

A contribution to supply chain design under uncertainty^{*}

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Abstract

In today's context of extended supply chains (SCs), business processes and partners, several factors can increase the chances of disruptions in supply chains, such as losses of customers due to intense competition, supply shortage due to uncertain sourcing, managing large number of supply chain partners, unpredictable failures, breakdowns, etc.

Predicting and responding to changes across a global supply chain require sometimes dealing with incomplete and uncertainty information. Accordingly, we should propose approaches to minimize vulnerability to possible sources of disruptions, considering expert judgments and using relevant decision aiding techniques. Building disruption-resistant supply chains can guarantee the availability of supply despite the presence of disruptive events (changing demand, breakdowns, etc.), and offer customers a competitively priced product in industries of already very tight profit margins.

In this paper, a multi-objective model of reliable actor selection for designing disruption-resistant supply chain is proposed. The propose of this paper is to provide control of supply chains disruptive factors, allowing minimizing vulnerability to some recurrent and substantial disruptions in order to design efficient and disruption-resistant supply chains.

Key words: Risk, Supply chain design, Multi-objective programming

1 Introduction

Despite the differences that exist between the actors of the supply chain, they should typically operate in an integrated manner by coordinating their activities. Moreover, these actors should be highly cooperative when it comes to improving the performance of the supply chain as a whole and achieving objective such as on-time delivery, quality, and cost minimization [31].

Companies nowadays operate in a highly competitive and changing world. Such a context compels companies to build effective supply chains and select effective and reliable actors.

As effectiveness of the whole SC is determined by the effectiveness of all its actors, restricting selection processes to suppliers without an integration of plants and DCs can expose the SC to great disruptions. Just as suppliers play a vital role in the overall SC, it is likewise essential that plants and DCs transform and distribute the products efficiently. The failure of one of these actors can severely disrupt the business continuity and the objectives of the SC. On the other hand, when the selection processes of all the SC actors are based on just one

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