



Key Factors of Supply Chain Resilience in China's Electronic Industry: A Preliminary Survey-Based Study

Shanshan Peng¹ Azmawani Abd Rahman^{1,*}

¹ Putra Business School, Level 3, Office Building of the Deputy Vice Chancellor (Research & Innovation) 43400, UPM, 43400 Seri Kembangan, Selangor, Malaysia

*dr.azmawani@gmail.com

Abstract. As the uncertainty of the modern business environment increases, the risk of supply chain disruptions has become a major challenge for the electronics industry, especially under the influences of global pandemics, geopolitical tensions, and shortages of raw materials. Shenzhen, as a core region of China's electronics industry, has become a focal point for how enterprises can enhance their supply chain resilience (Supply Chain Resilience, SCR). This paper, based on a survey, focuses on electronics companies in the Shenzhen area to explore the key factors affecting supply chain resilience and to identify the issues most closely related to it, thereby laying the groundwork for future large-scale data collection and in-depth research. The study constructs a survey framework around six key dimensions: supply chain resilience, supply chain collaboration and information sharing, strategic fit, supply chain resilience building, enterprise performance, and external environment. Statistical methods such as reliability analysis, correlation analysis, and mean and standard deviation analysis are applied to process the data. The research is expected to identify the key variables that impact supply chain resilience in the electronics industry, reveal the potential effects of supply chain resilience on enterprise performance, and provide practical guidance for optimizing supply chain management. The findings of this study will offer measurement tools for future research on supply chain resilience and provide decision-making support for electronics companies in enhancing their supply chain resilience.

Keywords: Supply Chain Resilience (SCR), Electronics Industry, Survey Research, Strategic Fit, Supply Chain Management

1 Introduction

With the rapid development of the global electronics industry, supply chain management is facing increasingly complex challenges. Shenzhen, as a key center for electronic manufacturing and supply chains, places great importance on supply chain resilience (Supply Chain Resilience, SCR)[1]. While existing studies have explored the impact of SCR on corporate competitiveness, research on how China's electronics industry, particularly Shenzhen enterprises, addresses specific challenges remains

limited. In recent years, factors such as the global pandemic, geopolitical shifts, and raw material supply disruptions have severely impacted the electronics industry, leading to order delays and economic losses. Enhancing the adaptability and recovery capabilities of supply chains has become crucial for improving corporate competitiveness.

Supply chain resilience refers to the ability of a supply chain to quickly restore normal operations and maintain business continuity during disruptions. Although previous research has shown that SCR helps enhance corporate competitiveness[2], there is still a lack of systematic quantitative analysis of the key influencing factors for Shenzhen's electronics enterprises. To bridge this gap, this study focuses on electronics companies in Shenzhen, employing a survey-based approach to explore key SCR factors from multiple dimensions, including corporate innovation, strategic fit, and supply chain collaboration. The data analysis methods include reliability analysis (Cronbach's Alpha)[3], correlation analysis (Pearson/Spearman coefficients)[4], mean and standard deviation analysis, and factor analysis to identify the most relevant factors. This study contributes to future large-scale data collection and in-depth research, providing theoretical support and practical guidance for optimizing supply chain management strategies.

2 Theory and Hypotheses

Supply chain resilience (SCR) refers to the ability of a company to quickly restore normal operations and maintain business continuity in the face of supply chain disruptions or unforeseen events. Increasing global economic uncertainty, pandemics, geopolitical shifts, and raw material shortages have posed significant risks to the electronics industry, making the enhancement of supply chain adaptability and recovery capabilities a key factor in maintaining corporate competitiveness. In response, this study has developed a survey framework based on six dimensions and formulated corresponding hypotheses:

1. **Supply Chain Resilience:** This dimension examines a company's ability to rapidly adjust supply chain strategies, develop contingency plans, and respond to disruptions (such as supply chain breaks, delivery delays, and the impact of supplier changes on production). These indicators reflect the basic responsiveness of an enterprise in managing unexpected risks.

2. **Supply Chain Collaboration and Information Sharing[5]:** This dimension assesses the timeliness of information sharing with upstream and downstream partners, the use of integrated management systems, the regularity of risk assessments, the application of visualization technologies (e.g., blockchain, AI forecasting), the proactive provision of risk-related information by suppliers, and the implementation of performance evaluations. These measures indicate the company's capacity for collaborative management.

3. **Strategic Fit[6]:** This dimension investigates the alignment between a company's supply chain management strategies and its overall development goals. It includes whether supply chain decisions are integrated into long-term strategies, receive

top management support, and contribute to market competitiveness—underscoring the importance of strategic alignment in building supply chain resilience.

4. Supply Chain Resilience Building[7]:This dimension considers whether a company has implemented redundancy measures, incorporated supply chain risk into procurement decisions, adopted digital technologies, conducted training and simulation exercises, and established dedicated risk management teams. These factors reveal the company’s institutional and procedural efforts to enhance resilience.

5. Performance:As a comparison, this dimension evaluates the impact of supply chain management on overall enterprise performance by examining metrics such as sales growth, profit margins, customer satisfaction, and product innovation capability.

6. External Factors:This dimension analyzes the concentration of raw material suppliers in specific regions, fluctuations in raw material prices, the application of automation and AI technologies in supply chain management, and the effect of supply chain digitization on operational efficiency. These external variables provide contextual background for validating the internal mechanisms of supply chain resilience.

The framework is designed to systematically identify key factors closely associated with supply chain resilience. It explores how innovation, strategic fit, and collaborative capabilities influence both supply chain resilience and overall performance. Ultimately, as shown in Figure 1, this framework provides theoretical support for optimizing risk response strategies and lays the groundwork for subsequent large-scale data collection and in-depth research.

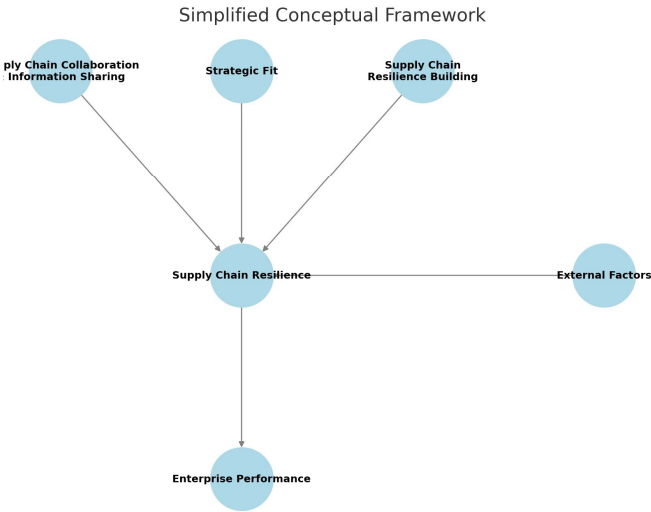


Fig. 1. Theoretical Framework

3 Research Design

To ensure the validity and reliability of the questionnaire, a total of 200 participants, including senior executives and full-time managers from the electronics industry sup-

ply chain, were initially targeted. The survey focused on companies involved in mobile phones and IoT terminal products, specifically selecting firms with at least five years of operational experience in supply chain management. The sample included manufacturers, suppliers, and distributors to ensure industry-wide representation. The surveyed companies were primarily located in Shenzhen and surrounding areas, reflecting the core hub of China's electronics industry.

The final sample consisted of 200 completed questionnaires, with a response rate of 95% and an effective response rate of 95%. All participants were from companies with extensive experience in operations, procurement, and logistics management, ensuring the relevance of their responses. The questionnaire utilized a seven-point Likert scale for variable measurement[8], with response options ranging from "1 - Strongly Disagree," "2 - Disagree," "3 - Somewhat Disagree," "4 - Neutral," "5 - Somewhat Agree," "6 - Agree," to "7 - Strongly Agree."

The survey was structured into six key dimensions, each represented by a set of questions as detailed in Tables 1 to 6. Table 1 (Supply Chain Resilience) assessed the companies' preparedness for disruptions, including emergency planning and the ability to find alternative suppliers. Table 2 (Supply Chain Collaboration and Information Sharing) evaluated the level of collaboration and transparency among supply chain partners. Table 3 (Strategic Fit) focused on the alignment between supply chain management and corporate goals. Table 4 (Supply Chain Resilience) further explored redundancy planning and the use of digital tools. Table 5 (Performance) measured the impact of supply chain resilience on market adaptability and profitability. Finally, Table 6 (External Factors) examined the influence of external risks, such as raw material price fluctuations and geopolitical factors, on supply chain management.

Table 1. Supply Chain Resilience (SCR)

Code	Question
SCR1	Does your company have an emergency plan to address sudden supply chain disruptions?
SCR2	In the past three years, has your company experienced any supply chain disruptions? (Yes/No)
SCR3	Does your company have the ability to quickly find alternative suppliers?

Table 2. Supply Chain Collaboration and Information Sharing (F)

Code	Question
F1	Do supply chain partners use a unified information management system?
F2	Does your company regularly conduct supply chain risk assessments with suppliers?
F3	Does your company have a transparent and efficient information-sharing mechanism with supply chain partners?

Table 3. Strategic Fit (SF)

Code	Question
SF1	Does your company's supply chain management strategy align with the overall corporate development goals?
SF2	Is supply chain resilience management supported by top management in your company?
SF3	Does supply chain management play a central role in your company's strategic planning?

Table 4. Supply Chain Resilience (SCR)

Code	Question
SCR1	Has your company established supply chain redundancy (e.g., extra inventory or backup suppliers)?
SCR2	Does your company consider supply chain risks in procurement decisions?
SCR3	Does your company use digital tools to enhance supply chain management efficiency?

Table 5. Performance(P)

Code	Question
P1	Has supply chain resilience improved your company's market adaptability?
P2	Has supply chain management optimization boosted your company's profitability?
P3	In the past three years, has your company experienced customer loss or sales decline due to supply chain issues?

Table 6. External Factors (EF)

Code	ExampleQuestion
EF1	In the past three years, has your company been significantly affected by raw material price fluctuations?
EF2	Has supply chain management been impacted by international trade policies or geopolitical factors?
EF3	Does your company use automation or AI technologies in supply chain management to enhance adaptability?

4 Analysis and Results

Based on the statistical analysis, the surveyed companies generally perform well in supply chain resilience, collaboration, and information sharing, with mean values ranging from 4.80 to 5.82. This indicates that most companies have relatively mature

management practices in these areas, with a high level of recognition and importance placed on these management measures. Companies believe they possess a competitive advantage in terms of supply chain resilience and collaboration capabilities.

However, the standard deviation values range from 0.98 to 1.32, indicating that there are certain differences in supply chain management practices across companies. Specifically, there are significant variations in areas such as regular risk assessments (F2), supply chain disruption response (SCR2), and customer loss (P3), with some companies excelling in these areas, while others need improvements and enhancements.

Additionally, some variables, such as emergency planning (SCR1) and the role of supply chain in strategy (SF3), have relatively low mean values, indicating that some companies have deficiencies in emergency management and strategic planning, particularly when it comes to preparing for sudden supply chain disruptions.

Overall, the sample data shows a relatively high level, with the standard deviation of each variable ranging from 0.98 to 1.32. This suggests that the overall level is fairly concentrated, with the majority of companies being close to the average level. This outcome is ideal and provides a solid foundation for further tests and analyses.

Table 7. Descriptive Statistics of Supply Chain Resilience Variables

Variable	Mean	Standard Deviation
SCR1	4.80	1.12
SCR2	5.12	1.17
SCR3	5.51	1.09
F1	4.95	1.28
F2	5.32	1.31
F3	5.03	1.22
SF1	5.62	1.06
SF2	5.21	1.12
SF3	5.04	1.32
SCR1	5.22	1.16
SCR2	5.42	1.14
SCR3	5.54	1.10
P1	5.82	0.98
P2	5.61	1.11
P3	5.22	1.27
EF1	5.41	1.12
EF2	5.02	1.16
EF3	5.31	1.21

5 Reliability and Validity of the Questionnaire

In this study, the Cronbach's alpha values for the variables of Supply Chain Resilience (SCR), Supply Chain Collaboration and Information Sharing (F), Strategic Fit (SF), and Corporate Performance (P) were 0.82, 0.87, 0.75, and 0.73, respectively. According to standard guidelines, a Cronbach's alpha value greater than 0.7 indicates good reliability, suggesting that the measurement results for these variables are reliable (Nunnally & Bernstein, 1978). Although the Cronbach's alpha value for the "Corporate Performance" factor is 0.73, which is still within the acceptable range, certain individual items in the questionnaire, particularly those related to Supply Chain Risk Assessment (F2) and Customer Loss (P3), exhibited some variability. To ensure consistency among respondents, further validation of these items' reliability may be necessary.

The variables and dimensions selected for this study are derived from widely validated scales and have been verified for their validity through factor analysis. However, it is recommended that the reliability of some individual items be further investigated in future research.

6 Reliability and Validity of the Questionnaire

Based on the Pearson correlation analysis (Fig.2), the results indicate that the various dimensions of supply chain management are generally interrelated. The supply chain resilience items (SCR1, SCR2, SCR3) exhibit moderate positive correlations with the supply chain collaboration and information sharing items (F1, F2, F3), suggesting that companies with effective emergency planning and rapid response capabilities also tend to maintain better information-sharing practices. Similarly, the strategic fit dimension (SF1, SF2, SF3) shows moderate correlations with both the resilience and collaboration measures, indicating that a strategic alignment of supply chain management with overall corporate goals is associated with enhanced operational effectiveness. Furthermore, the performance indicators (P1, P2, P3) are positively correlated with the resilience, collaboration, and strategic fit factors, which supports the hypothesis that improved supply chain management practices contribute to better market adaptability and profitability. However, some individual items, particularly in the risk assessment and customer loss areas, demonstrated relatively lower correlations with other variables, suggesting potential measurement variability that warrants further investigation. Overall, the empirical evidence largely supports the integrated framework, though refinement of certain items may be necessary to achieve more consistent reliability across the dimensions.

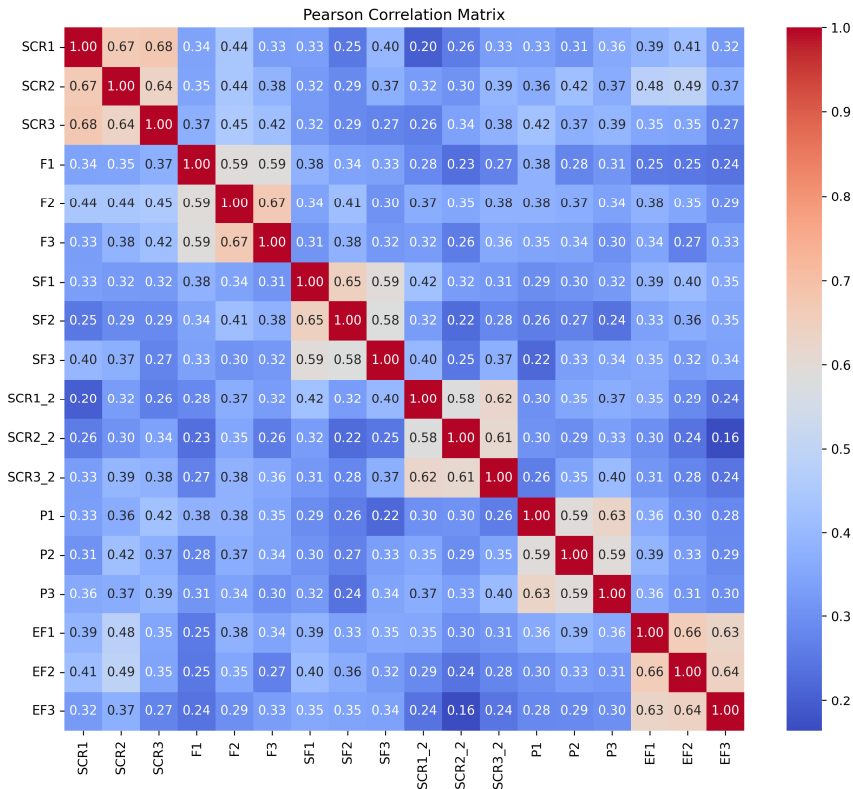


Fig. 2. Pearson Correlation Matrix of Supply Chain Management Variables

7 Conclusion

This study validates the reliability and effectiveness of the designed questionnaire in assessing key factors influencing supply chain resilience in China's electronics industry. The statistical analyses, including reliability and correlation assessments, confirm that the survey framework provides a robust foundation for understanding the interrelationships between supply chain resilience, collaboration, strategic fit, and enterprise performance. The findings indicate that companies with stronger resilience mechanisms tend to have better information-sharing practices and strategic alignment, which positively impact their market adaptability and profitability. However, certain items, such as risk assessment and customer loss, exhibit minor variability, suggesting areas for refinement in future research.

Based on these validated findings, the next phase of this study will involve large-scale empirical research to further explore causal relationships and develop actionable strategies for enhancing supply chain resilience in the electronics industry. Additionally, future research should consider cross-industry comparisons or longitudinal stud-

ies to examine how resilience factors evolve over time and across different business environments.

References

1. Cohen, M., Cui, S., Doetsch, S., Ernst, R., Huchzermeier, A., Kouvelis, P., ... & Tsay, A. A.: Bespoke supply-chain resilience: the gap between theory and practice. In: *Journal of Operations Management*, vol. 68(5), pp. 515–531 (2022).
2. Abeysekara, N., Wang, H., Kuruppuarachchi, D.: Effect of supply-chain resilience on firm performance and competitive advantage: A study of the Sri Lankan apparel industry. In: *Business Process Management Journal* 25.7, pp. 1673–1695. (2019).
3. Nunnally, J. C., Bernstein, I. H.: *Psychometric Theory*. 3rd edn. McGraw-Hill, New York (1994).
4. Field, A.: *Discovering Statistics Using IBM SPSS Statistics*. 5th edn. Sage Publications, London (2024).
5. Panahifar, F., et al.: Supply chain collaboration and firm's performance: the critical role of information sharing and trust. In: *Journal of Enterprise Information Management*, vol. 31(3), pp. 358–379 (2018).
6. Hughes, P., Morgan, R. E.: Fitting strategic resources with product-market strategy: Performance implications. In: *Journal of Business Research*, vol. 61(4), pp. 323–331 (2008).
7. Wang, Y., et al.: Research on resilience evaluation of green building supply chain based on ANP-fuzzy model. In: *Sustainability*, vol. 15(1), p. 285 (2022).
8. Zhang, B., Mohammad, J.: The effects of sustainability innovation and supply chain resilience on sustainability performance: Evidence from China's cold chain logistics industry. In: *Cogent Business & Management*, vol. 11(1), p. 2353222 (2024).

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

