandemic to respond to any expected disruption.

Keywords:

Offshoring, Reshoring, Supply Chain Resilience, Supply Chain Robustness

Introduction

The global supply chains is nowadays a vital role of developing countries. Organizations there start extended their business process to achieve supply chain excellences, decision makers of such organizations are seeking a further knowledge and experience in international markets (Buckley & Tian, 2017), to contribute in global supply chain (Sharma et al., 2022).

The COVID-19 pandemic have had a shocking outcome on global trade. In the second quarter of 2020, global trade was down 18.5 percent, a far sharper drop than was seen for GDP.

(Dollar,_2020). Proceeding COVID-19 outbreak, there is a dispute on global value chains (GVCs) and the vulnerabilities of offshoring manufacturing activities. COVID-19 is considered as one of key global crisis that influenced the back-end operations in global supply chain. Manufacturing and logistics disrupted for virus infection rates.

Reacting to pandemic outbreak, Supply chain analyst and experts speculate to get production facilities out and reduce reliance on China, “*businesses will be forced to rethink their global value chains*” they designate applying global chain as Just-in-Time “*while just-in-time manufacturing may be the optimal way of producing a highly complex item such as a car, the disadvantages of a system that requires all of its elements to work like clockwork have now been exposed*”. Furthermore, World Economic Forum called to “aggressively evaluate near-shore options to shorten supply chains and increase proximity to customers” as a response to COVID-19. (Miroudot, 2020)

The pandemic reveals the insubstantiality of global supply chains and the international trade. International trade experience a hassle, Air cargo is eight times more expensive than ocean freight, minor shipments is around 5-6 times more expensive (research at global freight booking platform Freight). Developing countries had been working hardly to provide better service to global chains, for instance, Egypt tries to offer Africa’s cutting-

edge global logistics hub, indeed, It will improve the internal business activities of country and accelerate economic growth of the MENA to have more resilient global chains (Maait, 2021).

The global supply chain vulnerabilities are represented in international trade continuation without more expenses than usual. Therefore, lockdown of borders imposed to disrupt the flow of products and materials through international borders. A number of manufacturers had been redirected to air cargo despite its high cost to speed up the delivery time and overcome the expected delay by other means. (Miroudot, 2020)

In accordance to risk exposure model, the management should assess the interval required post disruption to recaps back to full capacity production vs. interval to cope without disrupted suppliers. Reaching real KPI will indicate the precise situation for each business in order to undergo decision related to their supply chain design and structure. (Brown, 2020)

Sometimes, diversifying sources of supplies imposes more risk in global supply chain activities even through the production facilities in that locations had not been defected, international logistics and trades will be the defected one. Production facilities of electronics, auto makers had been disrupted, for instance Hyundai halted suspended it manufacturing activities in Asia for

lack of supplies. Since the closure of Wuhan city, Global supply chain are surviving to manage such vulnerabilities

Literature Review

More than two-thirds of international trade nowadays undertake within more than one border to handle value chain activities globally (Global Value Chain Development Report, 2019). Post COVID, many international trade disruptions are encountered to redirect the global focus toward supply chain resilience. Resilience is not the other face of Robustness. There is difference between two approaches. Miroudot (2020) defined Resilience as the capability to resume regular processes within reasonable interval post-disruption, While Robustness is the capability to uphold operations during a emergency. Most popular scenario of robustness is to place production facilities in different geographic locations so dealing with diversity of suppliers across different borders will ensure continuity of business process whenever the crisis take place.

The coronavirus outbreak heightened the emergency of insourcing the critical supplies especially medical one. The pandemic urge the analysis and reconsidering reshoring plans for any product or service providers (Greenfield, 2022). Two contradictory views are reacting to the future of supply chain globally. First one assume that pandemic is one for the environmental factors that could be managed as vulnerable risk such any natural disaster

and concede that replacing production activities back home to developed countries doesn't imply resilience. Shortens lead time, get domestic suppliers, less transportation cost will revert the performance of supply chain to more efficient. "American industries are not going to compete with overseas factories by manually building product faster. American workers are not going to accept lower wages and a lower standard of living to compete with overseas counterparts. In fact, it's logistically impossible to recreate overseas manufacturing models in this country. We simply don't have enough workers or square footage to replicate overseas manufacturing. The only way for us to compete globally is to out-innovate and out-perform our competitors." (Greenfield, 2022),

Since pandemic eruption, several disruptions in logistics routes, overseas labor forces and supplies were unreachable, Automation is the proposed solution for global manufacturers to develop solid domestic supply chains nearby the markets. Adoption of automated technology in production will help to reduce human interaction and enhance productivity. "The flexibility automation provides not only allows production to meet demand with fewer layoffs, but also allows companies to retain their most skilled and innovative workers through economic downturns." (Greenfield, 2022)

Reshoring scenario requires government engagement. For instance, pharmaceutical production offshored to India and China for environmental issue rather than cost-related one, Reshoring

will require investment in clean production technologies, (Brown, 2020). Retailing, wholesaling trading and Electronic and technology industry are most defected of pandemic with the disruption of production activities. (Miroudot, 2020)

Global Supply Chains

Global supply chain' motivation of firms to outsource and offshore production is to reduce cost and get value -added through trade allowances, labor cost, reduced logistics cost, accessibility to markets (Ferdows, 1997). Associated with benefits of Global supply chain, uncertainty and risk management concerns should be encountered as will deciding to restructure supply chain and offshore its activities. (Merschmann and Thonemann, 2011). Any expected disruptions of supply chain process are considered as a predictable in competitive environment. Supply chain resilience enables the decision makers to have adaptive capacity to manage unanticipated disruptions (Pettit et al., 2013; Scholten et al., 2014), organizations will not be able to preclude the manifestation of such disruptions (Juneho and Neungho, 2020).

There are two types of supply chain risks. Internal risks related to resources and internal operations, while external related to politics and environmental changes. Most studies earlier have been focusing on internal one rather than external assuming that possibility of their manifestation is fairly low (Juneho and Neungho, 2020).

Reshoring & Offshoring Motives

Most of brand providers redirect to offshoring scenario for economic value: low labor cost, cost disparities, low logistics expenses, raw materials accessibility, and emerging markets exploration (EU, 2021) While most for originations consider since 2019 reshoring scenario, the motive behind are not that different than one related to offshoring: less expenses, better quality, less interval, accessibility to better skills, expected disruption of operations (Stevenson and Hendry, 2017).

As direct effect of business automation and trend to deploy Artificial intelligence – robots redirect firms to consider reshoring is the best option to optimize its business performance. Generating value-add through cost reduction and give more accessibility to global markets are not obtained anymore by most of firms there (Kinkel, 2020, p. 197). In this context, reshoring may also express a certain change in company priorities with regard to locational advantages related to market proximity, lead times or production costs (EU, 2021)

To manage the effect of unanticipated risk and undertake right decision, adaptive supply chain resilience enables to have more elasticity, rapidity and cooperation (Jüttner and Maklan, 2011). Internal risks in supply chain activities used to be managed with more elasticity of resources to ensure supply chain resilience. “firm’s ability to integrate, build and reconfigure internal and

external competences to address rapidly changing environments” Consequently, ensuing supply chain resilience using a proper risk mitigation approach is not easy in extremely unreliable global chain. To manage the global supply chain effectively, there is need to figure out potential risks and define appropriate mitigation strategies (Giannakis and Papadopoulos, 2016) (Juneho and Neungho, 2020).

Effect of Pandemic on different industrial sectors

Global value chains have been extended to several industries, strategies are differentiated between industries, Auto makers, electronic and technology fields. For instance, Fashion key trademarks, Benetton pull out their facilities from Asia Post-Pandemic and placing production facilities nearshoring in Serbia, Croatia, Turkey, Tunisia and Egypt, with the aim of sharing production in Asia by the end of 2022. Producing in Egypt condensed with almost 2 months while dealing with Serbia and Croatia will have delivery time o five weeks. *“It’s a strategic decision to have more control on the production process and also on transport costs”* they placed 10% of production out of Asia (Anzolin and Aloisi, 2021).

Samsung new edition of smartphone in Daegu, Korea, Post COVID, it placed semi-finished components manufacturing to Vietnam. In some countries like, factory closures have added to the pressure. Nike, produce footwear in Vietnam which was suspended during pandemic and panned to be pull out resume

full productivity (Baldwin 2020). Hugo Boss is placing supply chain configuration nearshoring while Gap depends on overpriced air cargo to meet seasonal demands. H&M depend mainly on Asia for 70% of fabrication which was disrupted Post pandemic. Hugo Boss, is nearshoring to have own manufacturing facility in Turkey, Italy, Germany. Gap managed to overcome procurement delay due to shipment overcrowding and facilities shut-down (Brown, 2020) (Anzolin and Aloisi, 2021). Ford suspended its production facilities in America and Europe. Afterward, Volkswagen shut down its facilities in Europe and US. Upstream procurements had been defected as well with shutting down of facilities (Baldwin 2020). Zara, place more than half of it production nearshoring Spain, Portugal, Morocco and Turkey. (Brown, 2020).

Resilience & Robustness

Resilience means dealing with the origins of emergencies while enriching the firms' resources to overcome the risks. Conception of resilience is distinguished of robustness. Resilience is ability to resume operation within minimum interval post pandemic. While robustness is the capability to sustain processes throughout emergency (Miroudot, 2020). In accordance to firm' perception, a risk management approach of resilience differs than robustness.

From resilience perspectives, firm will go to restructure supply chain activities post the crises, single sourcing approach is key

approach to be followed to maintain long-term relationship with suppliers. Companies will be using safety stocks to sustain the supply sources within disruption (EU, 2021).

A robustness trend, is more depending on diversity of sources to give more flexibility to switch between suppliers during the disaster and ensure production continuity. Robustness strategies ensure significant costs. To work with diversity of suppliers, quality issues monitored, lead times observed, cost mark-ups for minor orders received. Resilient firms tried their best to overcome any suspected disruption with anticipating to that to narrow down its impact (Miroudot, 2020)

Supply chain resilience is “the capacity for an enterprise or set of business entities to survive, adapt and grow in the face of turbulent change” (Fiksel et al., 2015). Hohenstein et al. (2014) investigates supply chain resilience and define it as “*the capability to react to, cope with, adapt to or withstand unexpected event*”.

Resilience is the adaptive ability to manage and endure unforeseen events (Golgeci and Ponomarov, 2013), overcome any consequences related to unanticipated fluctuations (Klibi et al., 2010) and respond to interruption (Kumar and Sosnoski, 2011). Resilience moderate the effect of disruption and enrich the ability to recuperate rapidly by upholding stability of handling business process and control configuration and business function (Pettit et al., 2013) Juneho and Neungho (2020)

Robust supply chain approaches enable companies to adopt contingency plans when disruptions take place, since while it is inapplicable to condense the possibility of disruptions, there are different means to manage its impact on supply chain activities to have more resilient effect.

Developing a *Supply alliance network* to have more diversity of supplying sources from different countries. *Lead time reduction* is another strategy for Robustness, consolidate supply chain activities in major area avoid transportation timing in between. Alternatively, *Recovery planning systems* is another option for Global chains to consider. Giving a great visibility would enable to adjust the capability of the supply chain partners by time of disruptions. (Tang, 2006),

Manufacturing Technology & Automation- Smart Factory

The technology played great role in supply chain through three revolutions. First revolution through use of steam machines invention. The second industrial revolution introduces the use electricity and manufacturing ‘originations’ and initiates concept of mass production and number of automation features. The third industrial revolution introduces computer networks, the adoption of robotics in manufacturing, e-connectivity and increased level of automation features deployment (i-scoop, Marr (2018).

In the fourth industrial revolution the ubiquitous mobility one, connecting electronic trend with physical backgrounds (*Cyber*

Physical Systems), this generation embed the introduction of several technologies *Internet of Things*, *Big Data*, *cloud* with robotics and artificial intelligence trend to conclude with Industry 4.0 for full automation of production facilities. Cyber-physical systems form the basis of Industry 4.0. They use modern control systems, embedded software systems and connected wirelessly to form *Internet of Things*. Such networked systems enables production optimization (i-scoop, Marr (2018), (Dollar, 2020)

State-of-the-art in production automation aims to increase the competence of production cycle. With early generation, manufacturing state-of-art was focusing on individual organization boundary instead of supply chain with release of new technologies as Lean Management and robotics biomaterials, RFID, embedded systems. The need for supply chain defragmentation to integrate the partners and enable full automation. Fully automated production facilities enables least human interaction. (Sarma & Schmidt, 2013), (Nukeaw and Pecharpa, 2013). Emergence of Internet of Things, Cloud-based Engineering and Smart Manufacturing contribute to Industry 4.0. Industry 4.0 includes up-to-date high-tech developments to integrate the physical objects, human interactions and smart machines across boundaries to form agile value chain. (R. Berger, 2015)

The pandemic outbreak will indeed speed up emergence of Industry 4.0. The concept of deploying robots in every single production process was not a valid argument earlier than the

pandemic. Hiring human labor from developing countries to handle sewing activities was more affordable than deploying an automated service in that industry, While, it is realistic for any technology related industries. Nowadays, post pandemic, every single industry is reconsidering their automated solutions. Unexpected backlog during pandemic ‘disruption led to reconsidering different scenarios of supply chain resilience and adopting smart technologies and turning robot to more attractive cost-effective choice. Industry 4.0 adoption did not substitute developing countries role in global chain, instead obligating them to behave in light of state-of-arts of production. (Dollar, 2020).

Number of studies investigated the adoption of industry 4.0 pre-pandemic adoption. Schumacher et al, (2016). Most of their case studies claim that Industry 4.0 is a complicated solution to be adopted, improper awareness of such solution did not urge firms enough to adopt and get benefits. The authors urge the academia and practitioner to emerge the industrial organizations more to be more oriented toward industry 4.0 adoption. Manufacturing Firms were experiencing difficulties because of improper introduction of such combination of technologies: Internet of Things, Cloud-based Manufacturing. The study proposed a maturity model for industry 4.0 adoption. It have many pillars to be considered from strategy for implementation, leadership through technology adoption and implementation, external issues such as culture difference and readiness toward technology

adoption, governmental rules that could support that in addition to customization service that could be provided to customers. The model is beneficial to measure readiness of any industrial firms willing to go for industry 4.0

Dimension	Exemplary maturity item
Strategy	Implementation I40 roadmap, Available resources for realization, Adaption of business models, ...
Leadership	Willingness of leaders, Management competences and methods, Existence of central coordination for I40, ...
Customers	Utilization of customer data, Digitalization of sales/services, Customer's Digital media competence, ...
Products	Individualization of products, Digitalization of products, Product integration into other systems, ...
Operations	Decentralization of processes, Modelling and simulation, Interdisciplinary, interdepartmental collaboration, ...
Culture	Knowledge sharing, Open-innovation and cross company collaboration, Value of ICT in company, ...
People	ICT competences of employees, openness of employees to new technology, autonomy of employees, ...
Governance	Labour regulations for I40, Suitability of technological standards, Protection of intellectual property, ...
Technology	Existence of modern ICT, Utilization of mobile devices, Utilization of machine-to-machine communication, ...

Figure 1- Dimensions and Maturity items of Industry 4.0

Proposed Model

Based on above discussion on global supply chain role and their response toward pandemic' disruption. This study proposes a model for global supply chain to react post-pandemic and resume global chain activities. The model proposes different routes of

strategies to adapt to disruptions either to replace the sourcing and production facilities back-to home countries or nearby countries, alternatively, Industrial firms could minimize the effect of the disruption by keeping offshore activities and tend to have more than single-sources and multiple production facilities to have more flexibility. The study proposes that most of industry related to non-technology based that require fast development would prefer to go for reshore/nearshoring option while electronic and technology oriented industry will be hard to relocated outside Asia for cost issues. The emergence of industry 4.0 is mandatory for both scenario to manage any unexpected disruption and overcome its consequences. The maturity model to adopt industry 4.0 is mandatory to have a successful adoption and its fruitful outcome. It enables decision makers to assess the existing competences prior adoption of Industry 4.0.

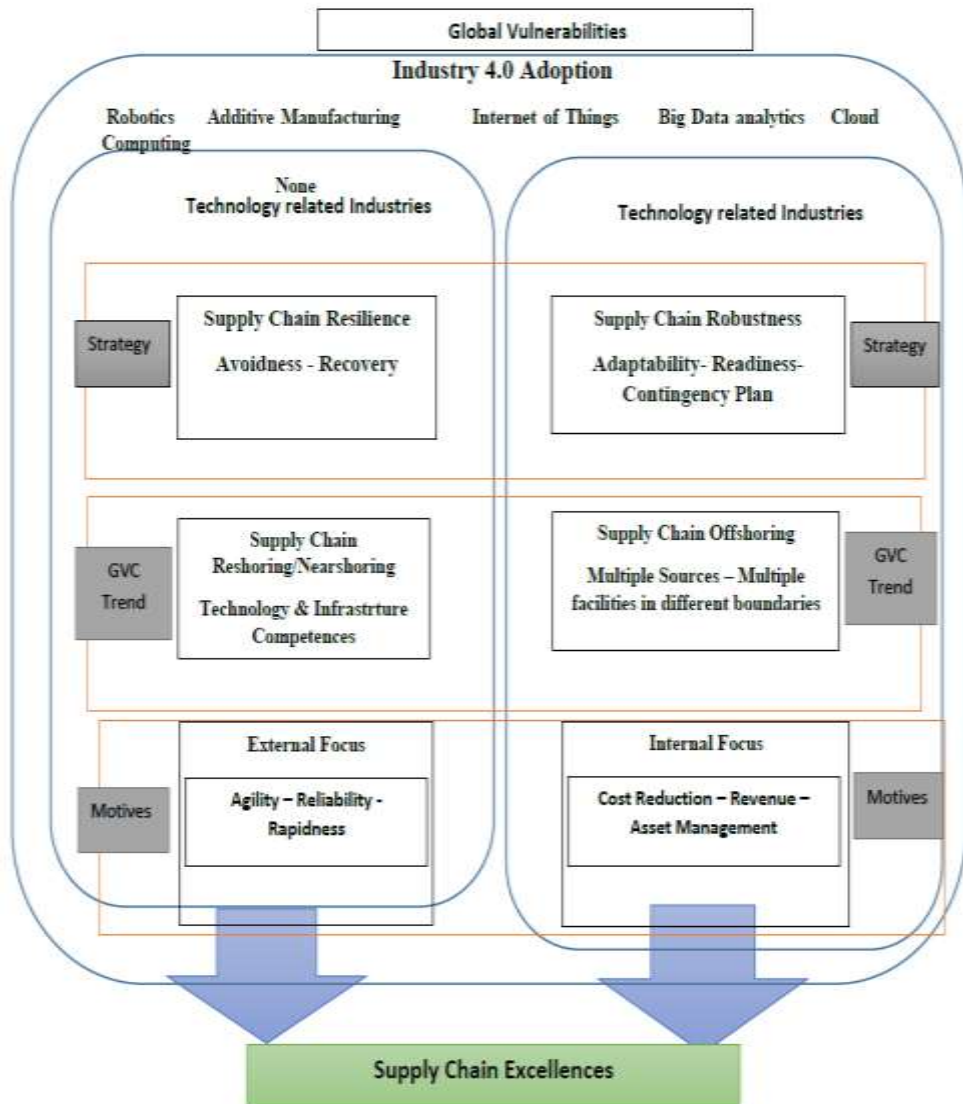


Figure 2: Proposed Model of Global Supply Chain Response Strategies Post Pandemic

Conclusion

The pandemic has speculating reshoring manufacturing to home countries. Meantime, Reshoring does not assure resiliency of global chain activities. There is always a need for more systems' capabilities to survive, anticipate, to response of any disruption even catastrophic incidents. (Sheffi, 2005).

Supply chain reconfiguration was under the way earlier than the pandemic. Many empirical studies have been studying the reshoring option prior pandemic due to increased tariff and required level of automations. Post Pandemic, securing nation's needs was one of top priority for industrial firms (Brown (2020). Parishioners and supply chain analysts did not claims to have the best options to ensure production continuity in regards of high labor wages in developing countries and expenses of raw material there.

Even though reshoring from Asia and China is on the rise, the reshore take place to intra-EU. This does not mean that offshoring strategies are no longer being chased. Reshore has a limited effect of employment rate in home countries. Most probably, motives behind reshoring is lack of flexibility, quality issues and the critical nations' need. (EU, 2021)

Labor forces in developed countries is an issue to make that successful, " The skilled workforce in the United States isn't up

to the workforce skill level in Germany, Switzerland, Japan and some other countries”, Moving manufacturing to North America is not going to be simple. That takes time and a huge investment. It’s not necessarily going to happen quickly, even with a concerted effort," he said. Europe requires clean manufacturing technology, as well. Environmental rules may be an obstacle to companies interested in reshoring. China has allowed some processes that have been disqualified in the U.S., like certain plating chemicals (Greenfield, 2022)

Either for offshoring or re-shoring scenario, Decision makers should have resiliency plans to manage incidences of supplying’ disruption during any unexpected circumstances. Further researches are required to investigate the role of developing countries in new era of global chain post pandemic. Accelerating their supply chain excellence to cope with the new era is mandatory from now one. Further investigates is required as well for reshoring cost-benefit analysis to ensure its efficiency.

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