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Aspects Regarding some Simulation Models for Logistic Management

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Abstract

The main purpose of the paper is to develop a neural network application that could predict supplier problems in terms of stock management, lead time and production. Stocks of goods that manufacturers would classify as raw materials stocks are, in a special sense, goods in early stages of the production process. In a logic-based economic competitiveness, the company which holds the largest stock is underperforming! Technically, the stock is inevitable and in some cases even desirable; economically it is associate with an asset value stock, therefore, it should be minimized. Minimizing the value, the costs will also be minimized.

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Keywords: logistics, stock management, production, stock costs, neural networks

1. Introduction

The companies perform in an unstable environment, where the tastes of the consumers are in a continuous changing Anastasiu, 2009. For small and medium sized manufactures, there are five emerging trends in supply chain management: green supply chains, supply chain risk management, supply chain agility, moving supply

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closer to home and dealing with increased logistics costs (http://www.ciras.iastate.edu). From the mentioned trends, the paper deals with the problem of disruption or excess stock of raw material in the supply chain.

Unanticipated disruptions to material flow in a supply chain can be costly. Not only are companies seeking ways to better respond to disruptions when they hit, but they also are trying to anticipate disruptions before they occur. The existence of a too high stock or the lack of it increases the company's costs. Many supply chain managers find themselves with an increasing number and volume of products to manage, but with limited resources to expand their capacity to manage, store, and distribute these products. Instead others companies will deliver the goods with a delay or will refuse the clients due to lack of raw materials in stock.

2. Determining the excess and deficiency stocks of the company and the associated costs function

The analyses start from determining the mathematical model that describes better the formation of raw materials stocks. A company can have either excess stocks or deficiency stocks. The costs generated by the stocks and the stock level are the object of this paper.

Stocks are a set of goods purchased for future use. The importance of stocks derives from the fact that their absence leads to disruptions in manufacturing a product. The randomness of demand in a T period highlights the importance of stock levels Abrudan et al., 2002.

Based on the probability distribution p r determined from a statistical observation application, it can be determined a probabilistic model. In analyzing the subject of this paper it has used a simplified model, where the launch costs is neglected www.scribd.com.

Noting with "S" the stock size and with "r" the production, there can be two mutually exclusive possibilities:

- r <S: in which case at the end of the T period there is in stock an amount "S-r" which will be sold with a C1 loss per unit
- r> S: So we have a stock shortage to cover the supply which requires the quantity "r-S", the additional costs per unit being considered equal to C2.

Considering the stock size "S" and the production "r" the costs function that must be minimized, will take the form:

$$G(S) = C_1 * \sum_{r=0}^{S} (S - r) * p(r) + C_2 * \sum_{r=S+1}^{\infty} (r - S) * p(r) \quad (1)$$

The model can be applied for unique or based on orders production that uses production management models, like Kanban. If it's supplied a larger amount, the surplus is capitalized with loss case a; if the quantity supplied is less than the demand case b is an urgent need for additional supplies Abrudan et al., 2002. In order to calculate the minimum of the G S function, we will calculate the G S-1 and G S+1 function:

$$G(S+1)=G(S)+(C1+C2)*p(r\leq S)-C2 \quad (2)$$

$$G(S-1)=G(S)-(C1+C2)*p(r\leq S-1)+C2 \quad (3)$$

Considering a stock S_0, the optimal stock: $G(S_0-1) < G(S_0) < G(S_0+1)$, according the relation (2) and (3) it has obtained:

$$G(S+1) - G(S) > 0 \text{ or } (C_1 + C_2) * p(r \leq S) - C_2 > 0 \quad (4)$$