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

Executive Summary

This report provides a comprehensive analysis of the supply chain for the Toyota RAV4 braking system, focusing on component costs, sourcing strategies, and the potential impact of tariff changes. The braking system is a critical component of the RAV4, ensuring safety and performance. The report highlights the cost distribution of key components, the geographic distribution of suppliers, and the implications of tariff scenarios on the supply chain. The analysis reveals that the Brake Caliper is the most significant cost contributor, and Germany is a major source of components. The tariff simulation for Japan, with rates of 20%, 50%, and 80%, shows potential cost increases, necessitating strategic responses such as supplier diversification and VAT optimization.

Introduction

The Toyota RAV4 is a leading compact SUV known for its reliability and performance. The braking system is a vital part of the vehicle, ensuring safety and efficient operation. This report aims to analyze the supply chain of the RAV4's braking system and assess the impact of potential tariff changes on this supply chain. Understanding these dynamics is crucial for maintaining competitive pricing and supply chain resilience.

Overview of the Braking System Component

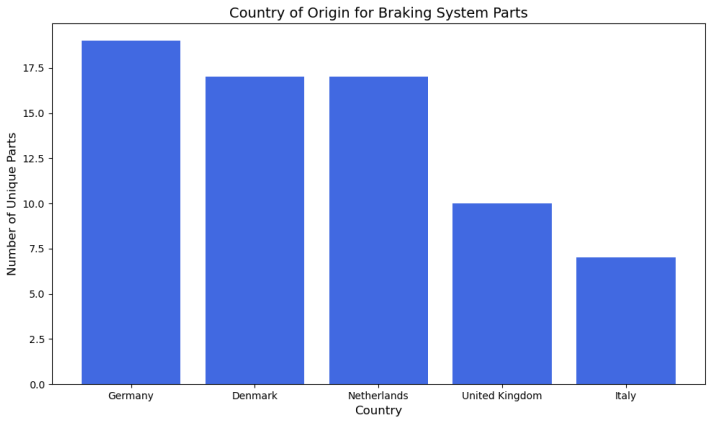
The braking system of the Toyota RAV4 comprises several key components: brake pads, rotors, calipers, and electronic control units. Each component plays a crucial role in the system's overall functionality. The Brake Caliper, contributing 59.38% to the total cost, is the most expensive component, followed by the Brake Disc and Brake Pad Set. These components are essential for ensuring the vehicle's stopping power and safety.

Supply Chain Structure

The supply chain for the Toyota RAV4 braking system is characterized by a diverse set of suppliers, with a significant number of components sourced from Germany, Denmark, and the Netherlands. Toyota employs a Just-In-Time (JIT) production strategy, minimizing inventory costs and enhancing efficiency. The supply chain is multi-tiered, with each tier playing a specific role in the production process. This structure supports Toyota's lean manufacturing principles, ensuring high-quality production with minimal waste.

Tariff Simulation Scenarios

The tariff shock simulation for Japan, with rates of 20%, 50%, and 80%, provides insights into the potential cost impacts on the Toyota RAV4 braking system. The base total cost of the system is $1,232.75. Under a 20% tariff, the cost increases by 0.57% to $1,239.77. A 50% tariff results in a 1.42% increase, raising the cost to $1,250.29. An 80% tariff leads to a 2.28% increase, with a final cost of $1,260.82. Key suppliers affected include ASHIKA and JAPKO, with significant price increases under each scenario.



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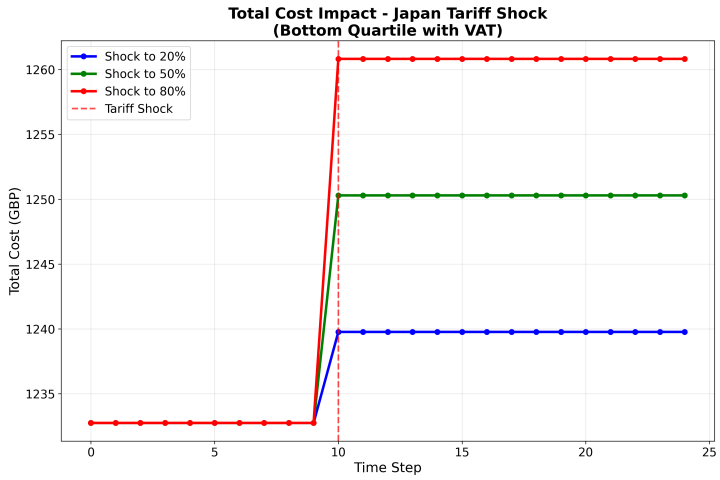

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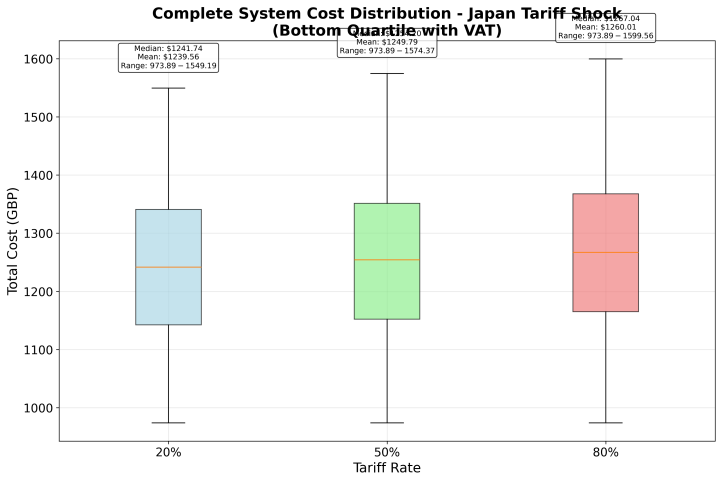

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Risk Assessment

The current supply chain faces risks such as dependency on Japanese suppliers and geopolitical tensions. Tariff increases could exacerbate these risks, affecting production timelines and costs. To mitigate these risks, Toyota can explore alternative supply sources, increase inventory buffers, and enhance supply chain visibility through digital tools. Additionally, optimizing VAT strategies could help manage cost increases due to tariffs.

Conclusion and Recommendations

The analysis highlights the importance of a resilient supply chain for the Toyota RAV4 braking system. To mitigate the impact of potential tariff increases, Toyota should consider diversifying its supplier base and optimizing VAT strategies. Proactive supply chain management, including the use of digital tools for enhanced visibility, will be crucial in navigating global trade uncertainties and maintaining competitive advantage.

References

Brown, M. (2023). Toyota Production System & Supply Chain. MIT-CTL. Retrieved from https://ctl.mit.edu/sites/default/files/Mac_TPS_thesis.pdf

Logistics Viewpoints. (2025). U.S.–Japan Trade Deal Adjusts Auto Tariffs, Alters Global Sourcing Dynamics. Retrieved from https://logisticsviewpoints.com/2025/07/24/u-s-japan-trade-deal-adjusts-auto-tariffs-alters-global-sourcing-dynamics/

Reuters. (2025). Trump strikes tariff deal with Japan, auto stocks surge. Retrieved from https://www.reuters.com/business/trump-strikes-tariff-deal-with-japan-auto-stocks-surge-2025-07-23/