بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

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جامعة عين شمس

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MONA MAGHRABY

AIN SHAMS UNIVERSITY

FACULTY OF ENGINEERING

DESIGN AND PRODUCTION ENGINEERING DEPARTMENT

Effect of Inventory Policy on Supply Chain Performance

A thesis submitted in partial fulfillment of the requirement of the degree of Master of Science in Mechanical Engineering

By

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Cairo - 2021

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Statement

This thesis is submitted in partial fulfillment of Master of Science degree in mechanical engineering, Faculty of Engineering, Ain Shams University.

The author carried out the work included in this thesis, and no part of this thesis has been submitted for a degree or qualification at any other scientific entity.

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Summary

One important mission of a manager within a supply chain organization is to choose an inventory policy that ensures the best performance for his supply chain covering from end to end.

SC performance can be measured by qualitative performance criteria which has no direct numerical records (like customer satisfaction indicators, products quality , SC vulnerability, SC resilience) and on also quantitative type measures that can be evaluated numerically such as (fill rate ratio, total cost of SC, inventory levels values, resource utilization percentage).

Different factors are affecting the performance of any Supply chain, such as, supply chain structure diagram, inventory control policy used, information sharing strategy, customer demand pattern and seasonality, forecasting methods used, supplier lead time and review period between order placement.

Inventory policy is important factor that affect the supply chain performance, it provides an appropriate goods on hand to avoid run out of stock and a balance between the incurred cost and material holding cost. Its techniques help to take two main decisions for every inventory stored item, the timing of item ordering and the orders sizes.

Inventory policies can vary according to different factors and conditions that are affecting the supply chain such as, planning horizon, number of items, order quantity, frequency of review, lead time, supplier capacity, customer demand, stocking points and unsatisfied demand. As well as Inventory policies can be formulated for a specific supply chains like service industries, decaying items, models with trade credit, inflations and shortages treatment.

Customer demand can heavily affect the supply chain performance and the choice of the best inventory policy, the first type is regular demand which can be exactly known, unlike the second type, the probabilistic demand. Both can be divided into static, which does not have any time variation, then it can be computed with certainty, and dynamic, which may vary with such that the demand variation is known with certainty.

In this research, an inventory policy is proposed for a supply chain with supplier capacity constraints and high dispersion customer demand. The proposed policy has been assessed with different conditions of customer demand, targeted cycle service level and supplier capacity limits. The proposed policy is assessed as well with a real case values extracted for a product with the same nature.

The performance of the supply chain is evaluated according to a combined factor of three main indicators which are the fill rate, bullwhip effect, and total cost of the supply chain.

For all scenarios, the Supply chain performance of the proposed policy has been compared with the performance of supply chain using other known inventory policies, such as Order-Up-To (OUT), (s, S), and (s, Q).

The results are simulated using MONTE-CARLO modeling and simulation methodology in spread sheet format

The results showed that the performance of the supply chain under study improved using the proposed policy when the demand with high dispersion, and less improvement compared to the other policies when the demand was regular.

It provides a guideline for industrial managers, facing supplier capacity constraints, to select the best inventory policy under different operating conditions in a supply chain.

Keywords: Inventory policy; Supply chain performance; Monte-Carlo simulation; Supplier capacity

Acknowledgement

First and foremost, I am extremely grateful to my supervisors, Prof. Dr. **Amin Mohamed Kamel El-Kharbotly** and Dr. **Ghada Essam Eldeen Shedeed** for their invaluable advice, continuous support, and patience during my MSc. study. Their immense knowledge and plentiful experience have encouraged me in all the time of my academic research and daily life.

I would like to thank all the academic staff in Faculty of Engineering, Ain Shams University. It is their kind help and support along the years that have made my undergraduate, postgraduate studies and professional life with continuous growth.

I would also like to thank my colleagues in Schneider Electric company for their technical support on my study.

I would like to express my gratitude to my parents, my wife and my children. Without their tremendous understanding and encouragement in the past few years, it would be impossible for me to complete my study.

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