

Evaluation of robustness of supply chain information-sharing strategies using a hybrid Taguchi and multiple criteria decision-making method

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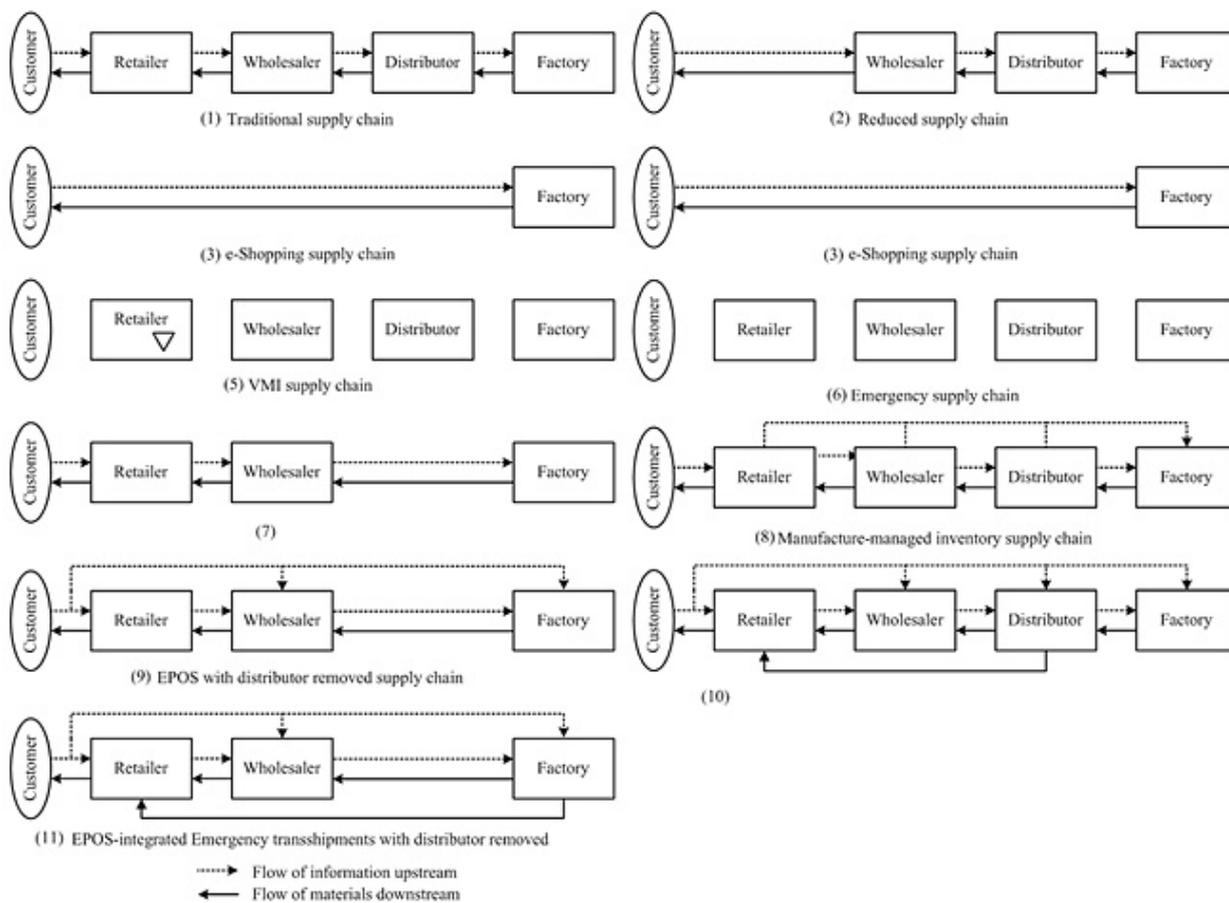
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The continuing advance in information strategy (IT) has contributed to more efficient supply chain management strategy, particularly, to the information sharing among the different supply chain organizations. In the past, there is a significant amount of literature dedicated to the optimization study of supply chain information sharing strategy; however, variations in the business environment can produce uncertainty and increase decision-making complexity for enterprises selecting from various supply-chain information-sharing strategies. Due to the inherent volatile supply chain environments, a robust design is a preferred strategy rather than an optimal strategy which may not be practical in the real-world environments. An effective and efficient supply-chain strategy should be capable of reducing costs and raising customer-service levels, and should be capable of enhancing the robustness of the supply chain. The present study investigated eleven supply chain information strategies as shown in the following charts. These strategies are from both literature review and from practical observations. The well tested Beer Game problem structure is adopted for the experiment of the robustness of different supply-chain strategies under various uncertain environments. A simulation model is then built for the Beer Game for testing and collecting of the performance measures from the different supply chain information sharing strategies. The proposed solution techniques included Taguchi methodology and multiple criteria decision-making methods (MCDMs), including simple multiple attribute rating technology (SMART), technique for order performance by similarity to ideal solution (TOPSIS), and grey relational analysis (GRA). The study innovatively adopted the Taguchi signal-to-noise (S/N) ratio for each criterion to evaluate the robustness of each performance measure. This S/N ratio is used to determine an overall evaluation among various supply-chain information-sharing strategies. Among the proposed information sharing strategies, the simulation results show that e-shopping has the most robust performance in uncertain environments. Although the Beer Game is adopted for the empirical illustrations, the results and the managerial insights are easily applicable to other applications. The study can potentially avoid the poor implementation of a poor supply chain information strategy which can be a cost disaster in practice and illustrated the contribution of the present study.





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