

Procurement in the Age of Supply Chain Disruptions: Strategies for Building Resilient Networks

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Abstract— In today's age of volatility, where the slightest sign of uncertainty can unravel even the most meticulously developed plans, supply chains bear the burden of navigating a storm of intensifying geopolitical tensions, pandemics, environmental disasters, and economic flux. Earlier procurement models, portrayed disruptions as insulated-in-nature, with effects being confined to a certain region or supplier. However, as supply chains become more global and turbulent, a new procurement paradigm is needed, one that prioritizes resilience. Through practical examples and insights, this paper proposes an actionable framework for how organizations can become proactivity equipped for modern-day risks through employing a combination of strategies such as supplier diversification, emerging digital solutions, and inventory models, all of which effectively manage risks and maintain agility. It also explores the substantial upfront investment costs and administrative complexities as main deterrents of immediate implementation. However, it goes on to demonstrate how this framework establishes the foundations for long-term value, in both adaptability and stability, making them ultimately worthwhile.

Keywords— Supply chain, Procurement, Disruption, Resilience, Technology, Sourcing.

1. Introduction

Supply chains are more global and interdependent than ever, enabling unprecedented efficiency and scale through traditional procurement models focused on cost reduction and lean operations. However, disruptive global events, such as COVID-19 and international trade disputes, have highlighted their fragility and need for adaptability, as minor shocks can trigger a global supply chain

crisis through cascading ripple effects [1][2].

Consequently, procurement has transformed from an operational support function to a driver of organizational resilience, risk mitigation, and strategic value creation in a new era of supply chain agility and competitiveness. This paper suggests revising procurement models to prioritize adaptability, visibility, and sustainability to meet demand in the turbulent global markets.

2. Literature Review

2.1. Understanding the Drivers of Disruptions in Supply Chains

Understanding contemporary drivers of supply chain disruptions and their subsequent impacts is crucial to building procurement models that withstand shocks and capture opportunities. In 2019, the world and its businesses were caught off-guard when the COVID-19 pandemic halted the world; therefore, procurement strategies did not account for it. Border closures paralyzed trade routes, while labor shortages and factory shutdowns caused worldwide scarcity of goods and subsequent inflation [3]. These worldwide lockdowns, which were used to prevent spread, exposed the failures of systemic dependencies of global production and logistics networks [4], leaving them vulnerable in the face of altering consumer demand and high costs.

Moreover, political instability between nations in the global landscape, whether born of arms like the Russian-Ukraine war or trade tension like the US-China disputes, has significantly disrupted supply chains. Ongoing geopolitical tensions have led to the

imposition of tariffs and sanctions [5] while revisions of regulatory border customs created hurdles in the flow of goods and increased lead times (ibid), rendering predefined procurement plans ineffective, and emphasizing the need for businesses to assess their suppliers' exposure to geographic and political instability and its consequent impact on supply networks. Finally, adverse weather conditions have increased in frequency and intensity. Events like the EverGiven, driven by high winds and a massive sandstorm, lodged the cargo ship in the Suez Canal and debilitated trade infrastructures for six days and stalled 12% of the world's trade, leading to shipment delays [6]. In addition, floods, wildfires, and hurricanes can physically damage manufacturing and storage facilities, causing stock losses and economic damages, affirming that climate threats represent a business continuity risk [7].

2.2. Strategies for Building Procurement-led Supply Chain Resilience

Supply chain resilience pertains to a firm's capacity to effectively restore supply chain operations to normal levels in the aftermath of unforeseen disruption [8].

In response to this constant uncertainty in the tumultuous global landscape, businesses must redesign supply chains to improve agility and responsiveness [9]. Supply chain models must be reconfigured from reactive cost-centers to proactive, crisis-resilient functions. One approach to building resilience is implementing supplier diversification [10]. The focus on sole sourcing for economies of scale no longer suffice, as if a supplier or general area gets compromised, the entire supply chain could be crippled. Therefore, procurement is adopting multi-sourcing, establishing a supplier base across multiple regions to disperse geopolitical risks across a wide area while limiting vendor collusion and monopolies [11]. Moreover, global disruptions instigated the reevaluation of procurement's dependency on offshore, low-cost suppliers in favor of near-shoring and ally shoring [12]. Nearshoring involves the relocation of manufacturing and storage facilities closer to demand markets to overcome logistics-related costs and risks [13], while ally shoring prioritizes vendors in regions

that are considered political and economic allies, both of which provide contingency in the face of external disruptions. To reinforce this resilience, businesses should also treat suppliers of critical materials as strategic partners rather than transactional providers [10]. Developing strong supplier relationships built on trust, collaboration and shared risk management fosters mutual understanding and coordinated response through information sharing, joint problem solving and innovative thinking. In times of crisis, valued suppliers are more likely to prioritize their partner's needs, remaining reliable and responsive for better outcomes amid disruptions.

Moreover, the role of technology within procurement has similarly expanded and deepened, especially with the continued emergence of superior and more innovative solutions. Employing advanced technologies across different supply chain stages enhances visibility, responsiveness, and decision-making under unprecedented disruption. Supply chains are integrating Internet of Things (IoT) devices in logistics and warehousing systems to track and monitor goods in real time and identify delays [14]. Procurement automation tools also reduce human error, shorten cycle times, and allow buyers to focus on strategic procurement activities. Also, blockchain technology ensures transparency and integrity by providing a digital, tamper-proof ledger that records information, facilitating traceability within the value chain [15]. Additionally, Artificial Intelligence (AI) leverages machine learning (ML) to perform routine tasks, such as demand forecasts and route optimization, with higher level of accuracy. AI technology enables the identification of patterns and uses them to predict and address unexpected issues self-sufficiently.

3. Methodology

This methodology section outlines the approach utilized to develop a procurement framework that demonstrates supply chain reliability in face of global market conditions. It will do so by addressing the following three questions:

- What strategies has Saudi Aramco implemented to maintain business continuity in terms of procurement?
- What are their uses and what impacts do they have on the organization?
- What are some challenges commonly associated with these practices and how can they be addressed?

This paper adopts a qualitative approach, relying on case studies, as it was considered the most suitable in addressing the aforementioned questions. It provides a holistic view of the topic at hand in real-world context. Furthermore, case studies are great for generating new frameworks by assessing real word case studies to develop and reorient theories based on the findings of the research. Specifically, the paper will focus on Saudi Aramco as main case study due to its relevance and practical experience in demonstrating resilience in face of modern-day global disruptions. Information was collected through a combination of primary and secondary sources, capitalizing on availability of the company's website and press releases as well as data collected through other researchers in the field exploring Saudi Aramco's procurement practices.

The qualitative nature of the methodology enables the understanding of strategic intent and practical implementation, facilitating the extraction of key practices and lessons. In regards to challenges associated with implementation; predefined themes within different industries were assessed and addressed within the context of the paper in effort to bridge theory and practice through capitalizing on real-world best-in-class practice on building resilient procurement networks.

4. Findings and Discussion

4.1. Saudi Aramco: A Real-World Case for Supply Chain Resilience

Rather than limiting its supplier base, Saudi Aramco has engaged with multi-region manufacturers for materials through its in-kingdom offices and OOK affiliates, maintaining strong networks both locally and globally. In doing so, Aramco created a redundant supplier base to ensure that if a particular vendor fails, procurement activities can smoothly shift to alternative sources to guarantee that operations continue with minimal interruption to the business.

Saudi Aramco has also identified nearshoring as another strategy that underpins resilience. The In-Kingdom Total Value Add (IKTVA) program was launched in 2015 to cultivate local businesses and retain 70% of procurement spending in the kingdom. However, IKTVA is not only about

expenditures but also focuses on developing strong relations by supporting local businesses, prioritizing their proposal against OOK one, while providing training and financing [16]. Through localizing manufacturing, sourcing, and storing Aramco's supply chain can rapidly respond to sudden demand shifts and align with customer requirements, all while reducing logistics and warehousing costs [17]. Such an initiative enables Saudi Aramco to sustain operations independently even if global networks collapse, providing insulation to external disruption and ensuring business continuity.

Moreover, Saudi Aramco identified the importance of digital transformations and the value they could bring to their operations at an early stage. Aramco is on a transformative journey, digitizing procurement, logistics, inventory, and warehousing systems using the supply chain control center through AI, blockchains, and IoT. The system could place a purchase order independently, replace them, and track deliveries while checking and notifying users of contract expiration and procurement cancellations [18]. In addition, integrating the SAP Ariba e-marketplace allowed procurement activities to continue when COVID-19 lockdowns restricted physical contact. More recently, Aramco introduced the world's first end-to-end supply chain digital twin, a digital replica of the company's supply chain "as-is" in real-time, enhancing visibility [19]. It leverages historical data to accurately forecast customer demand, considering market conditions and global dynamics. It also detects potential disruption scenarios while suggesting testable contingency strategies that facilitate agile decision-making [20].

Finally, Saudi Aramco leveraged the strategies above to develop a strategic inventory management model, as Just-in-Time, lean procurement strategies that favor cost-only no longer suffice. Digitization and reporting provide real-time visibility into stock levels and transit flows, automatically replenishing consumable commodities. Similarly, multisourcing and nearshoring allow for a targeted buildup of safety stock of critical commodities that ensure minimal disruptions in times of uncertainty [21]. It also practices inventory pooling, where different business units and departments share stock reserves, which are dynamically reallocated on an as-needed basis, creating a certain degree of supply autonomy. In doing so, overall inventory is reduced, but demand is met in cases of emergency and disruption, facilitating internal adaptation and uninterrupted operations.

Saudi Aramco is able to navigate the turbulent global landscape by strategically and proactively planning and managing its procurement activities. Resilience entails adapting, recovering, and thriving in the face of disruption while maintaining competitiveness and continuity [22] [23]. Aramco was able to identify that the longer it takes them to recover, the worse the impact. Therefore, they developed a balanced mix of strategies that allows them to flexibly emphasize resilience when needed without disregarding cost considerations, ensuring long-term stability and operational agility.

4.2. Challenges to Embedding Resilience in Procurement Practices

Although resilience-based strategies are a strategic imperative in an age of unpredictability, multiple barriers to implementation exist. One is reconciling short-term financial pressures with long-term investments in redundant supplier base, buffer stock, and digital transformation. While these might place pressure and drain funds, associated benefits and returns on investment make a compelling case for adaptation [24].

Furthermore, despite high-level digitization introducing new capabilities, it also presents new forms of disruption as its rapid pace and complexity can pose a serious detriment to organizations unprepared to adapt. In addition, Cyber-attacks have become a newfound threat that looms over digitized businesses with threats of internal and external data breaches and risk of reputational damage [25][26]. Additionally, possible unexpected system failures hinder communications and visibility and lead to operational lockdowns, consequently creating bottlenecks in the supply chain (ibid). Businesses will have to make a digital strategy that adopts a constant adaptation mindset as new technologies arise rapidly and concurrently. They also should integrate cybersecurity mechanisms and workforce training to mitigate potential exposure as commitment to digitization positions procurement and supply chains to not only withstand disruption but lead through it [27].

Additionally, organizational culture significantly impacts the ability of businesses to transition towards a resilience-oriented procurement strategy smoothly. One of the main barriers stems from internal resistance to make the shift from familiar

cost-based models towards those with a high degree of adaptability, making leaders skeptical towards investments in resilience. Additionally, a lack of trust in technologies with regard to work security contributes greatly to this resistance [28]. Some businesses fragment their different functions into isolated clusters, which inhibit cross-functional collaborations needed to successfully implement resilience strategies across organizations. Finally, bureaucratic red tape that is hierarchical hinders the ability of supply chains to make swift decisions in response to sudden disruptions. However, by failing to modernize and adapt to the current volatile landscape, procurement professionals risk exposing their supply chains to substantial disruptions, leaving them vulnerable to emerging challenges and unable to respond effectively.

5. Conclusions

The procurement function stands at a pivotal moment and is a key player in ensuring business continuity. As supply chain disruptions become more frequent and complex, procurement strategies must evolve to prioritize resilience alongside traditional cost-efficiency goals. Organizations that are able to build diversified supplier networks, maintain strong supplier relations, embrace digital innovation, and utilize these strategies to increase visibility and agility not only survive disruptions but also create a competitive advantage for themselves in the future, facilitating their survival. Resilient procurement is not a discretionary approach but a strategic imperative in an age of uncertainty.

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