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Hierarchical hybrid simulation optimization of the pharmaceutical supply chain

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ABSTRACT

In this paper, a global simulation optimization approach is developed to imitate and optimize the performance of the Pharmaceutical Supply Chain (PSC). Firstly, a hierarchical hybrid simulation model is developed in which aggregate and detailed data levels are addressed simultaneously. The model consists of two types of interdependent paradigms: the system dynamics paradigm, which depicts the echelons of pharmacies and wholesalers in the PSC, and the discrete event paradigm, which simulates the manufacturers with their detailed production operations, as well as the echelons of suppliers. Secondly, the "As is" scenario analysis and a screening process are performed to extract significant input parameters as well as sensitive outputs of the model. The final step optimizes the performance of PSC. The proposed approach validity is appraised by being applied to the PSC of a leading pharmaceutical company in Jordan. As a result, the opportunity loss cost has considerably decreased for both the manufacturer and wholesalers' echelons and the service level has improved throughout the PSC.

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