SCIENTIFIC PAPERS
OF THE UNIVERSITY OF PARDUBICE
Series B
The Jan Perner Transport Faculty
12 (2006)

THE STRATEGY OF STORES LOCALIZATION

Václav CEMPÍREK[1)], Rudolf KAMPF[2)]

Department of Transport Technology and Control[1)], Department of Transport Management, Marketing and Logistics[2)]

1. Introduction

Mentioned paper originated during solving grant project (GA CR) in Jan Perner Transport Faculty – University Pardubice. The grant project is called ,,Outsourcing in transport – logistic processes“.

Soluble group set as a main aim the exploration solution and designing suitable methodology and decision criteria for carrying out outsourcing in transport – logistic processes. The solution was focused on transport – logistic processes with the aim of setting theoretical hypothesis for implementation outsourcing mentioned processes and designing suitable methodology for outsourcing in transport – logistic processes. For fulfillment of this aim the soluble group already theoretically developed [6]:

- analysis of relations to company environment and external providers with the aim of identification basic steps of outsourcing and creating step-by-step diagram of carrying out outsourcing in transport-logistic processes,
- critical path analysis of partial activities and processes in transport-logistic processes.

Subsequently, we accomplished [6]:

- evaluating relations to company environment and external providers,
- boundary definition of “company-provider” and definition of requirements on providers, including provider’s strategy,

- analysis of basic steps in outsourcing, i.e. planning initiative, reconditioning strategic efforts, cost benefit analysis, choosing supplier, parley, transitional measures, operating mutual relations,
- project risk analysis,
- analysis of strategy expenditures in outsourcing, there were analyzed supply chain bonds, cost appeared from outsourcing relationship, outsourcing operating phase expenditures,
- within implementation process of outsourcing was made strategy analysis of functional area, assignment functional areas, which will be displaced including transformation of functional areas,
- it was evaluated decision process between outsourcing and insourcing.

Nowadays (in 3rd year of research), the soluble group starts works on determination conditions and basic decision criteria of implementation outsourcing in transport – logistic processes in light of more effective and more quality of chosen processes with the aim of respecting defined kriteria [8].

The final elaboration methodology of implementation outsourcing in transport – logistic processes will be based on piece of knowledge gained in the first and in the second phase.

It will be carried out marketing research in companies firm with the aim of finding out information about exploitation of transport – logistic outsourcing processes. The Information will serve for definition and analyzing collision points during implementation and exploitation outsourcing services in companies. At the same time begins work on book publication „ Outsourcing in transport – logistic processes".

In the next part the article deals with problematic of store localization. It's extract (fragment) of through report of research of grant project.

2. Store localization

The problem of object localization has been formed at first time by J. von Thunen in 1921 [1], in context influence price of piece of land and freight on business.

Mathematical model formulation of placing point in plane that is in the interaction with existing points was formulated earlier. Nowadays the choice of optimal objects localization concerns of all places in logistical chains, where are produced and stored products, raw materials and semi-finished products. So it's about localization of product companies, stores of raw materials, products, wholesales (distributive and logistic centers) and retail network on attachment to the seat of final consumption.

To the long - term strategy decision belongs the suitable placing of distributive store, whose long - term activity would guarantee economic return of intermediate capital.

Retail localization forms very specific group decision - making situations because of market localization and competition in the given place [3].

Basic designs of localization of distributive and logistical stores could be formulated in light of methods and criteria of their placing to three groups [7]:

- Localization on segment market – the function of this way located stores is above all resupply consumers, so that is why are located next to supplied region and they have to ensure the best possible economic supply given to insider consumers. Criteria for their positioning follow from requisite rate resupply, sizes average orders consumers and loads on some supply, which is among others dependent also on trucking loads. These ammunition may be run how manufacturers, so logistical or distributive organizations or group retail dealer. Typical instance are distribution shed with groceries placed what next of the main assembly consumption groceries, most often near big town agglomeration.
- Localization on production tenet - its sense is to concentrate goods from single seats and transport it to wholesale or to consumers in comprehensive supplies at low traffic rates. Such stores have the most of big grocery producers, big diary companies, which concentrate products from their manufactories and distribute them to the point of consumption.
- Combination localization – it's about placing stores among production and consumer centers. It's compromise solution of both previous cases.

3. Strategy of storage localization and service [2, 3, 5]

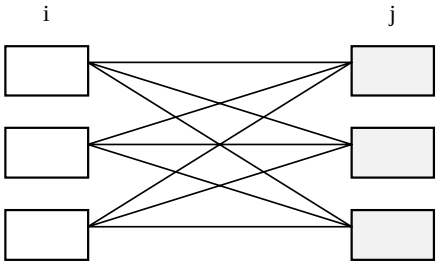


Fig 1 *Direct transportation among consigner´s and consignee´s stores*

- n_i number of consigners, where i = 1, 2, 3, ... , m

- m_j number of consignees, where j = 1, 2, 3, ... , n

trucking volume per month among consigners (n_i) and consignees (n_j) in tons

$A_i = a_i * T$

$B_j = b_j * T$, where

- a_i consignation amount by consigner n_i in tons per day

- b_j stock receipt by consignee n_j in tons per day

- T number of workdays in month

- trucking achievement per month in tkm

$$V = \sum_{i=1}^{m} A_i * s_{ij} = \sum_{j=1}^{n} B_j * s_{ij}$$, where

- s_{ij} average haul distance from i to j

- consignation amount from each consigner x_i on each consignee x_j per day

$$x_i = \frac{a_i}{m}$$, where m is number of relations to consignees

$$y_j = \frac{b_j}{n}$$, where n is number of relations from consigners

- total number of relations n_r, i.e. trucking connection between consigner and consignee

  $n_r = m * n$

- conveying amount in tons in one relatin per day (x_r) and per month (X_r)

$$x_r = \frac{a_i}{m}\left[t / day\right]$$

$$X_r = \frac{\sum_{i=1}^{m} a_i \times T}{m}\left[t / month\right]$$

- number of rides per day $n_F = n_r$
- total hauling distance per day $L = n_F \times s_{ij}$

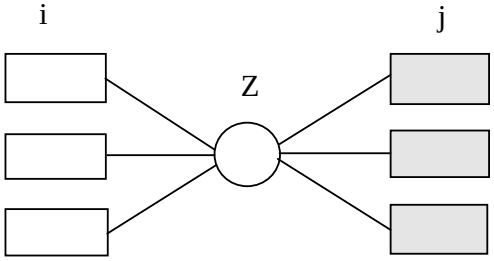


Fig 2 *We insert one central store among consigner and consignee*

- Z ... central store
- middle hauling distance from i to Z and from Z to j: $s_{ij} = (s_{iZ} + s_{Zj}) : 2$ [km]
- number of relation, it means trucking connection

  $n_r = m + n = n_i + m_j$, where

- m is number of relations of all consignees n_i
- n is number of relations of all consigners m_j

- trucking quantity in tons in one relation per day (x_r) and per month (X_r)

$$x_r = \frac{a_i}{m}\left[t / day\right]$$

$$X_r = \frac{\sum_{i=1}^{m} a_i \times T}{m}\left[t / month\right]$$

- number of rides per day $n_F = n_r = m + n$
- total hauling distance per day $L = n_F \times s_{ij}$

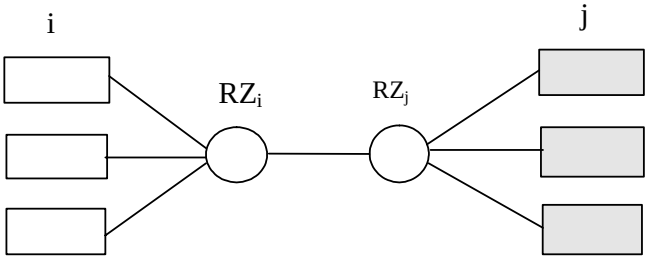


Fig 3 *We insert two central stores „RZ" among consigner and consignee*

- RZ_i central store for cartage and distribution of each consigner n_i
- RZ_j central store for cartage and distribution of each consignee n_j
- total hauling distanece $s_{ij} = s_{iRZi} + s_{RZiRZj} + s_{RZjj}$ [km], where
  - s_{iRZi} middle hauling distance from i to trans-shipment point RZ_i
  - s_{RZiRZj} middle hauling distance between trans-shipment points RZ_i and RZ_j
  - s_{RZjj} middle hauling distance from trans-shipment point RZ_j to j
- number of relation, it means trucking connection

  $n_r = m + n + 1 = n_i + n_j + 1$
- trucking quantity in tons in one relation per day (x_{iRZi}) and per month (X_{RZjj})

$$x_{iRZi} = \frac{a_i}{m}\left[t / day\right]$$

$$X_{RZjj} = \frac{\sum_{i=1}^{m} a_i \times T}{m}\left[t / month\right]$$

- number of rides per day

$$n_r = m + n + \frac{\sum a_i}{m_T} = n_i + n_j + \frac{\sum a_i}{m_T}, where$$

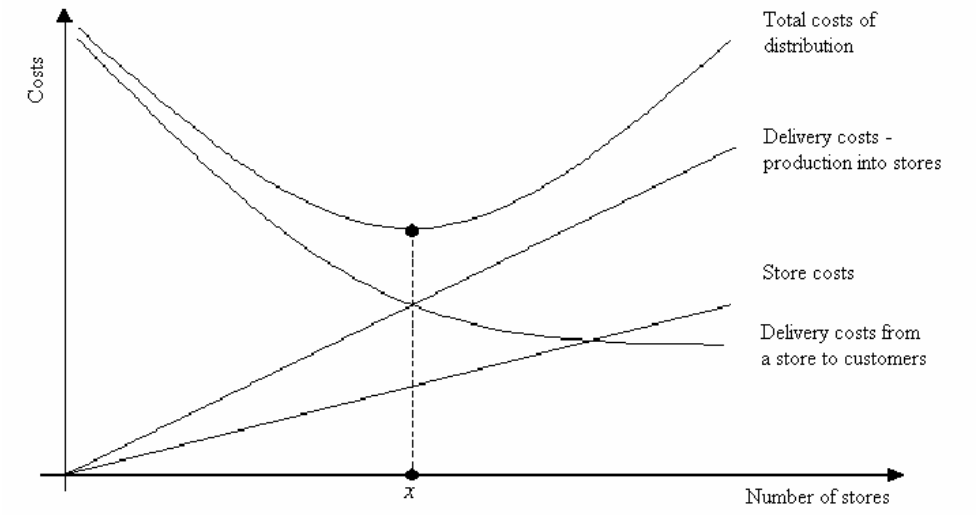
- mT ... trucking quantity in tons per one ride (loading weigh of vehicle)

- total hauling distance per day

$$L = n_i \times s_{iRZi} + m_j \times s_{RZjj} + \frac{\sum a_i}{m_T} \times s_{RZiRZj}[km]$$

4. Conclusion

The following graph shows the growth of expenditures of transportation and repositories during a higher number of repositories and the decline of expenditures for distribution from these repositories. The cumulative curve of all the expenditures shows the optimal number of repositories at it´s minimum.



The x point shows the optimal number of repositories with minimal expenditures of distribution.

Fig.4 *Distribution expenditures depending on number of repositories*

Geographical store localization can be solved by using location – allocation methods. Basic support data are the level of demand in single regions (microregions, towns, hamlets), the transportation network, the unit expenditures of multistop delivery trucks [4].

Note: This article is published as the part of research of the GAČR project – 103/05/2067 „Transportation – logistical processes outsourcing“.

Lektoroval: doc. Ing. Alexandr Čestnější, CSc.

Předloženo: 28. 2. 2007

Literature

1. BUCHHOLZ, J. a kol.: Handbuch der Verkehrslogistik, Springer-Verlag Berlin Heidelberg New York, 1998, ISBN 3-540-64517-9.
2. CEMPÍREK,V., KAMPF, R. Logistika. Univerzita Pardubice 2005. ISBN 80-86530-23-X.
3. DAVID, P. Strategie zásobovací logistiky v podmínkách dopravního podniku. Sborník příspěvků čtvrté mezinárodní vědecké konference „Nové výzvy pro dopravu a spoje“, Pardubice 2006, ISBN 80-7194-880-2.
4. GAŠPARÍK, J., DUGASOVÁ, E. Kundenbeziehungsmanagement in der Logistic und Transportwirtschaft. In: 5-th international conference for postgraduate students and young research and science workers Perners Contact 2004, 10th - 11th February 2004, Univerzita Pardubice, Česká republika 2004, ISBN 80-7194-633-8.
5. KAMPF, R. a kol. Výzkumná zpráva za I. etapu řešení projektu GA ČR 1103/05/2067 za rok 2005.
6. KAMPF, R. a kol. Výzkumná zpráva za II. etapu řešení projektu GA ČR 1103/05/2067 za rok 2006.
7. PERNICA, P. Logistický management, Radix s.r.o., Praha 1998, ISBN 80-86031-13-6.
8. POTKÁNY, M. Outsourcing, možná cesta k znižovaniu nákladov vo firme I. In: Produktivita 2/2005, Žilina, Slovenské centrum produktivity Žilina, 2005, s. 10–11. ISSN 1335-5961.

Resumé

STRATEGIE ROZMÍSTĚNÍ SKLADŮ

Václav CEMPÍREK, Rudolf KAMPF

Uvedený článek vznikl v rámci řešení grantového projektu GA ČR „Outsourcing dopravně-logistických procesů“.

Článek se zabývá problematikou prostorové lokalizace skladů. V volba optimální lokalizace objektů se týká v podstatě všech míst v logistickém řetězci, kde se vyrábějí a skladují výrobky, suroviny a polotovary. Tedy jde o lokalizaci výrobních podniků, skladů surovin, výrobků, velkoobchodů (distribučních a logistických center) a maloobchodní sítě ve vazbě na místa konečné spotřeby.

Summary

THE STRATEGY OF STORES LOCALIZATION

Václav CEMPÍREK, Rudolf KAMPF

This article is published as the part of research of the GAČR project ,,Outsourcing in transport – logistic processes“.

The article deals with problematic of stores space localization. Choice of optimal object localization is concerned in almost all places in distribution logistics, where are produced and stored products, raw materials and semi-finished products. So it concerns space localization of main factoring concerns, raw materials stores, products stores, wholesales (distribution and logistics centers) and retail network in attachment on places of final consumption.

Zusammenfassung

DIE STRATEGIE DER STANDORTSUCHE FÜR LOGISTISCHE LAGER

Václav CEMPÍREK, Rudolf KAMPF

Der Artikel entstand im Rahmen der Bearbeitung des Projekts „Outsourcing des Transports- und Logistikprozesses“, das von der Grantagentur der Tschechischen Republik gefördert wird.

Der Beitrag behandelt die Problematik der räumlichen Lagerdislokationen. Die Wahl des richtigen Standortes der Objekte betrifft alle Orte an der logistischen Kette, wo Produkte, Rohstoffe und Halbprodukte produziert und gelagert werden.

Im ersten Teil des Projekts wurde die Analyse durchgeführt und im weiteren Teilen werden z.B. die Risiken des Projekts und die Beziehungen zu der Umgebung behandelt.

Die Standorte der Lager sind an das Marktsegment, an das Produktionsprinzip und an die Kombination beider Kriterien gekoppelt.

Zu den Schemata für die Lagerdislokation werden Berechnungsformeln zum Vergleich der Leistungsmerkmale eingeführt. Endergebnis ist ein Graph, die das Wachstum der Kosten des Transports und der Lagerung sowie das Sinken der Distributionskosten in Abhängigkeit der Zahl der Lager zeigt. Das Minimum der Summenkurve der einzelnen Kosten zeigt dann die optimale Anzahl der Lager.