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The Impact of Environmental Uncertainty on Supply Chain Risks in Vietnamese Textile Enterprises

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Abstract

The Vietnamese textile industry is facing significant development opportunities from the Free Trade Agreements that have been signed, which will bring potential for export expansion to major markets worldwide. Through the process of researching the supply chain status of the textile industry, the author recognizes the influence of environmental uncertainty on the operational efficiency of Vietnamese textile enterprises. Based on theoretical foundations, research models, and research results, the author draws several conclusions. The research results indicate the impact of environmental uncertainty on supply chain risks in Vietnamese textile enterprises. It also highlights the importance of adopting flexible measures in the supply chain to mitigate risks for textile enterprises.

Keywords: Textile industry, Supply chain, Environmental uncertainty

1. Introduction

The global supply chain has been a familiar part of the international business landscape for decades. It plays a crucial role as it is involved in almost every activity worldwide. For businesses, an efficient supply chain creates a competitive advantage by not only controlling and optimizing various costs but also enhancing customer service. On a broader scale, the

supply chain contributes to the prosperity of each nation and is a vital component in global economic development. In recent years, the outbreak of the COVID-19 pandemic has significantly disrupted most global supply chains (Araz et al., 2020). The first quarter of 2020 witnessed a 3% decline in global trade value, with 94% of Fortune 100 companies reporting supply chain disruptions related to COVID-19 (Teodoro and Rodriguez, 2020).

Unprecedented challenges have disrupted supply chains both in terms of supply and demand, severely impacting the economies of many countries, including Vietnam. The global supply chain disruption occurred due to supply and demand constraints as China and major countries worldwide struggled with the pandemic outbreak. The trend of globalization and company mergers has increased the instability in the operating environment of businesses (Abrahamsson, Aldin, and Stahre, 2003). Risk is an aspect of the instability in the business operating environment. A survey on global supply chains and risk management shows that production and supply requirements have undergone repeated changes due to the frequent emergence of new products and the decline in the standardization of existing products and services. This is the main cause of the complexity of supply chains, leading to supply chain risks (PwC and MIT, 2013). These risks occur frequently and are defined as operational risks of the supply chain (Thun and Hoenig, 2011). In this study, the research team focuses on the instability of the supply chain in terms of operational risks and the factors that drive and mitigate these operational risks.

The COVID-19 pandemic has significantly disrupted the global textile supply chain, including in Vietnam. Currently, the textile industry plays an important role in the country's economy. In the process of international economic integration, along with high competitiveness, the textile industry has risen to become one of the key export sectors of Vietnam's industry. The textile industry also has a high labor demand, making it easy to solve and attract employment for workers, including those from rural areas; thereby contributing to social stability and progress, improving production relations, ensuring and moving towards more equitable income distribution, while ensuring more jobs for society, reducing urban unemployment, and increasing labor utilization in rural areas. Specifically, the textile industry provides approximately 2.5 million jobs. There are about 6,000 textile and garment companies in Vietnam, 70% of which operate in garment production. Therefore, the instability and risks of the supply chain, especially the textile supply chain, will greatly affect the economy in general and textile enterprises in particular.

The Vietnamese textile industry is facing significant development opportunities from the Free Trade Agreements that have been signed, which will bring potential for export expansion to major markets worldwide. Additionally, the US-China trade war has prompted businesses to seek partners outside of China, with Vietnam being a promising candidate. However, in 2020, the textile industry suffered the most prolonged negative impact from the COVID-19 pandemic, with the pandemic causing a 3.89% decline in global textile trade compared to 2019. The IIP index of the textile industry decreased by 0.5%; the garment manufacturing sector decreased by 4.9% due to the pandemic disrupting raw material supplies, shrinking the market for garment products, and significantly reducing demand for textile products as consumers worldwide focused only on essential goods and pandemic prevention.

Therefore, the textile industry needs to find ways to survive and develop in line with the new context. To minimize the risk of supply chain disruptions, studies have suggested that flexibility and diversification are the best ways to mitigate risks. “Flexibility” has been studied for many years from an economic perspective (Lavington, 1921; Jones and Ostroy, 1984; Devereux and Engel, 2003) and an organizational perspective (Burns and Stalker, 1961; Boynton and Victor, 1991; Golden and Powell, 2000). In the field of operations management, flexibility was initially proposed to help managers cope with unexpected changes in the production system, such as equipment failures, changes in task completion times, delays in loading and unloading, and re-manufacturing (Sethi and Sethi, 1990). In this regard, flexibility represents the ability of a manufacturer to restructure resources to improve productivity and quality. Bevilacqua et al. (2019) suggested that since manufacturers value flexibility in order fulfillment, a flexible production structure is crucial to timely address unpredictable market fluctuations. Sreedevi and Saranga (2017) pointed out that flexibility in supply, production processes, and distribution plays a regulatory role in the relationship between environmental uncertainty and supply risk. Flexibility demonstrates a company’s ability to adapt to unforeseen environmental changes in both production and market processes. Flexible manufacturing is one of the main competitive weapons for manufacturers in today’s competitive market (Beamon, 1999; Oke, 2005). Through the collection of domestic and foreign documents, the team found that there are many studies that have pointed out the factors that cause supply chain risks as well as research on the impact and impact of supply chain risks on business operations, but the studies only list, presents types of risks that few studies focus on identifying mechanisms to address risk gaps and mitigate supply chain risks.

Thus, although previous studies have highlighted the types of instability and supply chain risks, they have not delved into the study of the relationship between them nor have they come up with some specific solutions to reduce supply chain risks. In addition, the content is not comprehensive and the scope of research is still narrow. Aware of this situation, the research team conducted a study on the impact of an uncertain environment on supply chain risks at textile and garment enterprises in Vietnam to conduct research.

2. Proposed Research Model

Based on the relationships in the theoretical foundation and research overview, the authors propose the following research model:

The research model is built on: The research model of Sreedevi, R.; Sarana, Haritha (2017). Currently, few studies use a model similar to that of Sreedevi, R.; Sarana, Haritha (2017). Most other studies on this topic still use relatively simple, conventional models with few dependent variables. Moreover, Sreedevi’s model was proposed in 2017, which is quite recent (2022). At the same time, this model still holds practical significance today. Models in other studies have been used for a long time and have little practical significance. Therefore, we base this research model on the theoretical foundation of Sreedevi et al. (2017). To process the data in this model, the research team uses the PLS-SEM structural equation modeling method.

Three groups of factors include:

- Environmental uncertainty.
- Supply chain risks: supply risk, production risk, delivery risk.
- Supply chain flexibility: supply flexibility, production flexibility, distribution flexibility.

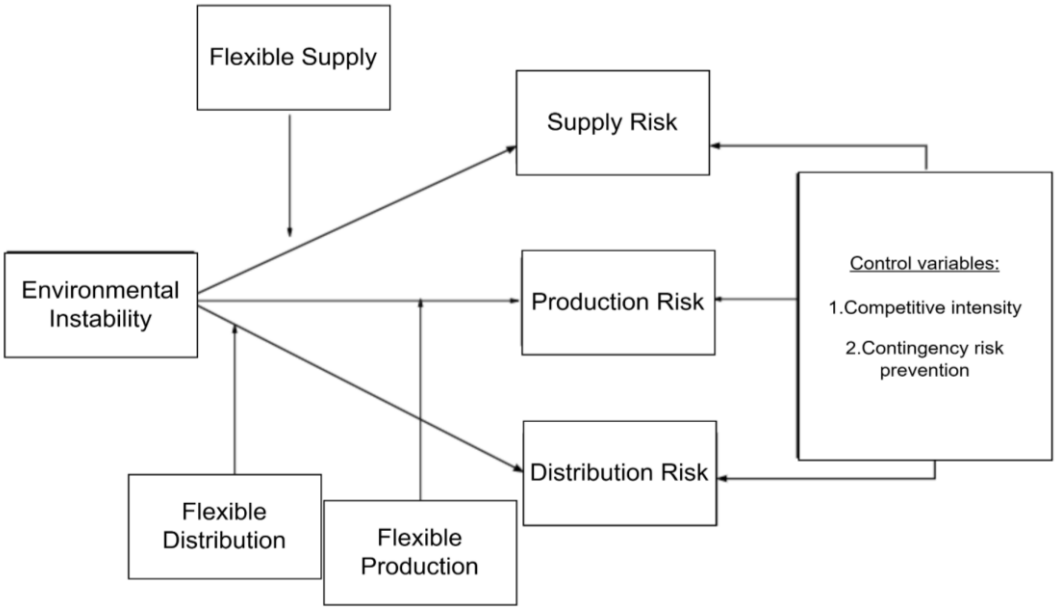

Figure 1. Proposed Research Model

One-way impact arrows: From environmental uncertainty to supply chain risks: supply risk, production risk, delivery risk (i.e., environmental uncertainty impacts supply chain risks). From supply chain flexibility: supply flexibility, production flexibility, distribution flexibility to the relationship between environmental uncertainty and supply chain risks (i.e., supply chain flexibility impacts the relationship between environmental uncertainty and supply chain risks). Six research hypotheses from H1a to H1c, H2a to H2c.

3. Research Methodology

After collecting a sufficient number of samples (specifically 254 samples), the team proceeded to clean the samples and then conducted the official data analysis. After compiling the data, the team tested the reliability of the factors using the Cronbach's Alpha analysis method. Following this, the research model and hypotheses were tested using the SEM structural equation modeling method.

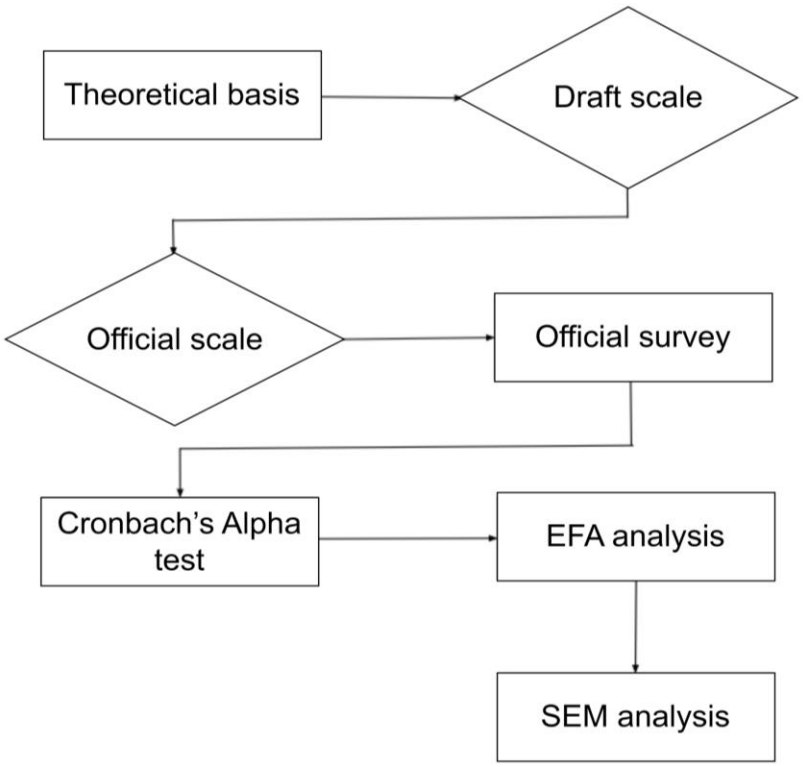

Figure 2. Research Process Diagram

After conducting the data collection methods according to the process, the data analysis results will be clarified in the next section.

4. Research Results

The remaining relationships are all statistically significant. Specifically, the variable EU impacts the variables SR, MR, and DR with impact levels of 0.325, 0.298, and 0.607, respectively. Thus, environmental uncertainty affects, specifically causing supply risk, production risk, and delivery/distribution risk for businesses. In other words, businesses with high environmental uncertainty are more likely to encounter supply chain risks => Hypotheses H1a, H1b, and H1c are accepted.

Accordingly, the indirect relationships are all statistically significant, except for the relationship between DF and DR, which is not statistically significant with a p-value = 0.442 > 0.05. Specifically, the variables SF and MF have a positive impact on the variables SR and MR with impact levels of 0.169 and 0.197, respectively; additionally, SR positively impacts MR, and MR positively impacts DR (with impact levels of 0.189 and 0.224, respectively).

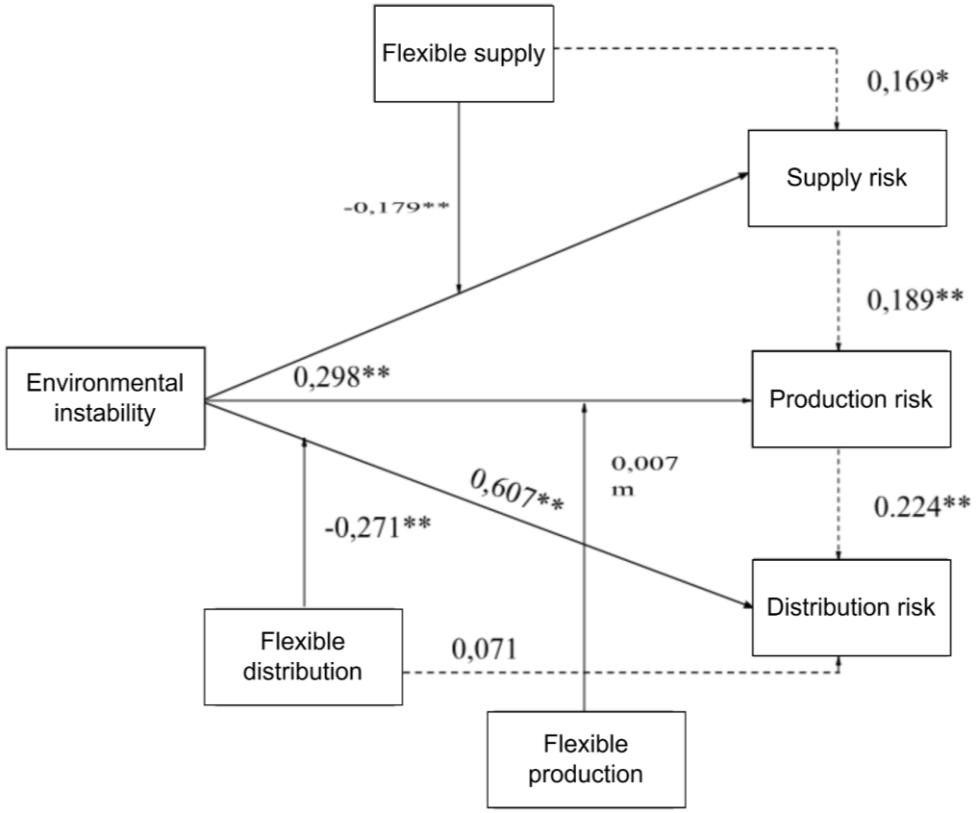

Figure 3. Impact Coefficients of Variables

5. Research Conclusion

The research has demonstrated the relationship between environmental uncertainty and supply chain risks, while also providing assessments of the benefits of supply chain flexibility, production flexibility, and distribution flexibility in mitigating supply chain risks in Vietnamese textile enterprises. To better compete in the market, businesses must enhance their product supply capabilities and increase product customization. This leads to increased uncertainty in the supply chain. In today's fiercely competitive environment, supply chain uncertainty is inevitable; however, this uncertainty does not necessarily lead to supply chain risks if businesses adopt flexible supply and production systems as a measure to mitigate risks.

The research has answered the posed questions, showing that environmental uncertainty positively impacts supply chain risks in Vietnamese textile enterprises, meaning that businesses with high environmental uncertainty face higher supply chain risks. The application of appropriate supply chain flexibility measures will help mitigate these risks, but it depends on the environment in which the business operates. Specifically, the research team found that supply flexibility and production flexibility play a regulatory role in the relationship between environmental uncertainty and corresponding supply chain risk factors. Therefore, in an uncertain environment, textile enterprises that adopt flexible supply and production strategies will have relatively lower supply and production risks compared to

companies that do not apply supply chain flexibility measures. This result aligns with the findings of Sreedevi et al. (2017): in an uncertain environment, supply flexibility and production flexibility help reduce supply risks and production risks.

The research also shows that distribution/delivery flexibility does not play a regulatory role in the relationship between environmental uncertainty and distribution risk. This is because distribution flexibility measures are mainly applied internally within the enterprise, while delivery/transportation risks are not only due to internal processes and aspects related to the enterprise's distribution flexibility but also due to external factors such as infrastructure and logistics systems. This finding is consistent with the research of Merschmann and Thonemann (2011), specifically in certain environments, flexibility may not be effective in mitigating supply chain risks. A 2012 global trade logistics survey by the World Bank showed that companies in countries with low logistics performance index rankings are likely to be affected by a lack of adequate infrastructure support (Arvis et al., 2012). This is directly related to this research as it was conducted on Vietnamese textile enterprises. Compared to the global logistics system, Vietnam's logistics network still has many limitations due to outdated transportation infrastructure, leading to increased delivery delays. Therefore, even if a business has many backup transportation methods, these external factors can hinder timely delivery, making distribution flexibility ineffective. It can be seen that the enterprise's distribution flexibility measures are not sufficient to mitigate distribution risks and also depend on external factors such as the logistics capacity of the country in which the business operates.

Additionally, the study presents a special result beyond the research questions posed by the authors. This is the domino effect from supply risk to production risk and distribution risk. Specifically, supply risk can lead to production risk and, consequently, delivery risk. Therefore, if Vietnamese textile enterprises focus on mitigating supply risk, it will also benefit the reduction of production risk and delivery risk.

Overall, the research results show the impact of environmental uncertainty on supply chain risks in Vietnamese textile enterprises. It also highlights the importance of adopting flexible supply chain measures to mitigate risks for textile enterprises operating in highly uncertain environments.

Competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Informed consent

Obtained.

Ethics approval

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The journal's policies adhere to the Core Practices established by the Committee on

Publication Ethics (COPE).

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Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Data sharing statement

No additional data are available.

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