



A STUDY ON THE FUTURE OF SUPPLY CHAIN MANAGEMENT BY LEARNING FROM SUEZ CANAL CRISIS, UKRAINE WAR, AND CHINAPLUS ONE POLICY

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ABSTRACT

With the growth of the Suez Canal and its development, it became a catalyst to globalization. But in 2021 when a large ship got stuck in the Suez Canal, the catalyst became a bottleneck. Global trade was severely impacted by the accident. The Ukraine war had an adverse impact on the supply of wheat and sunflower from Ukraine and Natural Gas from Russia. The power of competitive advantage was lost in world trade due to this war. The US has continued its hostilities towards Trade with China and the current situation can be best described as a Trade War. MNCs are now implementing the China plus one policy. All these points indicate that the future of SCM is going to be different as globalization is turning the corner. This paper will discuss lessons that businesses can learn from these events to build more resilient and agile supply chains, such as the need for more visibility and traceability, diversification of suppliers, and contingency plans.

Introduction

Supply Chain Management (hence referred to as SCM), is something that we might not think about but affects our daily life to its very smallest point. Simply put, SCM means the process of managing the flow of goods and services, from its raw material stage till its delivery to the customer. In our globalised economies where each country is more interlinked and interconnected than ever before, SCM and logistics play an important role. Today, the production of a particular product doesn't happen in just one location and isn't bound by geography but is international. Raw materials sourced from India and countries in Africa, sent to China for manufacturing, where each component may have been made somewhere else, and ultimately sold in the western market is a common example of this. Optimizing and continuously refining SCM hinges on comprehensive visibility across the entire supply chain. This visibility empowers organizations to meticulously track goods and services as they traverse each stage of the supply chain, enabling timely identification of deviations from plans and expeditious corrective actions. It also grants decision-makers ample time to proactively respond to disruptions or unforeseen obstacles, fostering resilience and agility within the supply chain. SCM encompasses the intricate oversight of a potentially vast network of interconnected entities, including sub-suppliers such as raw materials-providers, suppliers, manufacturers, logistics partners, wholesale distributors, retailers, and ultimately, end users.

Background on these events

1. Suez Canal Crisis



Suez Canal has been pivotal for trade between Europe and Asia since its inception. It was often regarded as the bridge between western world and the eastern world. When in 2021, a massive ship got stuck in the canal and blocked world trade, it prompted Supply Chain Managers to look more deeply into their systems to ensure they're prepared for such unpredictable events in the future.

2. Ukraine War Crisis

On 24th February 2022 Russia attacked Ukraine when Putin announced a “special military operation” to demilitarize and denazify Ukraine. The most serious effect of the war for the global economy will be higher oil prices. The military operation into Ukraine is also a clear warning to the world about Russia’s opposition against NATO’s further expansion and Ukraine’s intentions of joining NATO in the future. The war is devastatingly affecting the human population and will likely have long term effects on global trade, particularly the oil and wheat markets.

3. China Plus One Policy

Since the 1970s, most leading MNCs have had their production houses in China, due to low labor costs. But changes in geopolitical dynamics have left them wanting to not be reliable on just China and to look for diverse sources of manufacturing. Supply chains have had to evolve quickly and adapt to multiple sources of manufacturing, which has put a strain on therecovering world economy from the 2020 pandemic.

Objectives

1. To study the impact of mentioned events on Global Supply Chain.
2. To understand the problems faced in Modern Logistics.
3. To provide solutions to those problems.

Research Methodology

The research methodology for this study focuses on the analysis of effective management of supply chain with specific focus on the mentioned events. Data will be collected from secondary sources, including government agencies and industry reports and other research papers with comprehensive coverage of the entire dataset. Ethical considerations, such as data privacy, has been maintained, and data limitations will be acknowledged. This methodology forms the structured foundation for meaningful insights and conclusions in the study.

Literature Review

The literature on supply chain management emphasizes the transformative role that technology has in managing complex global challenges. Insights from Investopedia provide a foundational understanding of SCM dynamics, while the Suez Canal Authority offers historical context on trade route significance. BBC and The Conversation reports highlight the impact of geopolitical tensions, particularly the Ukraine-Russia war. India Today and Business Standard quantify the financial toll of crises like the Suez Canal blockage and analyse strategies like the China Plus One policy to diversify supply chains.

Meanwhile, Fletton and the World Economic Forum discuss weaknesses in the global supply



chain and point to the need for resilience amid wheat shortages and other challenges. Macrotrends and BBC News offer insights into China's export trends and the impact of geopolitical tensions on commodity markets. Business Insider has covered efforts to fix supply chain problems like the Ever-Given ship problem.

In addition, research taken from ArXiv and Academia.edu explores the transformative potential of AI in supply chain management, particularly in increasing efficiency and safety in the food supply chain. Collectively, this volume highlights the critical importance of technology integration, transparency, and adaptability in creating resilient and efficient supply chains that can navigate today's dynamic global marketplace emphasizing the interconnectedness.

Data Analysis

1. Suez Canal

The Suez Canal was established in 1869 and helped to reduce world trade traffic around The Cape of Good Hope and cut the journey by an approximate of 23 days. As the world economies grew, the Suez Canal also widened and deepened to help larger cargo vessels travel through. In early 2021, one such vessel, The Ever Given, lost its ability to steer due to an ongoing sandstorm and strong winds and got lodged in the banks of the canal. This blockage cost approximately 54 billion dollars worth of goods to come to a halt as they couldn't go through the canal anymore while the ship was stuck. These ships did not just have cargo on board but also livestock, which became a challenge for logistics companies to manage. Apart from that Suez Canal is important because it has:

- 12% of the global trade.
- One million barrels of oil/day.
- 8% of daily trade of liquefied Natural Gas
- Daily incomes of \$14-15 million. Pre-Pandemic represented 2% of Egypt's GDP.

2. Ukraine War Crisis

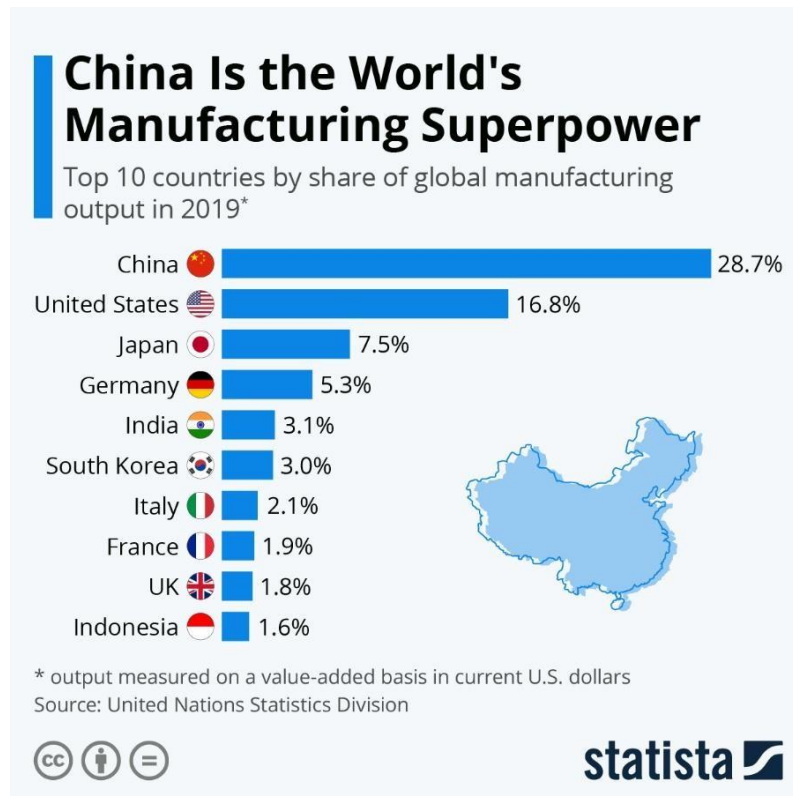
As Russia supplies over 14% of world's fuel requirement, especially to Europe, the outbreak of the war, meant a severe energy crisis for Europe and worldwide. As gas prices skyrocketed, cost of shipping goods also increased. Along with that, many countries began imposing sanctions on Russia to stop the war, which resulted in the shift manufacturers had to take to move to another country and calculate optimal shipping routes.

Ukraine and Russia were qualified as the bread baskets for the world. They together used to share 30 percent of global wheat exports. According to FAO, the withdrawal of these two economies from global wheat exports would enhance the number of under nourished people by eight to 13 million over the course of this year and next. As the war has already badly affected, the sowing of the crop, the future of wheat production is also dim. Ukraine was also the main source of sunflower oil. The disruption of its trade also fuels the price of vegetable oil globally. So, the UN Secretary General, Antonio Guterres warns that the war could reverberate far beyond Ukraine causing a "hurricane of hunger" and a meltdown of the global food systems.

A study conducted by the R. K. Talreja College of Arts, Science and Commerce concluded that "If the current conflict does not de-escalate, the oil prices in the global markets can again reach as high as 138 USD/BBL and can even test higher highs" which, as oil prices rise, it is likely to do.

3. China Plus One Policy

China is sometimes known as the manufacturing unit of the world. Since the 1970's most of the world's goods are produced in China. In a report by the UN, 28% of worlds



manufacturing took place in China. But recently, due to rising labour costs in the area and to not be overly reliant on one country, a lot of Western MNC's have adopted a "China Plus One" policy in which they invest in one other country along with China. Since the first implementation of this policy 10 years ago, Global Supply chains have had to adapt to goods coming not just from one country but multiple countries (Mexico, India, Philippines).

Solutions:

1. Transparency Policy:

Transparency in supply chain management has emerged as a critical strategy for businesses seeking to build trust with stakeholders, enhance brand reputation, and ensure ethical and sustainable practices throughout their operations. A policy that entails the disclosure of information regarding various aspects of the supply chain, including sourcing of raw materials, manufacturing processes, labour practices, and environmental impact is very important in our current world of unprecedented change, where we face challenges such as Global Warming, increase in corruption, increase in unethical practices, where consumers are growing increasingly aware of the sustainability problems in our current ecosystem. The recent surge in information about the exploitation of the citizens of the Democratic Republic of South Congo, which holds 60% of the world's cobalt reserves, Cobalt, which is an important component of lithium-ion batteries which are used in almost all our electronic devices, is a testament to the



growing concerns in consumers on how their product is manufactured and delivered. Implementing such a policy involves leveraging technologies such as blockchain to create immutable records of transactions and product movements. Blockchain technology enables the creation of transparent and tamper-proof digital ledgers, allowing stakeholders to trace the journey of products from origin to destination. By recording each transaction in a secure and decentralized manner, blockchain enhances transparency and accountability across the supply chain.

Being transparent about their supply chain, such as Where do they get their raw materials? How is it shipped? Where is it produced? Is child labour involved? can help answer consumer concerns over whether the product is authentic, if it has been ethically made; and what is the carbon footprint involved in the making of this product? Giving consumers this information, has a two-fold effect, as companies are held accountable for their actions, but consumers get to make better purchasing decisions, helping build trust and loyalty.

Another benefit of having transparency in supply chain management is, the collaboration between logistics partners will increase. As every logistics company can see the collective problems, they face they can use their collective minds to tackle the solution quicker. Imagine how much easier the Suez Canal crisis could have been handled, if the companies involved, had a transparency policy, so that they could come up with effective solutions quicker.

A policy which enables transparency, also allows for regulation and risk management to be more effective. As companies let their workings be more transparent, it becomes easier for lawmakers to ensure that they are compliant with local and international laws. This also eases following industry standards and ensuring sustainability.

In summary, transparency in supply chain management is essential for fostering trust, accountability, and sustainability across the value chain. By embracing transparency policies and leveraging technologies such as blockchain, companies can enhance visibility, mitigate risks, and build resilient supply chains capable of thriving in an increasingly complex and interconnected global economy.

2. Technological Policy:

In the fast-paced digital era of the 21st century, technology has become a cornerstone of modern supply chain management, offering unprecedented opportunities for innovation, efficiency, and competitiveness. A technological policy entails the strategic adoption and integration of advanced technologies, such as artificial intelligence (AI) and data analytics, to optimize supply chain operations and ensure efficiency. With the growth of generative AI, it has become ever more important and crucial for businesses to implement AI to aid in their growth and streamline services.

An example of how this can be used is, Given the prompt *“Hello, I am a logistics manager for a shipping company. Our base of operations is Mumbai, India. We have an order of ~100 kgs that needs to be sent to Lunde port, Sweden, via sea. Currently, due to the Israel Palestine war and Yemen attacks near the Suez Canal we are quite uncertain to send our goods through the canal. Unfortunately, a few of the goods on board are perishable and might end up expired in Sweden. Can you give us a route we should take, to ensure minimal risk of attacks and so that the goods end up in time (around 40-45 days) Given the ship will travel between 10-15 knots.”*

It can generate an answer like

“Considering the current situation and your concerns, here are some possible routes to ship your goods from Mumbai to Lunde, Sweden, via sea, while minimizing risk and ensuring timely delivery:

1. Cape of Good Hope Route:

This route circumnavigates Africa, avoiding the Suez Canal entirely. Estimated travel time: 50-60 days (depending on weather and sea conditions)

2. Red Sea - Gulf of Aden - Bab el-Mandeb Strait:

This route utilizes the Red Sea and Gulf of Aden, passing near conflict zones but avoiding the Suez Canal.

Estimated travel time: 45-50 days.

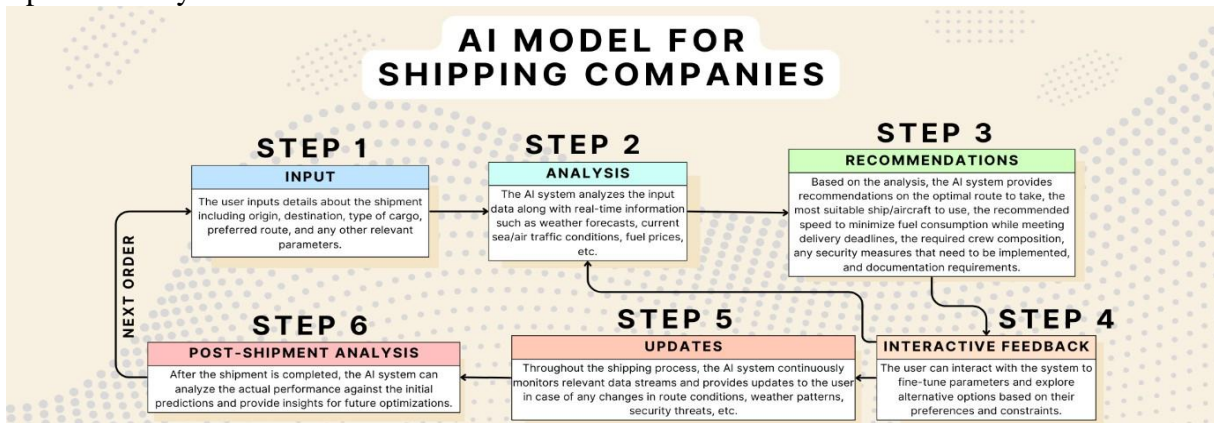
3. Mediterranean Route (via Gibraltar):

This route sails through the Mediterranean Sea and the Strait of Gibraltar, avoiding conflict zones near the Suez Canal.

Estimated travel time: 40-45 days.”

Considering this has been generated via a common chat bot, if an AI has been coded to specifically used in supply chains, then it can help businesses take quicker decisions by providing the right solution to the right problem.

A possible way this AI bot could work is:



The possibilities of such an AI are endless, it can be used for:

Route Optimization; Fuel Consumption Prediction; Weather Forecasting; Environmental Impact Assessment; Cargo Management; Crew Management; Regulatory Compliance; Security Threat Analysis; Vessel Performance Monitoring; Port Operations Optimization; Supply Chain Visibility; Customer Service and Communication; Risk Management; Data Analytics and Reporting and Continuous Improvement and Learning.

Let Us Explore how such an AI system would have helped during the situations we have mentioned above:

1. Suez Canal Crisis:

Route Optimization: The AI system could have quickly analysed alternative routes for ships affected by the closure of the Suez Canal, considering factors such as distance, transit time, fuel consumption, and port availability.



Weather Forecasting: It could have provided real-time weather updates and forecasts to help ships navigate safely through alternative routes, avoiding adverse weather conditions and potential hazards.

Supply Chain Visibility: The AI system could have tracked shipments affected by the canal closure and provided insights into inventory levels, delivery schedules, and potential disruptions in the supply chain.

2. Ukraine-Russia War:

Security Threat Analysis: Such a system could have monitored security threats in the region and provided alerts and recommendations to shipping companies operating in areas affected by the conflict.

Regulatory Compliance: It could have advised companies on international sanctions, trade restrictions, and legal requirements related to shipping goods to and from conflict zones.

Risk Management: By assessing geopolitical risks and analysing market trends, the AI system could have helped companies evaluate the potential impact of the conflict on their business operations and develop strategies to mitigate risks and ensure continuity.

3. China Plus One Policy:

Market Analysis: An AI system could have analysed market trends, economic indicators, and geopolitical dynamics to help companies identify suitable locations for setting up manufacturing facilities as part of the China Plus One strategy.

Regulatory Compliance: It could have provided guidance on local regulations, tax policies, labour laws, and environmental standards in potential host countries, helping companies navigate regulatory complexities and ensure compliance.

Supply Chain Optimization: By optimizing supply chain networks and logistics operations, the AI system could have helped companies diversify their supplier base, reduce dependence on China, and improve resilience to disruptions in global trade.

Environmental Impact Assessment: It could have evaluated the environmental impact of manufacturing operations in different countries and recommended sustainable practices and green technologies to minimize carbon footprint and promote environmental stewardship.

In summary, Technological Advancements in AI could prove to be a real time saver in Supply chain management, a tool that could revolutionise how we manage our logistics if used right.

3. Environmental/Fuel Policy:

Environmental management is an important aspect of supply chain management, especially with growing concerns about climate change, pollution, and environmental sustainability.

A key element of the environmental fuels' strategy is the transition from fossil fuels to renewable energy sources such as electricity and hydrogen fuel cells. Fossil fuels include coal, oil and natural gas which are major sources of greenhouse gas emissions and air pollution, contributing to climate change and increased environmental degradation. By investing in new fuel production technologies, companies can reduce carbon footprints, air pollution, and contribute to global efforts to combat climate change.

Electric vehicles (EVs) represent a promising alternative to conventional gasoline-powered vehicles, offering lower emissions, lower operating costs, and energy efficiency by electrifying transportation vehicles, investing in rental infrastructure. Companies can accelerate the transition to cleaner, more transport system sustainability by reducing reliance on fossil fuel.

Similarly, hydrogen fuel cells provide a viable solution for heavy transport and industrial



decarbonization, providing a scalable and efficient alternative to conventional diesel engines and combustion technologies. Hydrogen fuel cells generate electricity through chemical reactions between hydrogen and oxygen, producing only steam as a by-product.

However, hydrogen fuel cells face challenges related to hydrogen production, storage, and distribution. Hydrogen cars also face a problem of lower mileage, where the amount of distance covered under per kilogram of Hydrogen is very low compared to its counterpart. In addition, the development of hydrogen systems including storage and distribution channels requires capital investment and technological innovation. Despite these challenges, ongoing R&D efforts aim to overcome these obstacles and unlock the full potential of hydrogen fuel cells as a clean, sustainable energy solution for the future.

In the context of the ongoing Russia-Ukraine conflict, the implementation of environmental policies could play a significant role in reducing the impact of inflation of fuel prices and addressing the broader geopolitical and economic challenges associated with the crisis.

Why should Businesses Implement these policies?

Advantages for Consumers:

1. **Cost Savings:** Environmental policies, such as transitioning to alternative fuel sources like hydrogen or electric vehicles, can lead to reduced fuel costs for consumers.
2. **Improved Air Quality:** By promoting the adoption of cleaner energy sources and reducing reliance on fossil fuels, environmental policies contribute to improved air quality.
3. **Enhanced Product Transparency:** Transparency policies in supply chains allow consumers to make informed purchasing decisions by providing visibility into product origins, manufacturing processes, and environmental impact.

Advantages for Businesses:

1. **Competitive Advantage:** Companies that embrace environmental policies and sustainable practices can gain a competitive edge in the marketplace.
2. **Operational Efficiency:** Technological policies, such as investing in AI tools and automation, can streamline business operations and improve efficiency.
3. **Risk Mitigation:** Environmental and route policies help businesses mitigate risks associated with supply chain disruptions, transportation delays, and environmental regulations.

Conclusion

In Conclusion, this paper provides a brief look into how implementation of these technologies can help us maneuver supply chain in a much more systematic and controlled manner. By adopting transparency, technology, environmental considerations, companies can better manage the complexities of the supply chain. These techniques provide greater visibility, efficiency, and flexibility in the face of global disturbances. Embracing such improvements is paramount to ensure fast and consistent supply chain performance in an ever-evolving environment.

Bibliography

For Bibliography scan the QR code:

