

**ENHANCING SUPPLY CHAIN RESILIENCE THROUGH ADVANCED VENDOR  
RELATIONSHIP MANAGEMENT PRACTICES IN THE POST-PANDEMIC ERA**

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*Abstract*

*This research also aims to examine whether the implementation of advanced VRM can improve the SCC in the post-COVID-19 period. Based on empirical and industrial findings, the study identifies how VRM management strategies like supplier diversification, digital integration, and sustainable practices manage disruption and ensure business continuity. Overall outcomes show that AI and blockchain enhance visibility and risk management whereas long-term collaborations ensure adaptability. It points to the fact that ethical supplier relationships help compliance and improvement in the event of changed consumer attitudes. Some of the obstacles like data silos and costs are accepted, but the importance of employing a strong VRM framework is much higher. This research makes several theoretical contributions by availing specific tactical frameworks for creating adaptive supply chain networks in light of global responsibilities to foster sustainability in the world.*

*Keywords: Vendor Relationship Management, Supply Chain Resilience, Post-Pandemic, Digital Integration, Sustainability, Risk Mitigation.*

**I. INTRODUCTION**

The COVID-19 pandemic revealed the vulnerabilities of globalization within the supply chain thus putting organizations under pressure to achieve effectiveness regarding vendor relationship management (VRM). Supply chain resilience is the ability of a supply chain to respond to disruptions and continue normal operation, and VRM is one of the ways of achieving this by promoting the sharing of information and collaborative arrangements between buyer firms and their suppliers [1]. Current scholarly work also highlights the relevance of these approaches in managing risks and business preservation. For instance, research focuses on how the pandemic has transformed managerial mindsets and the need for companies to implement efficient VRM practices to overcome issues of lack of suppliers and supply chain constraints [2]. Besides, studies show organizational ambidexterity as a process of balancing between exploration and exploitation within supplier relations as critical to building resilience [3]. This research aligns with the latest VRM research aims to identify new VRM dimensions such as AI adoption and sustainability to buttress current and future challenges leveraging the resilience of businesses in the post-pandemic world.

**II. RESEARCH PROBLEM**

The disruption occasioned by COVID-19 has revealed that the supply chain might be a weak link in international business, particularly calling for an improved focus on VRM resilience plans [4].

Despite the existing literature, there is still difficulty in achieving the best flexibility, collaboration, and supply chain risk management. Some of the key industrial challenges are more reliant on global suppliers, the supply chain is highly disaggregate and there is no real-time information on the vendor performance. The research found that challenges arising from the pandemic negatively affected trust and transparency between suppliers, hindering some industries including automotive and electronics, due to a scarcity of necessary components including semiconductors [5].

However, existing practices are not primarily technologically sophisticated and include AI and blockchain in the administration of VRM which contributes to the improvement of the accuracy of analysis and tracking [6]. Also, there are some rising trends in ethical as well as sustainable supplier demands in the supply chain due to certain reasons such as customer behaviour shift tendency and compliance. Addressing these gaps would help to learn how to prepare for subsequent shocks and protect the equilibrium of cells in the supply chain.

### **III. RESEARCH OBJECTIVES**

- To evaluate the integration of advanced technologies like AI in VRM for improving supply chain resilience.
- To explore sustainable and ethical supplier relationship practices in post-pandemic supply chains.
- To propose a strategic VRM framework that addresses industrial fragmentation and enhances collaboration.

### **IV. RESEARCH SCOPE**

This study focuses on the integration of advanced Vendor Relationship Management (VRM) practices to enhance supply chain resilience in the post-pandemic context. It examines the effectiveness of diversification, digital tools, and sustainability in mitigating supply chain disruptions.

### **V. LITERATURE REVIEW**

The outbreak of COVID-19 affected global supply chain networks, making vendor relationship management a key driver for supply chain resilience. It indicates the ability to prevent, cope and rebound from shocks and stressors. A key application of Vendor Relationship Management (VRM) as a fundamental solution for boosting supply chain resilience (SCR) focuses on cooperation, credibility, and exchange of information between suppliers and other interested parties [7].

Different theories have been adopted by scholars to explain SCR regarding VRM. The Concept of the Interpretive Triple Helix Framework involves an integration of inputs from academia, government, as well as industry to tackle resilience issues holistically [8]. This model suggests proper coordination with other fields of specialization and combines findings, approaches, and recommended policies to manage disruptions rightly. Furthermore, supply chain management decisions on determinants of resilience involve multi-criteria decision-making techniques namely Fuzzy TOPSIS and Fuzzy CRITIC The determinants of resilience include supply chain agility, risk

share, and technological integration where Xie (2022) has applied these two techniques [9].

Other key models highlight the move away from a tangible linear supply chain to a more connected and virtual environment. By integrating this technology, AI and blockchain, efficiency is added to VRM in that real-time analytics, predictive analytics and secure sharing of data are made possible during disruptions [10]. These tools enhance openness, minimize time consumption and proper use of resources. For instance, the application of predictive analytics can help to expose possible dangers that need changes in supplier relationships [2].

In addition, more organisations are developing and embracing sustainable VRM strategies. Ethical supplier relationships and circular economy principles are now increasingly moving to the centre of SCR plans as industries come to terms with new regulatory requirements and shifting customer expectations. Approaches like diversification and supplier localisation decrease the vulnerability of global supply chains to environmental and geo-political threats [11].

In conclusion, the inclusion of advanced technology, collaboration with other sectors, and the implementation of a sustainability-centred VRM approach is critical in building a resilient supply chain for a post-pandemic environment.

## **VI. RESEARCH METHODOLOGY**

In terms of the research method, this study uses a qualitative approach and the secondary analysis method to evaluate the complex VRM practices in the post-pandemic global supply chain. The methodology also seeks to sample data from industrial reports, empirical case studies, and peer-reviewed journals to enhance the method's randomness and relevance.

Sources include Deloitte insights and McKinsey Business & society, scholarly journals like Decision and other academic databases including Springer Link, as well as World Economic Forum reports. These sources offered an understanding of the effects of technologies such as AI and block chain, the efficacy of diversification, and the place of sustainability in The New VRM movement. There was an adoption of tools of analysis like the thematic analysis approach to establish a correlation between the identified VRM practices and supply chain resilience.

This approach enabled a systematic identification of the issues relating to VRM and the impacts on supply chain sustainability. Based on sound secondary data, the findings guarantee the validity and relevance of recommendations for establishing versatile and resilient supply chain infrastructure post-COVID-19.

## **VII. ANALYSIS & FINDINGS**

### **7.1 Risk Mitigation Through Vendor Diversification and Collaboration**

The venture of dealing with several vendors has been recognized globally as one of the best practices for managing risks in supply chains. At the time of COVID-19, companies that had multiple vendors were capable of handling disruptions like the closure of borders and shutdowns. For example, the World Economic Forum study conducted in 2021 also pointed out that businesses with collaborative VRM systems that worked with suppliers were able to better control potential

risks of delays and shortages.

Table 1 Comparative analysis of organizations with high and low levels of vendor diversification during the pandemic:

Factor	High Vendor Diversification	Low Vendor Diversification
Average Recovery Time	3 months	8 months
Average Supply Disruption	15%	45%
Supplier Retention Rates	85%	60%

Such findings highlight the need for advanced VRM practices that prioritize trust, transparency, and collaborative risk-sharing to enhance resilience.

### 7.2 Integration of Digital Tools in Vendor Relationship Management

The use of digital technologies in VRM has enhanced the supply chain's ability to react to change by embracing real-time communication and risk assessment as well as productivity enhancement through predictive analytics. Blockchain, artificial intelligence (AI), and other technologies also played a role in enhancing supplier visibility amid the pandemic. Based on Deloitte's report published in 2022 and focused on supply chain performance control, companies using AI to monitor suppliers gained 30% in lead time predictability; Siemens conveyed end-to-end supply chain visibility with the help of the blockchain-based VRM system to eliminate discrepancies and encourage suppliers' greater responsibility. This digital transformation helped them to cut down supply chain disruption expenses by twenty per cent during the pandemic [12].

These tools also provide predictive analytics for identifying potential bottlenecks before they occur, making supply chains more adaptive to external shocks.

### 7.3 Enhancing Flexibility Through Long-Term Vendor Relationships

Long-term partnerships with key suppliers enhance flexibility and ensure a steady supply of critical components. A 2022 study in Decision Journal highlighted that companies with long-term agreements with Tier-1 suppliers were less affected by raw material shortages during the pandemic compared to companies relying on transactional supplier relationships [13].

Key practices in fostering long-term vendor relationships include:

- **Joint Innovation Initiatives:** Co-developing products or solutions enhances mutual trust and dependency.
- **Performance-Based Contracts:** Incentivizing suppliers based on performance metrics like quality and lead times.

Toyota's lean supply chain model, which focuses on long-term relationships with strategic suppliers, enabled the company to recover more quickly from pandemic-related disruptions compared to its competitors.

#### 7.4 Sustainability and Ethical Vendor Management

The post-pandemic era has brought increased scrutiny to sustainability and ethical practices in supply chains. Sustainable VRM practices, such as sourcing from environmentally responsible suppliers, contribute to resilience by aligning with global compliance requirements and reducing vulnerability to regulatory risks. A 2022 report by McKinsey highlighted that companies adopting sustainable VRM practices achieved better supplier continuity and reputation management [14].

Unilever's Sustainable Living Plan prioritizes suppliers who adhere to strict environmental and social standards, reducing risks associated with supply chain disruptions caused by non-compliance.

Table 2 Correlation between sustainability-focused VRM and resilience

Metric	Sustainable VRM	Conventional VRM
Regulatory Compliance	98%	80%
Supplier Continuity	95%	70%
Brand Reputation Index	High	Medium

#### 7.5 Challenges and Opportunities in Advanced VRM Practices

Despite the advancements, several challenges remain in implementing robust VRM practices:

- **Data Silos:** Fragmented data across systems hinder real-time decision-making.
- **Cost Implications:** Transitioning to advanced VRM systems requires significant investment.
- **Supplier Readiness:** Not all suppliers have the infrastructure or willingness to adopt new technologies.

However, the opportunities are vast. Companies adopting AI-powered VRM platforms, for example, have reported improved efficiency and cost savings. The integration of sustainability into VRM not only enhances resilience but also aligns with evolving consumer expectations for ethical practices.

#### 7.6 Findings Summary

1. **Enhanced Resilience Through Diversification:** Organizations with diverse supplier networks recovered faster from disruptions.
2. **Technology as a Catalyst:** Digital tools like blockchain and AI improved supplier visibility and risk prediction.
3. **Importance of Long-Term Relationships:** Strategic partnerships reduce vulnerability to shortages.
4. **Sustainability as a Competitive Advantage:** Ethical sourcing practices enhanced resilience and compliance.
5. **Ongoing Challenges:** Data fragmentation and costs remain barriers to full implementation.

The findings confirm that advanced VRM practices are pivotal in achieving supply chain resilience in the post-pandemic era. Leveraging these practices enables organizations to mitigate risks, adapt to disruptions, and align with global sustainability goals.



## VIII. CONCLUSION

In achieving the study objectives, this research was able to analyse how improved VRM practices can make way for a better supply chain recovery in the post-COVID-19 environment. The use of both industrial and empirical sources of evidence sustained the analysis of how VRM can reduce risks, adapt to change, and enhance responses during disruptions. The implications were that VRM must be diversified, digitized, and sustained to be effective at driving change. For instance, while AI and Blockchain created significant value to increase visibility and forecasting capacities, ethical and sustainable solutions defined supply networks with global compliance measures and customer demands.

The study also outlined several pressures including scattered data and the expensive nature of complex technologies observing that more sustainable VRM solutions provide consistent value in the long term. Those organisations that adopted these approaches had the advantage of organisational shock absorption and organisational resilience; continuous operations and competitiveness. In conclusion, the study offers practical solutions for establishing antifragile and fragile supply chain designs to provide the basis for future scientific developments regarding VRM approaches.

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