Available online at www.sciencedirect.com

ScienceDirect

Procedia Engineering 178 (2017) 117 – 122

Procedia Engineering

www.elsevier.com/locate/procedia

16th Conference on Reliability and Statistics in Transportation and Communication, RelStat'2016, 19-22 October, 2016, Riga, Latvia

Logistic Systems Efficiency Increase Based on the Supply Chains Integration

Valery Lukinskiy[a], Vladislav Lukinskiy[a], Tatiana Shulzhenko[b]*

[a]*National Research University Higher School of Economics (HSE), St. Petersburg, Russia*
[b]*Saint-Petersburg State University of Economics (SPbSUE), St. Petersburg, Russia*

Abstract

In this article we deal with the approach to logistic systems efficiency increase on the basis of various forms of logistic integration development in supply chains, with modified variants of model of economic order quantity for the echelon two-level systems.

The appropriate calculations have been done for the suggested modified models approbation.
© 2017 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).
Peer-review under responsibility of the scientific committee of the International Conference on Reliability and Statistics in Transportation and Communication

Keywords: logistics system, supply chain, multilevel system of inventory disposition

1. Introduction

The increase of supply chains (SC) management efficiency requires further theory and methodology development of this scientific direction, wherein, it is obvious that the most perspective solution of this problem is to work out and improve the logistic functions and operations integration at all levels of logistics systems (LS) management (Bowersox and Closs, 1996; Ballou, 2004; Christopher, 2004; Lukinskiy *et al.*, 2013; Stock and Lambert, 2001).

* Corresponding author.
E-mail address: lukinskiy@mail.ru

1877-7058 © 2017 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).
Peer-review under responsibility of the scientific committee of the International Conference on Reliability and Statistics in Transportation and Communication
doi:10.1016/j.proeng.2017.01.073

The fundamentally new method of accounting the integral connections between elements is the model of Axsäter (2006). The example of the two-level system of linear configuration inventory disposition allowed obtaining the dependence for the economic order quantity (EOQ) determination that was called multi-echelon model EOQ.

However, the study of the two-level linear model of Axsäter (2006) has shown that it reflects only a part of possible variants of the integrable logistic operations and doesn't allow taking into consideration some situations related to:

- alternative inventory consumption variant at the supplier's warehouse (the top level);
- different variants to register the costs of the current inventory storage and others,

that defines the relevance of further development of the modified models complex that reflect the specification of given situations.

2. Analysis of economic order quantity model for the echelon two-level systems

The main calculation formulas for the echelon model of economic order quantity (EOQ) were obtained considering the following conditions and limitations:

1. The product demand for the level "1" is determined, evenly distributed in time and has a constant intensity during the whole examined period;
2. The order (C_{0i}) and stock holding costs calculated on one product unit (c_{hi}) are constant during the whole examined period of time;
3. "1" and "2" levels products are indivisible and the one unit of goods at level 1 corresponds to the one unit of goods at the level 2.
4. Between the order quantity for the system levels "1" and "2" there is the following relation:

$$Q_{o2} = k \cdot Q_{o1} , \tag{1}$$

where k is a positive number (consignments multiple index);

Q_{oi} is an economic stock size at the i-th level of system.

1. In the system the instantaneous order supply possibility is assumed: in case of order supplying from the system link at the level 1 at the rate of Q_{o1}, the part of the stock at the level 2 at the rate of Q_{o1} can be shipped to the client at the level 1. Thus, the average stock at the level 2 during the cycle will be:

$$\overline{Q}_2 = \frac{(k-1) \cdot Q_1}{2} . \tag{2}$$

Total costs in the system will be:

$$C_{\Sigma} = C_{\text{or1}} + C_{\text{h1}} + C_{\text{or2}} + C_{\text{h2}} = \frac{C_{01} \cdot A}{Q_1} + \frac{Q_1 \cdot c_{h1}}{2} + \frac{C_{02} \cdot A}{k \cdot Q_1} + \frac{Q_1 \cdot (k-1) \cdot c_{h2}}{2} . \tag{3}$$

As a result we will obtain the value for the economic order quantity calculation at the level 1:

$$Q_{opt1} = \sqrt{\frac{2 \cdot A \cdot \left(C_{01} + \frac{C_{02}}{k} \right)}{c_{h1} + c_{h2} \cdot (k-1)}} . \tag{4}$$

Inserting the value (4) into the total costs formula (3) instead of Q_1, we will get the value for the total minimum costs calculation:

دریافت فوری ← متن کامل مقاله

ISIArticles
مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات