A Novel Stochastic-Dynamic Framework for Optimizing Multi-Criteria Decision-Making in Global Supply Chain Networks

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Abstract. This study introduces a pioneering stochastic-dynamic framework tailored for optimizing multi-criteria decision-making processes within global supply chain networks. Utilizing advanced probabilistic models and dynamic optimization techniques, the framework addresses the complexities of contemporary supply chain management. Empirical analyses demonstrate the framework's efficacy in enhancing decision accuracy and operational efficiency. The results underscore its potential application in global supply chains, offering significant insights for researchers and practitioners alike.

Keywords: stochastic-dynamic framework, multi-criteria decision-making, global supply chain networks, dynamic optimization, probabilistic models

Introduction

In the evolving landscape of global supply chains, decision-makers face unprecedented challenges characterized by volatility, complexity, and interconnectivity. As corporations strive to maintain competitive advantage while safeguarding operational resilience, the need for robust decision-making frameworks becomes imperative. Global supply chain networks are inherently complex systems, subject to diverse risks and uncertainties ranging from geopolitical tensions to technological disruptions. There is an urgent demand for

methodologies that can integrate multifaceted criteria and provide decision-makers with reliable insights amidst such unpredictability. The novel stochastic-dynamic framework presented in this paper aims to fill this critical gap. By leveraging advanced probabilistic models and dynamic optimization techniques, the framework offers a comprehensive methodology to optimize decision-making processes across global supply chains. It encapsulates a holistic approach that factors in multiple criteria, enhancing both the accuracy of predictions and the efficacy of decisions. This paper commences with a review of the existing literature on supply chain decision-making models, followed by a detailed exposition of the proposed framework's conceptual foundations. Subsequent sections delve into the methodological design, data analysis, and empirical validation of the framework. The concluding section synthesizes the findings, highlighting the theoretical and practical implications of the study.

References

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