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COMMERCE OF ENGINEERING DECISIONS

Logistics Centre Concept through Evolution and Definition

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Along with worldwide production and trade globalization, the importance of logistics centres is growing in the supply chain management efficiency aspect.

The paper reviews existing terminology of facilities for logistics operations. Most commonly logistics centre concept is consolidated with understanding of distribution centre, central warehouse, freight/transport terminal, transport node, logistics platform, freight village, logistics depot, distripark etc.

An attempt to rectify the hierarchy of logistics facilities and formulate the definition of logistics centre was made in the article. The structure of logistics facilities hierarchy was proposed by the authors. Efforts were put to compare the concepts and understandings worked out by different world and Lithuanian authors and point out the development and evolution of logistics centres.

Logistics centre concept appeared 30 years ago. During this period either practical or nonfiction understanding of Logistics centre functional and conceptual significance has changed. Logistics centres can be classified into three different categories or generations on evolution basis. It is based on the scope and extension of logistics activities. Historically, typical logistics functions were shipping, receiving, storage, order picking, break-bulk, freight consolidation and containerization. Today, thanks to technology, many distribution operations are computerized, automated, and equipped with state-of-the-art material handling equipment and information systems. Nowadays many distribution operations have added a number of value-added services, including total logistics management, inventory control and tracking, packaging, labeling and bar coding, procurement and vendor management, and customer service functions, such as returns, repair, rework and assortment promotional assembly.

Due to the process of evolution as well as types and functionality of centres recently developed in the market there is no embracing concept and definition for logistics centre term determination. Lots of scientists (Pegrum, 1963; Bowersox, Smykay, LaLonde, 1968; Reynaud, Gouvernal, 1987; Cavinato, 1989; Holtgen, 1996; Johnson, Wood, 1996; Wiegmans, Masurel, Nijkamp, 1998; Breitzmann, Wenske, 1999; Ballis, Golias, 2002; Židonis, 2002; Waters, 2003; Kondratowicz, 2003; Kia, Shayan, Ghotb, 2003; Ballou, 2004; Urbonas, 2004; Meidutė, Vasiliauskas, 2005; Rushton, Croucher, Baker, 2006; Lu, Yang, 2006; etc) examined the theory of logistics and supply chain management, coping with logistics centre determination and functionality analysis, among all. Survey findings showed that not only terms, but the concepts differ as well. Logistics researchers have made little effort to build a unified logistics centre conception.

The definition of logistics centre was proposed by the paper author coming to the conclusion that evaluating presence and scope of the factors in Logistics centre definition, Logistics centre can be considered as Freight village, Transport node or Distribution centre as well.

Keywords: *logistics centre concept, definition, evolution, freight village, logistics node, distribution centre.*

Introduction

Worldwide globalization of industry and trade made a significant impact on practice and theory of logistics and supply chain management. Trade barriers have been decreased, but the logistics services requirements as well as cost constantly raises, so various businesses, especially international companies, change the attitude to material storage, production and product distribution. They are searching for industrial and logistics centres where repacking, labeling, bar-coding, light assembly and other value-added services to merchandise in transit can be provided (United Nations, 2002).

The majority of European Countries have geographical potential to establish and develop competitive logistics centres of European transport network. The construction cost of logistics facilities such as warehouses or terminals are relatively low in East European regions. Lithuania tends to become and already is one of connecting parts between Eastern and Western Europe in context of international trade and logistics. The demand for competitive logistics centres is growing accordingly. The heritage of theory development and empirical research on unified concept of logistics centre is quite poor in comparison to other disciplines. It might be influenced by a rather short history of supply chain management theory. So understanding what logistics centre definition encompasses is essential in response to scientific, commercial and governmental attitude of any country.

The aim of the research is to determine logistics centres concept pointing at their development and evolution as well as investigating the existing logistics centres understandings and definitions. To point out or to frame the

definition of logistics centre, characterizing most common understanding of a concept.

The object of the survey is logistics centre concept.

Methods of the survey include nonfiction and special literature comparative analysis and synthesis, the generalization of the research results.

Logistics centres evolution

Logistics Centre is not a new concept – it appeared 30 years ago. Logistics has changed over the past four-five decades. During this time there have been a number of significant changes in the way things are produced, stored and moved, which is what logistics is all about. Accordingly either practical or nonfiction understanding of Logistics centre functional and conceptual significance changed. Hence there was no commonly agreed definition of this concept established.

Lots of characteristics (names) are used to describe centre for logistics functions performance – logistics centre, distribution centre, central warehouse, freight/transport terminal, transport node, logistics platform, freight village, logistics depot, distripark etc.

Variation in the definition of the term are partly an outcome of the evolution process and new types of centres that have been developed in recent years (Kondratowicz, 2003). Best way to understand what is what is to look back through years of evolution, while logistics centres meaning and understanding have been shaped.

During the late 1950's physical distribution management began to materialize as an important business activity (Lynagh, 1971). 'Marketing concept' along with market segmentation, cost-profit squeeze, electronic data processing was the facts, which implemented the system approach and put the ground for physical distribution management. Twenty-five years have seen this concept of combining all the functions of distribution together into a system mature and into a major field of business study. The years since 1965 have been characterized by a refinement in basic concepts (Bowersox, 1969). In 1960's logistics was a synonym for physical distribution. In 1985 Jones and Riley introduced the term Supply Chain Management as a tool to manage inventory for gaining competitive advantage. Eventually inventory management services became a subject for sale. Logistics centre concept emerged along with a concept of logistics outsourcing (3rd Party Logistics). The consolidation of Distribution Centre is a new trend in global logistics management, with a reduction in an inventory costs often being cited as one of the main benefits (Teo et al., 2001).

The following reasons have often been cited for adopting the consolidation system:

- Reduced facility investment cost.
- Increased service quality.
- Lower total inventory cost (Teo et al., 2001).

The process of globalization influenced multinational companies' production concentration into fewer locations. Market has demanded a new global logistics strategy. Since the end of 1980s global firms have been steadily reducing their number of national warehouses, consolidating them into regional distribution centres that serve a much wider geographical area (United Nations, 2002). European experience has showed that such consolidation can result in enhanced competitiveness, though such centralized logistics services system may influence growth of transport costs, because products have travel longer distance and usually shorter time to succeed in customers' requirements fulfilment. One more of lately offered logistics services package include final assembly and products customization that takes place at distribution centres, close to the end users. In most cases, regional distribution centres are located near airport or seaport, so that raising demand can be met with agility, reliability and flexibility.

According to United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) study report (2002) logistics centres can be classified on evolution basis into three different categories or generations. It is based on the scope and extension of logistics activities as shown in Table 1. Logistics centres provide not only traditional activities such as storage, but also value-added logistics services such as labeling, assembly, semi manufacturing and customizing.

Both logistics companies and shippers agree that value added services in logistics centres are important in supply chain management, and this tendency is expected to continue in the future. In many cases, these services overlap or include third-party logistics services, such as inventory management, inspection, labeling, packing, bar-coding, order picking and reverse logistics, etc. The main VAL activities are (United Nations, 2002):

- Receiving goods, breaking shipments, preparing for shipment, returning empty packaging
- Simple storage, distribution, order picking
- Countrylizing and customizing, adding parts and manuals
- Assembly, repair, reverse logistics
- Quality control, testing of products
- Installing and instruction
- Product training on customer's premises.

Logistics centers are challenged to offer market a competitive and high quality categories of functions, enlarge their profitability, and limit environmental interference of their activities. Logistics centre evolution and development is leading to functionality and service quality improvement as well as to unification of commonly used determinants for their establishment.

Logistics centre definition

Due to the process of evolution (see Table 1) and destination as well as types of centres recently developed in the market there is no embracing concept and definition for logistics centre term determination.

Sometimes *distribution centers* are described as storing finished goods on their way to final customer, while *logistics centers* store a wider mix of products at different points in the supply chain. Waters (2003) uses the general term *'warehouse'* to cover all such facilities. He proposes a definition, which states that a '**warehouse** is any location where stocks of material are held on their journey through supply chains. As well as storage, warehouses

can be used for number of other activities' (Waters, 2003). Ballou (2004) the term 'distribution warehouse' uses synonymously with 'field warehouse' and 'distribution centre' at the same time equating it to 'terminal'.

Table 1

Logistics centres evolution

1960s - 1970s	1980s – early 1990s	Mid 1990s - present
		Materials management Distribution services (national/global)
	Bonding	Import clearance Bonding Inbound transportation
Receiving	Receiving	Receiving
	Cross-docking	Cross Docking
Storage	Storage	Storage Inventory management and control Shipment scheduling
Order processing Reporting Picking	Order processing EDI* Reporting Picking	Order processing EDI* Reporting Picking
Order assembly (Re) packaging	Order assembly (Re) packaging Stretch-shrink-wrapping	(Product) subassembly Order assembly (Re) packaging Stretch-shrink-wrapping
Palletiz-ing/unitizing Label/mark/stencil	Palletiz-ing/unitizing Label/mark/stencil	Palletizing/unitizing Label/mark/stencil
Shipping Documentation	Shipping Documentation Outbound Trans-portation	Shipping Documentation Outbound Transportation Export documentation FTZ* operation JIT/ECR/QR* services Freight rate negotiation Carriers/route selection Freight claims handling Freight audit/payment Safety audits/reviews Regulatory compliance review Performance measurement Returns from customers Customer invoicing

Source: Ernst F. Bolten, Managing time and space in the modern warehousing, Amacom, 1997, p.19.x

Abbreviations: EDI – electronic data interchange, FTZ – free trade zone, JIT – just-In-time ECR – efficient customer response, QR – quick-response.*

They are a few of authors who put different names of facilities for transport, logistics, storage and distribution operations in one line. The main criteria to correspond are operations performed and services offered.

A number of previous studies have addressed the issue of the importance of service attributes of distribution centers or warehouses (Johnson, Wood, 1996; Bowersox, Closs, 1996; Lambert, Stock, 1993). Johnson and Wood (1996) provided a list of services attributes of public warehouses consisting of bonded storage, office and display space, integrated data-processing equipment, inventory level maintenance, local delivery or tendering outgoing movements to carriers, unpacking, testing, assembling, repacking, price marking, and securing collateral goods for loans (Lu, 2004).

Bringing out the level of performance in proposed definitions the structure of logistics facilities hierarchy is below to make some clearance in terms (see Figure below). 1st level indicates the smallest scope of activities and the highest scope is defined by the 3rd level of the model. The intersection arrows between different levels show that either connected facilities names can be brought into higher or lower level, depending on how one or another author defines the facilities. The closest connection among the definitions is represented by linkage of unidirectional arrows.

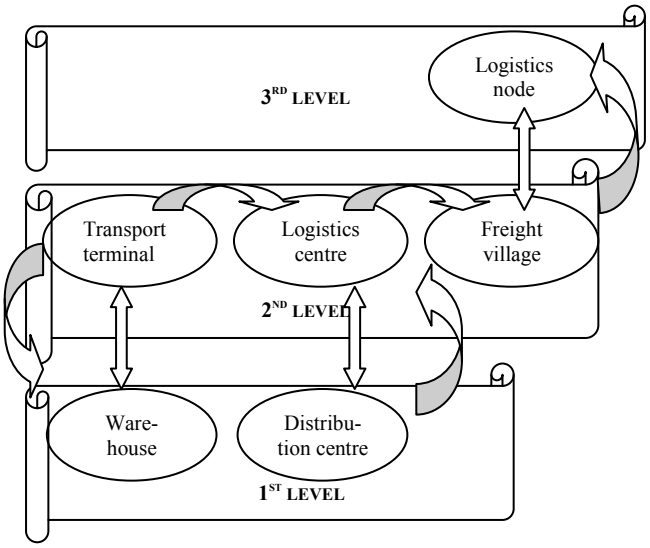

Figure. Logistics facilities hierarchy

The model can be applied only if citing the authors, who make different terms for facilities presented in the model. For example, the literature survey showed that some logistics facility can include one or another type of facilities with different names in the model above. So in that case model can be applicable. The definitions of different authors are presented further in such dimension.

Usually logistics centre conception in Lithuania is identified as storage facility. First of all a warehouse with only storage activity is taken into account while talking about logistics and distribution centre (Rimiene, 2006). But in fact even a small-scale terminal or warehouse has much more proceedings quite often.

Warehouse is understood as a place for inventory that has no direct impact on production (Minalga, 2001). An aim of warehouse logistics, as described by Minalga (2001), is to shape a system for all warehousing type sorting as well as freight shipment until the goods delivery, i.e. for goods storage during the production and delivery to customer period. He describes **warehousing** in narrow sense as a function – time cover between material in stock and the demand. Broader understandings are proposed by Urbonas (2004): '**warehousing** – goods interception and storage in assigned area and facility', and Židonis (2002): '**warehousing** is a connecting link be-

tween producer and customer and is one of logistics system integrated parts'. The authors provide list of main differences among warehouses and distribution centres:

- warehouses store all products and distribution centres – only required inventory;
- warehouses include more product maintenance operations;
- distribution centres develop value-added services (VAL);
- activity rate reduction is important in warehousing, distribution centres aim – to expand profit while meeting customers requirements (Židonis, 2002).

Warehouses can be either private or public (McGinnis, Kohn, 1988; Sheehan, 1989; De Koster, Warffemius, 2005) (Lu, Yang, 2006). Public warehouses almost satisfy the description of distribution centre. Some authors conclude that **distribution center** is virtually synonymous with the **warehouse** because it is also where most goods from different suppliers are collected for delivery to customers' temporary holding areas and is in somebody's distribution system. In distribution channels, warehouses are intermediate storage points between suppliers and the manufacturer, and the manufacturer and industrial customers. A **distribution center** is a warehouse that emphasizes the rapid movement of goods (Johnson, Wood, 1996 (Lu, Yang, 2006)). **Distribution center** Cavinato (1989) defined as 'a warehouse of finished goods; also applied to the facility from which wholesale and retail orders may be filled; a materials warehouse would also be a distribution center for buyers of its stock' (Lu, 2004).

Bowersox et al. (1968) stated that **distribution centre** represents a 'physical facility used to complete the process of product line adjustment in the exchange channel. Primary emphasis is placed upon product flow in contrast to storage'. This differs from the old understanding of warehouse. Later perceptions of distribution centres are close to logistics centre definitions (Reynaud, Gouvernal, 1987; Holtgen, 1996; Lu, Yang, 2006), because they cover the main criteria that logistics centre compose of. For example, Reynaud and Gouvernal (1987) **distribution centre** defines as a place, where consignments from different origins are grouped or split, it is above all a transport organization centre, located at nodal points in the system, i.e. at the meeting point of flows of goods in regional, inter-regional or international trade.

By consolidating a range of ancillary distribution activities at one site, **logistics centres** are intended to:

- contribute to (additional) combined transport;
- promote regional economic activity;
- improve land use and local distribution (Holtgen, 1996).

In respect of regional aspect distribution centres are ranged into *local, regional, national* or *international*. The differences exist not only in names, but also in meanings, scope of activity, criteria for evaluation or importance in the context of logistics system.

An *international distribution center* is defined as a place that integrates the operations of manufacturing with land, sea, air transportation, storage, port, and customs operations in order to achieve the efficient distribution of commodities (International Maritime Organization 1991 (Lu, 2004).

National Distribution centre – distribution centre whose purpose is to serve the whole country or supply a network of regional distribution centres to achieve national coverage. Goods are usually received and often dispatched on a trunk haul journey (Britains Railway, 2004).

Regional Distribution centre – distribution centre serving a region as part of a wider network of similar facilities to achieve national coverage. Usually served by a trunk haul from a port, manufacturing site or national distribution centre (Britains Railway, 2004).

Local Distribution centre – distribution centre, mostly the ending point of a distribution network, distributing consignments to their final users.

Being similar to logistics centre, a distribution centre does not function in the same way as a container depot or inland port currently does. Kia et al. (2003) presume a **distribution centre** as 'an exchange point where an inland mode of transport, such as a train, meets another mode of transport, such as truck. It serves an invaluable purpose in the whole process of production, consumption and supply. It is a concept that can be placed in the chain of transport to speed up the process of freight distribution'.

Wiegmans' et al. (1998) point of view to transport or freight terminal is very similar to distribution or logistics centre: '**terminal** is a place where goods are transferred between any two or more freight transport modes. In this interface unit loads are collected, exchanged, stored and/or distributed. The handling operations at the freight terminal may include the same transport mode or two different transport modes' (Wiegmans et al., 1998). Core activity of terminals is transshipment of goods between different transport modes (Holtgen, 1996). The transfer between transport modes is critical attribute of transport terminal since terminal appearance in distribution logistics evolution. Five decades ago Pegrum (1963) stated the same: '**transport terminals** are regarded as the points of concentration at which traffic on the intercity carrier ends its journey, or is interchanged for further movement when transferred for continuance to ultimate destination in another center'. Nowadays rail–road terminals consist of a wide range of installations, ranging from simple terminals providing transfer between two or three modes of transport, to more extensive centres providing a number of value-added services such as storage, empties depot, maintenance, repair, etc (Ballis, Golias, 2002).

Seen from the specific perspective of geographical coverage, volume, and capacity Wiegmans et al. (1998) proposes the following five characteristic types of freight terminals:

1. XXL or ***mainport terminal*** will usually have abundant deep-sea, rail, truck, and barge connections throughout the world. Furthermore, this type of terminal can be characterised by low costs, high volumes, high capacity utilisation, IT-intensive operations and heavy-weight global logistic play-

ers involved. Usually a mainport will either be a major seaport or a large airport with world-wide connections.

2. XL or ***international terminal*** can be characterised by deep-sea, rail, truck, and barge connections on a more continental level. European-wide networks are served. This terminal is especially used as an international distribution centre.
3. L or ***national terminal***: is operated on the country level in Europe and has rail, barge, and truck connections at a country level. This terminal is used as a national distribution centre.
4. S or ***regional terminal*** is characterised by low cost through low budget solutions, relatively low volumes, relatively low IT-components in the operations, and smaller regional and national logistical players. This small terminal is used as a regional distribution centre. There are usually truck and rail or barge connections.
5. M or ***local terminal*** is only served by trucks that collect and distribute freight to and from their final destination. A simple connection with rail or barge is provided.

Alternative terminal types are based on the characteristics of freight flows (Bowersox, 1986; De Wit, 1989) that are handled by airport terminals combined with four types of bundling freight flows: point-to-point, trunk line with collection/distribution, line, hub-and-spoke (Wiegmans et at., 1998). It should be absolutely clear that this sub-division of characteristics into such groups does not cover all current terminals unambiguously. Some terminals will have characteristics of two or more different terminal types.

Transport nodes are points which gather and connect different transport modes and give an opportunity to serve cargoes which flow from different directions (InLoc, 2006). Under this name EU financed 'InLoc' project coordinators (2006) see ports, intermodal terminals, logistics centres. Logistics centres form a special type of transport nodes. The Baltic seaports should be recognized as logistics nodes supplementing the logistics centres.

The literature survey above once more proved that there is no visible separation among terms identifying facilities for logistics services provision. Logistics centre definition can be used to cover either of them in response to:

- geographical coverage;
- services provided;
- transport mode transfer.

Europlatforms – the association of the European freight villages (in Italy, France, Spain, Denmark, Germany, Portugal, Luxembourg, Greece, Poland), developed the definition of logistics centre, which is agreed among its members:

'A **Logistics Centre** is the hub of a specific area where all the activities relating to transport, logistics and goods distribution – both for national and international transit – are carried out, on a commercial basis, by various operators. The operators may be either owners or tenants of the buildings or facilities (warehouses, distribution centres, storage areas, offices, truck services, etc.) built there. In order to comply with free market rules, a Logistics Centre must be accessible to all companies involved in the activities set out above. A Logistics Centre must also be equipped with all the public facilities necessary to carrying out the above-mentioned operations. If possible, it should also include public services for the staff as well as users' equipment. In order to encourage intermodal transport for goods handling, a Logistics Centre should preferably be served by a variety of transport methods (roads, rail, sea, inland waterways, air). It is vital that a Logistics Centre be managed as a single and neutral legal body (preferably by a Public-Private-Partnership) if synergy and commercial cooperation are to be ensured. Finally, a Logistics Centre must comply with European standards and quality performance in order to provide the framework for commercial and sustainable transport solutions' (Europlatforms, 2004).

'InLoc' (2006) appeal almost the same definition: '**Logistics centre** – a centre in a defined area within which all activities relating to transport, logistics and distribution of goods are carried out by various operators on a commercial basis. A Logistics Centre must be open to allow access to all companies involved in the activities set out above. It should also be equipped with facilities serving different modes of transport'.

But the same association previously used another name to cover the definition: 'a **freight village** is a defined area within which all activities relating to transport, logistics and the distribution of goods, both for national and international transit, are carried out by various operators'. This definition was established by Europlatforms in 1992 (Galloni, 1999).

In short, the **Logistics Centre** is simply a **village** planned and built to best manage all the activities involved in freight movement (Europlatforms, 2004). Usually only large-scale intermodal logistic centre is called freight village.

Some authors make an emphasis on functionality of logistics centre: 'a **logistics centre** is a particular territory where such services as cargo transfer, storage, distribution over the territory of one or more countries, customs mediators, insurance, maintenance and repair of transport facilities, etc. are provided' (Lingaitis, Fadina, 2003). Other authors – exclude the scope of physical area and regard logistics centre or freight village a structure including premises, called by other terms above for specific activities to be performed. Breitzmann and Wenske (1999) describe **logistics centre** as a **freight village** being a specific group of transport and warehousing centres (Kondratowicz, 2003). Rushton et al. (2006) states that freight villages usually have warehouses and distribution companies based alongside the rail facilities. Break-bulk and freight consolidation services are usually also available. Some of these facilities are classified as inland ports and so customs services are available. According Europlatforms (2004) 'the most important infrastructures inside a Logistics Centre are the *warehouses* and the *intermodal terminal'*.

Services provided by logistics centre 'depend on the predominant function, size and range of operation' (Meidute, Vasiliauskas, 2005). Proposing no differentiation between terms of logistics and distribution centre

Meidute, Vasiliauskas (2005) use these criteria to divide them into:

a) *International* Logistics Distribution Centres.
b) *Regional* Logistics Distribution Centres, those are intermediate link in the logistics channels, and fulfilling regional distribution service tasks.
c) *Local* Logistics Distribution Centres, those in most cases are end links of a distribution network.

Other researchers or institutions dealing with logistics concern come to an understanding that logistics centre is only one section of a bigger structure. When logistics centres are grouped together in a common dedicated area, it is sometimes called a Distripark (distribution park). Therefore, a ***Distripark*** is a large-scale, advanced, value-added logistics complex with comprehensive facilities for distribution operations at a single location, which is connected directly to container terminals and multimodal transport facilities for transit shipment, employing the latest information and telecommunication technology (United Nations, 2002). Container ports are generally a preferred choice to set up Distripark, since they are already closely located to various inland transport facilities and highly skilled workforce.

Such consolidation was influenced by worldwide development of information technologies and telecommunication as well as financial investments in logistics infrastructure. These facts affect that logistics facilities have to put more emphasis on better utilizing existing facilities as well as adding capacity (United Nations, 2002).

Logistics centre services

Historically, typical logistics functions were shipping and receiving, storage, order picking, break-bulk, freight consolidation and containerization. Today, thanks to technology, many distribution operations are computerized, automated, and equipped with state-of-the-art material handling equipment and information systems. This enables them to deliver overnight to a widening geographic market. As a result, many distribution operations have added a number of value-added services, including total logistics management, inventory control and tracking, packaging, labeling and bar coding, procurement and vendor management, and customer service functions, such as returns, repair, rework and assortment promotional assembly.

An attempt to define logistics centre functionality was already made by the author of this survey (Rimienė, 2006). Different logistics centers at different locations and with different missions may offer different range of functional operations. Seeking competitiveness and customers' satisfaction there must be found a way to create a consistent framework in which these logistics centers that operate within a wide variety of geographical, economic and political context can turn into an effective network for multimodal transport services to cater to international traffic and goods flow.

Warehouse/Distribution/Logistics center facilities vary greatly, depending on their type of operations, their functions, the geographic region served and their space needs (New York Empire state development, 2006).

As the movement of freight within distribution centers accelerates, cross-docking is growing in importance. With crossdocking, goods come in one door and go out another with minimal delay - a package that might have spent five days in yesterday's distribution center is now processed through in 24 hours or less.

In general, the average distribution facility employs fewer than 100 workers. However, recent trends toward expanding operations to include value-added services are expected to increase the average employment in these types of operations (New York Empire state development, 2006). The location goal of most warehouse/distribution/logistics **centers** is to select a site that offers the lowest possible transportation costs with the easiest access to the greatest number of customers. The location process typically used in the selection of an appropriate site takes into consideration the products for which a distribution facility is desired; the market area or areas that are to be served and the degree of market penetration necessary. The location criteria that warehouse/distribution/logistics centers factor into their site selection decision include, but are not limited to, market trends, proximity to existing and new customers, access to suppliers and vendors, transportation services and cost, telecom infrastructure, labor availability and cost, building and site acquisition and cost, quality educational institutions and training facilities, and regulatory factors, such as inventory valuation.

Assuring fluidity between all the transport connections and coordinating all the transport modes are some of the tasks of a Logistics Centre. This is why most European Logistics Centres are located in hub points for transport and distribution activities. The widespread of logistics centres services indicates not only that their number is increasing substantially but also that their functionality is changing (De Koster, Warffemius, 2005).

Conclusions

A number of different terms, with the most common being 'distribution centres' and 'logistics centres' (Waters, 2003) are used to describe warehouses or facilities for logistics operations to be held. At the same time a concept of 'logistics centre' in logistics theory and especially in practice usually intersects with terms of 'freight village', 'logistics node', 'terminal', etc. Most likely such situation was influenced by the short existence of supply chain management approach and not long logistics centre evolution period.

Logistics researchers have made little effort to build a unified logistics centre conception. That is why the attempt to rectify the hierarchy of logistics facilities and formulate the definition of logistics centre is of a great importance to every researcher, interested in logistics theory.

Nowadays logistics centres have been developed during last three decades and their functionality expanded from traditional individually offered receiving, storage, shipping services to sophisticated, highly automated value added complex of services, including number of handling functions from storage, consolidation, maintenance, etc services to customs, final assembly, repairing,

financial and audit attendance.

The functionality depends on type, legal status, geographical coverage, intermodality and other criteria of a logistics centre. Issue of different terms, naming the same logistics services rendering facilities, is important for function determination as well.

The literature review of concepts of different scientists and practicians was made by the authors to adjust the hierarchy of logistics facility descriptions and understandings. Logistics facilities hierarchy model was made to link different terms on one platform.

Summarizing works of different authors the table for comparison is proposed below to show the differences or similarity between different attitudes (see Table 2). List of main emphasis was excluded to see how researchers estimate the concept of logistics centre.

Table 2

Definitions of Logistics centre

Definition	Authors	Emphasis on
Logistics centre *as* *Freight village* *or* *Logistics node*	Breitzmann, Wenske (1999) Kondratowicz (2003) Rushton, Croucher, Baker (2006) Meidute, Vasiliauskas (2005) Europlatforms (2004) InLoc (2006)	transport, logistics and goods distribution functionality freight transport modes change geographic coverage facilities include warehouses, distribution centres, storage areas, offices, truck services, etc public services, full territory access management and ownership issues
Freight terminal *as* *Distribution centre*	Pegrum (1963) Holtgen (1996) Wiegmans, Masurel, Nijkamp (1998) Ballis, Golias (2002)	freight transport modes change handling operations value-added services
Distribution centre as *Logistics centre*	Reynaud, Gouvernal (1987) Holtgen (1996) Kia, Shayan, Ghotb (2003) Lu and Yang (2006)	consignments grouped or splited transport organization centre freight transport modes change located at nodal points in the system
Distribution centre *as* *Warehouse*	Bowersox, Smykay, LaLonde (1968) Cavinato (1989) Johnson , Wood (1996) Lu, Yang (2006) Zidonis (2002)	product flow in contrast to storage value-added services rapid delivery
Warehouse	Minalga (2001) Zidonis (2002) Urbonas (2004)	place for inventory storage connecting link between producer and customer

To conclude the research, common understanding of 'Logistics centre' concept was formulated on emphasized criteria (see Table 2) and is proposed by the author below:

'Logistics centre (*Freight village / Logistics node / Distribution centre*) is a special intermodal hub (nodal point) in the transportation system, including different logistics facilities, where separate operators are providing number of services, connected to transportation, logistics and distribution in established geographical coverage.'

In this point, only public hubs are considered as Logistics centres. Geographical coverage is used in sense of describing local, regional, international significance of a hub.

The resuming point can be made stating that evaluating presence and scope of the factors from Logistics centre definition, Logistics centre can be considered as Freight village, Logistics node or Distribution centre as well.

The rectified concept would be a platform for further research.

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Logistikos centrų raida ir sampratos jų sąvokai apibrėžti

Santrauka

Pasaulinė gamybos bei prekybos globalizacija daro didžiulę įtaką logistikos ir tiekimo grandinės valdymo praktiniams bei teoriniams sprendimams. Tarptautinės kompanijos vis dažniau ieško logistikos centrų, kuriuose būtų teikiamos ne tik tradicinės logistikos paslaugos, bet ir pridėtinę vertę kuriančios (pvz.: žymėjimo, pakuotės keitimo, kodavimo, galutinio produkto surinkimo, kt.) paslaugos. Lietuva ketina tapti jungiančiąja tarptautinės prekybos bei logistikos grandimi tarp Rytų ir Vakarų Europos, vystyti logistikos centrų infrastruktūrą, kad galėtų įsilieti į Europos logistikos tinklą. Tuo tarpu mokslinių tyrinėjimų logistikos srityje rezultatai kol kas nepateikia visiems priimtinos ir vienodai suprantamos „logistikos centro" sampratos. Taigi teisingai suvokti bei išgryninti „logistikos centro" apibrėžimą ypač svarbu tiek moksliniu, tiek visuomeniniu bei komerciniu aspektu.

Straipsnio tikslas – remiantis logistikos centrų vystymosi ir raidos apžvalga bei esamų logistikos centro sampratų ir apibrėžimų analize, išskirti arba suformuluoti logistikos centro sąvoką, kuri leistų apibendrinti logistikos centro sampratą.

Tyrimo objektas – logistikos centro sąvoka.

Tyrimo metodai apima mokslinės ir specialiosios literatūros lyginamosios analizės ir sintezės, tyrimo rezultatų apibendrinimo metodus.

Logistikos centrų raida

Logistikos centro sąvoka nėra nauja – pirmą kartą ji pradėta vartoti prieš 30 metų. Tačiau bendro apibrėžimo kol kas nėra suformuluota. Iki šiol vartojamas ne vienas pavadinimas centrui, kuriame teikiamos logistikos paslaugos, apibūdinti: „logistikos centras", „paskirstymo centras", „centriniai sandėliai", „krovinių gabenimo/transporto terminalas", „transporto mazgas", „logistikos platforma", „krovinių kaimelis", „logistikos bazė" ir t.t. Tokią terminų įvairovę lėmė kaip tradicinių bei naujo tipo logistikos centrų evoliucijos rezultatas. Logistikos centrų sąvoka atsirado kartu su trečiosios šalies logistikos (3PL) samprata. Pagal literatūroje pateikiamus raidos etapus: I – 1960–1970 metai, II – 1980–1990 pradžia, III – 1990 vidurys – dabartis, logistikos centrai gali būti skirstomi į tris kategorijas (United Nations, 2002), kurios remiasi logistikos paslaugų įvairovės ir veiklos masto kriterijumi. Trečiosios kategorijos logistikos centrai teikia ne tik tradicines paslaugas (prekių priėmimas, saugojimas, krovinių konsolidavimas, kt.), bet ir pridėtinę vertę kuriančias logistikos paslaugas. Daugeliu atvejų jos sutampa su trečiosios šalies logistikos paslaugomis – atsargų valdymu, priežiūra, žymėjimu, pakavimu, kodavimu, užsakymų surinkimu, reversine logistika, kt. Logistikos centrų evoliucija ir vystymasis daro įtaką jų paslaugų kiekio ir kokybės augimui bei bendrų jų kūrimosi veiksnių atsiradimui.

Logistikos centro apibrėžimas

Centrų, kuriuose teikiamos logistikos paslaugos, sampratas, pavadindami juos skirtingai, pateikia daugelis užsienio (Pegrum, 1963; Bowersox, Smykay, LaLonde, 1968; Reynaud, Gouvernal, 1987; Cavinato, 1989; Holtgen, 1996; Johnson, Wood, 1996; Wiegmans, Masurel, Nijkamp, 1998; Breitzmann, Wenske, 1999; Ballis, Golias, 2002; Waters, 2003; Kondratowicz, 2003; Kia, Shayan, Ghotb, 2003; Ballou, 2004; Rushton, Croucher, Baker, 2006; Lu, Yang, 2006; kt.) ir Lietuvos (Židonis, 2002; Urbonas, 2004; Meidutė, Vasiliauskas, 2005; kt.) autorių bei visuomeninės organizacijos (Europlatforms, 2004; InLoc, 2006; kt.).

Esamos logistikos centrų sampratos išsiskiria dviem kryptimis:

- Autoriai, teigiantys, jog logistikos centro sąvoka atitinka sandėlio, paskirstymo centro, transporto terminalo ir kt. logistikos patalpų pavadinimų sąvokas (Waters, 2003; Ballou, 2004);
- Autoriai, apibrėžiantys logistikos centrą konkrečia sąvoka, tačiau atskirais atvejais prilyginantys jį atitinkamai kitoms logistikos patalpų pavadinimų sąvokoms (Pegrum, 1963; Bowersox, Smykay, LaLonde, 1968; Reynaud, Gouvernal, 1987; Cavinato, 1989; Holtgen, 1996; Johnson, Wood, 1996; Wiegmans, Masurel, Nijkamp, 1998; Breitzmann, Wenske, 1999; Minalga, 2001; Židonis, 2002; Ballis, Golias, 2002; Waters, 2003; Kondratowicz, 2003; Kia, Shayan, Ghotb, 2003; Europlatforms, 2004; Ballou, 2004; Urbonas, 2004; Meidutė, Vasiliauskas, 2005; Rushton, Croucher, Baker, 2006; Lu, Yang, 2006; InLoc, 2006).

Atliktos literatūros apžvalgos ir analizės rezultatai apibendrinami lentelėje išskiriant akcentuojamas logistikos patalpų charakteristikas, persidengiančias logistikos centro / krovinių kaimelio / logistikos bazės / krovinių terminalo / paskirstymo centro / sandėlio sąvokose. Remiantis tyrimo duomenimis, pagrindiniai bruožai, kuriais pasižymi

sandėliai (logistikos centrai siaurąja prasme) yra atsargų saugojimas, atstojant jungiamąją grandį tarp gamintojų ir klientų (Minalga, 2001; Židonis, 2002; Urbonas, 2004). *Paskirstymo centro, krovinių terminalo ir logistikos centro* sąvokos siejasi tokiomis charakteristikomis: intermodalumo, pridėtinę vertę kuriančių paslaugų bei krovinių valdymo funkcijų gausa (Wiegmans, Masurel, Nijkamp, 1998; Holtgen, 1996; Pegrum, 1963; Ballis, Golias, 2002; Reynaud, Gouvernal, 1987; Lu, Yang, 2006; Kia, Shayan, Ghotb, 2003; Židonis, 2002; Johnson, Wood, 1996; Cavinato, 1989; Bowersox, Smykay, LaLonde, 1968). *Logistikos centro plačiąja prasme sąvoka tapatinama su krovinių kaimelio, logistikos bazės* sąvokomis, ir apima transporto, logistikos ir paskirstymo funkcijų gausą, intermodalumą, geografinį išplitimą, visuomeninių paslaugų bei viešumo kriterijus, centro valdymo bei nuosavybės klausimus, taip pat sandėliavimo, administracinių, techninių patalpų ir paslaugų gausą (Breitzmann, Wenske, 1999; Kondratowicz, 2003; Europlatforms, 2004; Meidutė, Vasiliauskas, 2005; Rushton, Croucher, Baker, 2006; InLoc, 2006).

Daugumos ankstesnių įvairių mokslininkų atliktų tyrimų rezultatai rodo, jog logistikos centro funkcijų gausa yra labai svarbus logistikos patalpų vertinimo kriterijus. Straipsnyje pateikiamas autorių sudarytas *logistikos patalpų hierarchijos modelis*, atskleidžiantis ryšį tarp išskirtų sąvokų bei nurodantis galimybę sisteminti mokslinėje literatūroje aptinkamų apibrėžimų bei sampratų įvairovę, išskiriant teikiamų paslaugų aspektą. Remiantis modeliu, įvairiai autorių apibrėžiamas logistikos patalpų sampratas galima išdėstyti trijų lygių atžvilgiu, kur 1-asis nurodo mažiausias veiklos apimtis vykdančių logistikos patalpų sąvokas, o 3-iasis – didžiausios apimties funkcijomis, patalpų gausa ir svarba transporto sistemoje apibūdinamas sąvokas.

Įvairūs autoriai pateikia skirtingas jų apibrėžtų logistikos patalpų (logistikos ar paskirstymo centrų, terminalų, kt.) grupavimo charakteristikas. Savo dydžiu ar paskirtimi dažniausiai jos skirstomos į *vietinio, regioninio,* ar *tarptautinio* lygio centrus.

Logistikos centrų paslaugos

Istoriškai susiklostė, kad tipinėmis logistikos funkcijomis yra laikomos prekių priėmimas, saugojimas, užsakymų surinkimas, iškrovimas, krovinių konsolidavimas, konteinerių krova. Technologijų dėka šiandien daugelis operacijų yra kompiuterizuotos, automatizuotos, turi naujausią medžiagų priežiūros ir valdymo įrangą bei informacines sistemas. Todėl šiuo metu logistikos paslaugų įvairovė labai plati ir apima daug naujų papildomą vertę kuriančių paslaugų, tarp kurių galima paminėti visą logistikos valdymą, atsargų kontrolės ir apskaitos, pakavimo, žymėjimo, kodavimo, tiekimo bei tiekėjų valdymo, klientų aptarnavimo paslaugas, pavyzdžiui, grąžinimo, remonto, perdirbimo, asortimento reklamos paslaugas. Skirtingos paskirties bei skirtingose vietovėse įsikūrusios logistikos patalpos skiriasi savo funkcijų gausa bei veiklos mastu.

Apibendrinant tyrimo rezultatus, remiantis logistikos centrų raidos etapais, išanalizuotomis įvairių autorių sąvokomis ir akcentuojamomis savybėmis, buvo apibrėžta ir autorių pasiūlyta bendra logistikos centro sąvoka:

„Logistikos centras yra tam tikras transporto sistemos intermodalinis centras (mazgas) su įvairiomis logistikos patalpomis, kuriame veikiantys skirtingi operatoriai teikia daugelį su transportavimu, logistika ir paskirstymu susijusių paslaugų tam tikros geografinės rinkos atžvilgiu.“

Pagal šį apibrėžimą tik viešieji centrai laikomi Logistikos centrais. Geografinė rinka čia apibrėžiama vietinio, regioninio ar tarptautinio logistikos centro statusu.

Įvertinant patalpų, kuriose teikiamos logistikos paslaugos, atitiktį pateiktame logistikos centro apibrėžime išskirtoms savybėms logistikos centru gali būti laikomas krovinių kaimelis, logistikos bazė ar paskirstymo centras.

Raktažodžiai: *logistikos centro sąvoka, logistikos centrų evoliucija, krovinių kaimelis, logistikos mazgas, paskirstymo centras.*

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