Supply Chain Analysis of the Toyota RAV4 Braking System and Tariff Impact Simulation

Executive Summary

This report provides an in-depth analysis of the supply chain for the Toyota RAV4 braking system, focusing on the structure, key components, and potential impacts of tariff changes. The braking system is crucial for vehicle safety and performance, comprising components such as brake pads, rotors, calipers, and electronic control units. The supply chain is characterized by a diverse geographic distribution of suppliers, with significant contributions from Germany and Denmark. A tariff shock simulation for Japan, with rates of 20%, 50%, and 80%, reveals potential cost increases and highlights the need for strategic risk mitigation. Recommendations include diversifying suppliers and enhancing supply chain resilience.

Introduction

The Toyota RAV4 is a leading compact SUV known for its reliability and performance. The braking system is a critical component, ensuring safety and optimal vehicle control. This report aims to analyze the supply chain of the RAV4's braking system and assess the impact of potential tariff changes on its cost structure.

Overview of the Braking System Component

The braking system of the Toyota RAV4 includes several key components: brake pads, rotors, calipers, and electronic control units. Each component plays a vital role in ensuring effective braking performance. Brake pads and rotors are essential for friction and stopping power, while calipers apply pressure to the brake pads. Electronic control units manage the braking system's electronic functions, ensuring safety and efficiency.

Supply Chain Structure

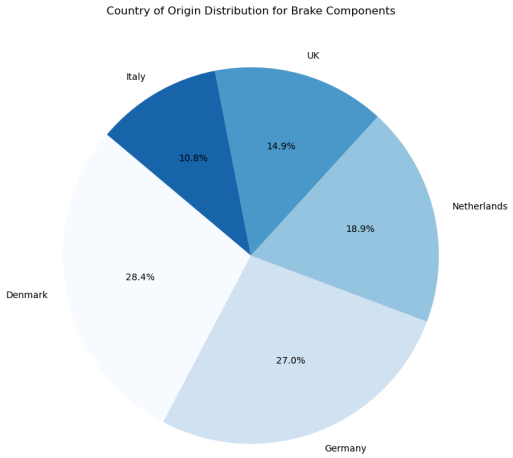
The supply chain for the Toyota RAV4 braking system involves multiple suppliers across different countries. Key components such as brake pads and rotors are primarily sourced from Germany, while Denmark supplies brake calipers. Toyota employs a Just-In-Time (JIT) supply chain strategy, minimizing inventory costs and enhancing efficiency. The supply chain is tiered, with raw materials sourced from various countries and components assembled in strategic locations.

Key Suppliers and Geographic Distribution

Germany and Denmark are the primary suppliers for the RAV4's braking system components. Germany supplies brake pads and rotors, while Denmark provides brake calipers. Other countries, including Belgium, the Netherlands, the UK, and Italy, also contribute to the supply chain, albeit to a lesser extent.

Tariff Simulation Scenarios

The tariff simulation for Japan considers three scenarios with tariff rates of 20%, 50%, and 80%. The base total cost of the braking system is $134.7. The simulation results indicate cost increases ranging from 0.24% to 2.06%, depending on the tariff rate. Key suppliers affected include FEBEST, with significant price adjustments under each scenario. The final costs under each tariff rate are $135.03, $136.25, and $137.48, respectively.



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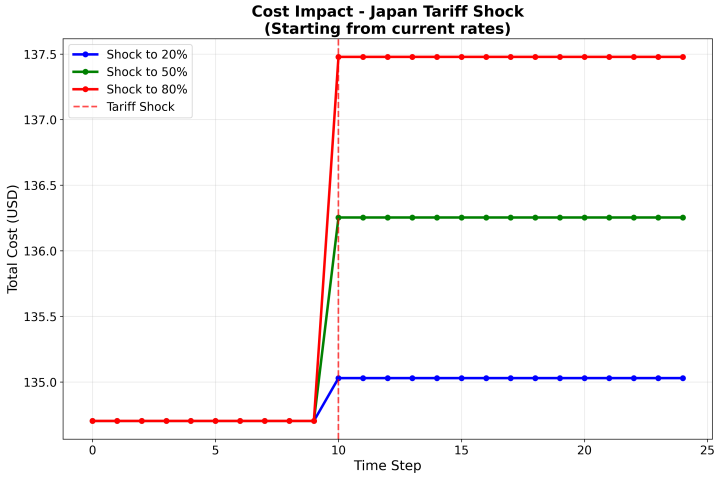

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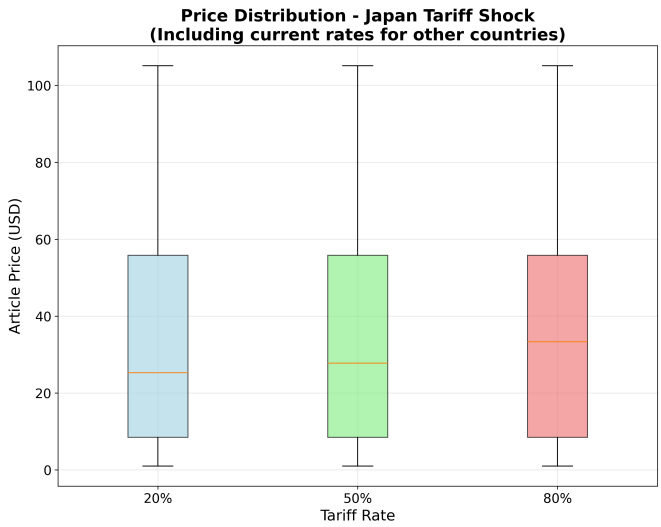

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Risk Assessment

The supply chain for the RAV4's braking system faces several risks, including dependency on Japanese suppliers, geopolitical tensions, and raw material price volatility. These risks could disrupt supply chain continuity and increase costs. Mitigation strategies include diversifying supplier networks, increasing inventory buffers, and utilizing digital tools for enhanced supply chain visibility.

Conclusion and Recommendations

The analysis highlights the importance of a resilient supply chain for the Toyota RAV4's braking system. To mitigate risks and optimize costs, Toyota should consider diversifying its supplier base, particularly in regions exposed to high tariffs. Enhancing supply chain resilience through strategic partnerships and digital monitoring tools is also recommended. Future research should focus on monitoring geopolitical developments and their potential impact on the supply chain.

References

Brown, M. (2003). Toyota Production System & Supply Chain. Zaragoza Logistics Center. CNBC. (2025). Stocks of Japan automakers soar after US lowers auto tariffs. WC Shipping. (2025). Auto Parts Tariff Impact: Reshaping US-Japan Supply Chains. ScienceDirect. (2019). Impact of US steel and aluminum tariffs on trade in North America. Car and Driver. (2025). Trump-Japan trade deal tariff on Japanese cars.

Appendices

Additional data and charts supporting the analysis, such as detailed cost breakdowns, supplier lists, and tariff impact calculations, are included in the appendices. A glossary of terms used in the report is also provided for clarity and understanding.