

LOGISTIC DISTRIBUTION CENTRES – BUSINESS SUCCESS FACTOR OF TRADING COMPANIES

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Abstract

In order to impact national, regional and global markets trading companies should establish logistic distribution centres. Their number, size, equipment, location, traffic and infrastructure connectivity, economic growth and the rise of consumer power on national, regional and global markets affects the development of logistic network and exploitation of trading company synergies. Special attention should be paid to positioning of logistic distribution centres, because market coverage depends on their strategic planning, and by that, the possibility of optimizing the logistic network and rapid response to consumer demands. To prove the hypothesis about logistic distribution centres as a decisive factor of business success of trading companies, methods of analysis and synthesis were applied, as were the mathematical and comparative method. The findings are based on analysis of a hypothetical example of optimizing the logistic network of a trading company by establishing a logistic distribution centre, but also on the analysis of several practical examples of establishing (national) logistic distribution centres of trading companies in Croatia. A particular object of research is the establishment of Lidl's logistic distribution centre in Perušić.

Key words: trading companies, logistic distribution centres, logistic network

1. INTRODUCTION

Modern logistics distribution centres went through an intense development phase between 1970 and 1980 when entrepreneurship began to flourish and larger properties for production were being sought. These were equipped with adequate infrastructure and transport connections, but also ensured tax, fiscal and employment benefits. The first modern distribution centre was opened in 1970 by Walmart, the world's largest retailer, at its headquarters in Bentonville, Arkansas.

Its purpose was reduction of logistic expenses and increase in efficiency of inventory management (Nadilo, 2012). All logistics distribution centres depend on good transport connections. The low cost of land is also important, as are good infrastructural facilities, and they are commonly found in business and economic zones. Their number, size and positioning on the logistic network of a trading company dictates the possibility of optimizing logistics costs and thus the success of the trading company.

Recently, trading companies are facing a dilemma of opening their own logistics distribution centres or renting a space in centres appropriately equipped and positioned in the most favourable positions. For example, the main feature of Immopark Zagreb (the new logistics distribution centre in Jastrebarsko) is its proximity to the A1 motorway exit for Jastrebarsko, its distance of only 24 km from Zagreb, and the availability of the entire motorway network through the nearby junction Lučko. There are plans for railway expansion, since the railway line is also in vicinity of the centre. Other Croatian cities are also easily accessed from this point (Rijeka – 125 km, Osijek – 280 km, Split – 336 km), as well as other major cities in the region (Ljubljana – 137 km, Vienna –

380 km, Budapest – 380 km, Sarajevo – 410 km, Belgrade – 415 km). Therefore, it is not surprising that Lidl's logistics centre was built along the access road to Jastrebarsko in 2008 and will be discussed in this research. Apart from Lidl, the leader in central distribution in Croatia is Konzum, which operates with two of its own logistics distribution centres in Zagreb and Dugopolje (Dujak, et al. 2011).

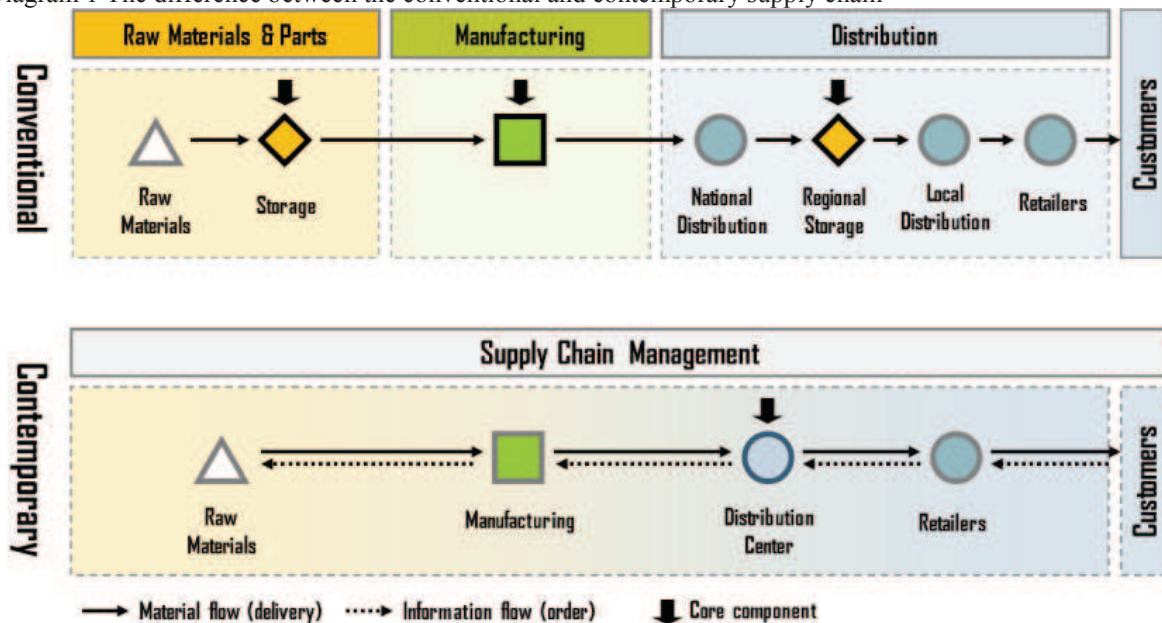
2. THEORETICAL FRAMEWORK

Logistics distribution centres have evolved from traditional warehouses. The main difference between distribution centres and warehouses is the fact that a warehouse is designed to store goods for longer periods of time. Distribution centers are facilities with primary purpose of logistic coordination. There is a number of different activities within a centre, with the main task of constant adapting to new market demands through continuous automation and computerization. Besides manipulative activities (loading, unloading, load transfer), there is a development in trade, delivery and transport functions in logistic systems on all levels. New modes of production are concomitant with new modes of distribution. Their main purpose is to provide value-added services to freight, which is stored for relatively short periods of time (days or weeks). DCs are often in proximity to major transport routes or terminals.

The scope and significance of logistics distribution systems is continually amplifying. The continuous growth of the number and contents of logistic activities conditions the growth of the relative share of logistic costs in total costs structure. Thus, in terms of globalization, the challenge of finding the way to minimize logistic costs is put before economic science even more ardently. Namely, the basic factor of global efficiency is a design of an adequate spatial configuration, and building efficient business infrastructure and network of external connections required for the implementation of business strategies. Internationalization of business leads to centralization of distribution, and distribution centers are a market example of such centralization. Of course, we are talking about large regional centres.

The fundamental difference between the conventional and contemporary approach to distribution management in supply chains is reflected exactly in the approach to distribution (cf. Diagram 1).

Diagram 1 The difference between the conventional and contemporary supply chain



Source: Hesse, M. & Rodrigue, J.P. (2004) "The Transport Geography of Logistics and Freight Distribution", Journal of Transport Geography, Vol. 12, No. 3, pp. 171-184.

Hesse and Rodrigue (2004) emphasize that contemporary supply chain freight flows tend to be of lower volumes, of higher frequency, often taking place over longer distances (outsourcing and offshoring). These flows have been associated with a modal adaptation, namely through containerization. The extent of these changes can be characterized by the growth of geographical areas of interaction, and by the temporal flexibility of freight flows, both resulting in a rising amount of freight transport. The distribution center thus becomes the core component of such a distribution system as it regulates the flows of a closer interaction between production and consumption.

Accordingly, it is highly likely that some trading companies will try to consolidate certain markets of a region or its parts by providing services from a single logistics distribution centre. In the long run, such decisions will depend primarily on the further development of economy, production, consumption and distribution. By establishing a logistics distribution centre, a full control of product entry and exit is achieved, as well as significant time savings, while errors are minimized and unused storage space is a rare occurrence. The main motif is a more efficient and cheaper goods distribution, and ultimately, an increase in profit. The development of transport infrastructure reduces the need for smaller warehouses in every large regional centre, so a number of retail companies more and more opt for a central warehouse and logistics distribution centre. Thereby, costs are drastically reduced. Basic features of logistics distribution centres are given in Table 1.

Table 1 Characteristics of large-scale distribution centers

| | | |
|----------------------|--|---|
| Size | Larger | More throughput and less warehousing. |
| Facility | One storey; Separate loading and unloading bays | Sorting efficiency. |
| Land | Large lot | Parking space for trucks (often not necessary due to high throughput); Space for expansion. |
| Accessibility | Proximity to highways | Constant movements (pick-up and deliveries) in small batches (often LTL); Access to corridors and markets. |
| Market | Regional / National | Less than 48 hours service window. |
| IT | Integration | Sort parcels; Control movements from receiving docks to shipping dock; Management systems controlling transactions. |

Source:<http://people.hofstra.edu> [access June 12, 2014]

3. RESEARCH RESULTS

Each possible logistics system implies a total logistics cost given by the expression (Kotler, 1988, p. 579):

$$M = T + FW + VW + S \quad (1)$$

Where:

M = total logistics cost of proposed system

T = total freight cost of proposed system

FW = total fixed warehouse cost of proposed system

VW = total variable warehouse cost (including inventory) of proposed system

S = total cost of lost sales due to average delivery delay under proposed system

We will now examine the total distribution cost associated with different proposed distribution systems (with or without LDC) and select the system that minimizes total distribution cost.

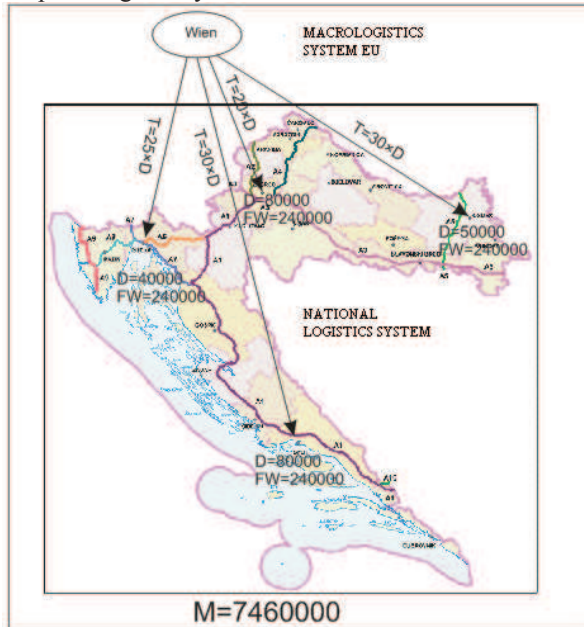
In the example under consideration the emphasis is on total freight cost of proposed system and total fixed warehouse cost of proposed system.

To clearly demonstrate the possibility of optimizing the supply chain in the logistic system by establishing a logistics distribution centre, a hypothetical example is considered below. A distributor of home appliances is considering establishing a logistic system of logistic market in Croatia. They made an estimation of annual demand of 250 000 products. They are considering the possibility of selling in leased retail premises in Split (demand of 80 000 products), Zagreb (80 000), Rijeka (40 000) and Osijek (50 000). Costs of each retail and warehouse facilities amounts to 20 000 HRK per month. Retail facilities could be supplied from Vienna at these transportation costs: Vienna – Zagreb 20 HRK per unit, Vienna – Rijeka 25 HRK per unit, Vienna – Osijek 30 HRK per unit, and Vienna – Split 30 HRK per unit. They are considering the possibility of opening a regional warehouse in Croatia, in the Zagreb area, more precisely in Jastrebarsko. Annual cost of renting a warehouse in Jastrebarsko amounts to 700 000 HRK. In that case, aggregate shipment cost from Vienna to Zagreb would be 15

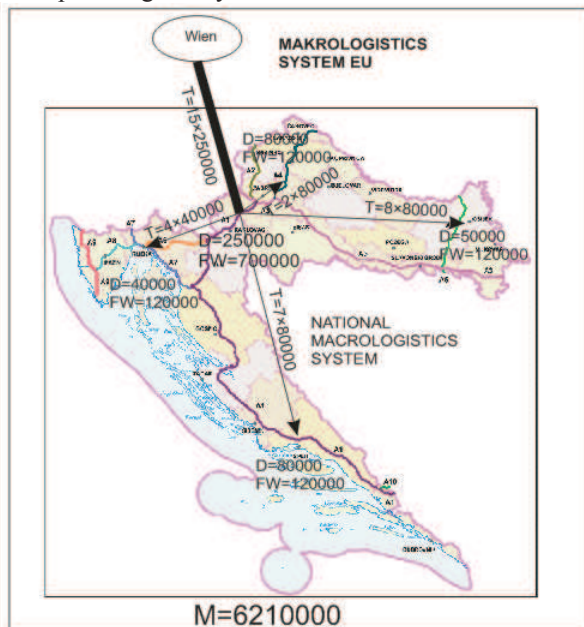
HRK per product. Shipment from Jastrebarsko to sales premises in Zagreb would be 2 HRK, to Rijeka 4 HRK, to Split 7 HRK and to Osijek 8 HRK. Opening of LDC in Jastrebarsko would lessen the need for storage in these cities, so monthly storage costs would be 10 000 HRK lower.

Map 1a and 1b show a single-level logistic system (without a LDC) and a multi-level logistic system (with a LDC) and total costs of both systems.

Map 1a Logistic system without LDC.



Map 1b Logistic system with LDC.



Source: authors

Comparison of Map 1a and Map 1b shows lesser total costs in a logistic system with a LDC, in the amount of 1,25 million HRK, or 16,7%.

Freight distribution is a **market servicing activity**, implying that the nature and structure of the market will have an important impact on the manner it is serviced. Freight distribution is deeply imbedded within its regional geography. Two related variables can help define the level of service performed by a distribution network composed of a set of distribution centers, each covering a specific portion of the territory. The first is the **average distance to customers**, which defines the market size as well as the delivery and return (back haul) distance. The second is the **lead time** which is the time it takes for a distribution center to deliver the goods once an order has been placed.

Accordingly, the following shows Konzum's and Lidl's distribution systems in Croatia, respectively, based on the selection of two of their logistics distribution centres.

Map 2a. Konzum's central distribution.



Map 2b. Lidl's central distribution.



Source: Authors

These two maps represent two different but similar optimal scenarios in distribution centres choice of location in Croatia. It is based on two basic assumptions. The first is that the market potential is directly related to the accessible population. The second is that deliveries are done by truck using the motorway network. For two distribution centers, the optimal locations would be one for the south and one for the north of the country. The main variables for choosing a location of a LDC are: 1) total population within their respective market areas, 2) lead time and 3) average distance to customers. Frequency of service is an important variable that influences the suitable number of distribution centers servicing a supply chain. A low frequency level tends to require less distribution centers than a high frequency level. A limited number of distribution centers also implies longer distances for empty returns, which is costly.

Interestingly, Konzum supplies warehouses in Osijek, Rijeka and Poreč from LDC Zagreb, while Zadar, Korčula and Dubrovnik are supplied from LDC Dugopolje. Lidl has chosen a different approach. Namely, their LDC Jastrebarsko supplies the region of Zagreb and Slavonia, while LDC Perušić supplies Istria, Kvarner, Lika, Gorski kotar and Dalmatia. While many predicted Lidl's failure on Croatian market, up to 2011 they have invested more than 3 billion HRK in retail network, and 180 million HRK in construction of LDC Perušić.

Basic information on Lidl's LDCs are given in Table 2.

Table 2 Basic features of Lidl's supply centres, LDC Jastrebarsko and LDC Perušić.

| Basic information | LDC Jastrebarsko | LDC Perušić |
|---|------------------|---|
| Surface area (m ²) | 45000 | 31200 |
| Number of employees | 90 | 85 |
| Monthly average of input pallets | 23000 | 20239 |
| Monthly average of commissioned cartons | 1680000 | 1593485 |
| Monthly average of output pallets | 27000 | 23599 |
| Daily average of delivery trucks | 23 | 23 |
| Number of supplied retail premises | 49 | 35 |
| Number of forklifts | 70 | 40 |
| Number of articles (standard range) | na | 1600 |
| Warehouse capacity (euro pallet) | 22000 | 13000 |
| Number of supply branch offices | 49 | 35 |
| Supply region | Zagreb, Slavonia | Istria, Kvarner, Lika, Gorski kotar, Dalmatia |
| Average distance from branch offices to warehouses (km) | 140 | 191 |

Source: Authors, according to Lidl's internal data

4. CONCLUSION

Logistics distribution centres have evolved from traditional warehouses. Modern logistics distribution centres went through an intense development phase between 1970 and 1980. The main difference between distribution centres and warehouses is the fact that a warehouse is designed to store goods for longer periods of time. Distribution centers are facilities with primary purpose of logistic coordination. In practice of large trading companies on Croatian market becomes obvious that to optimally cover the Croatian retail network needed two logistics-distribution centers. It is based on two basic assumptions. The first is that the market potential is directly related to the accessible population. The second is that deliveries are done by truck using the highway network. For two distribution centers, the optimal locations would be one in north Croatia (Jastrebarsko) and one in south Croatia (Perušić in our opinion).

5. REFERENCES

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