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THE INFLUENCE OF LOGISTICS CENTERS ON THE REGION DEVELOPMENT ON THE EXAMPLE OF BEŁCHATÓW DISTRICT

Monika Kozerska, Leszek Szczupak

Czestochowa University of Technology
Faculty of Management

Abstract: Logistics centers are considered a good investments stimulating local economy and activating new undertakings related to influx of new business entities. The article presents principles of operation of logistics and distribution centers, as well as their main responsibilities and functions. The aim of this paper is to define and classify such centers. What is more, as far as their location is concerned, the potential localization of logistics centers are mainly urban agglomerations, sites that could handle several provinces with their main agglomerations and finally locations with high concentration of industry and logistic services. An example of such solution is Bełchtów district.

Keywords: logistics center, distribution center, location, development

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Introduction

As a result of global economic processes, formation of distribution and logistics centers has become a common phenomenon (Skowron-Grabowska et al. 2017, p. 102). The most popular types of functional and spatial concentration are distribution centers. They have been replacing retailers' warehousing facilities and manage finished goods warehouses on behalf of manufacturers. As a result, distribution centers are essential to those distribution channels which involve more participants, both the suppliers and the consignees. Manufacturing and trading companies have been increasingly entrusting realization of some tasks to businesses from the transport and logistics field. Hence, the first decade of this century has seen an increase in the number of new distribution centers. This phenomenon concerns mainly third-party logistics businesses, which offer comprehensive logistics services. Logistics park is a more advanced form of functional and spatial concentration. It is a cluster of facilities that enable not only the typical wholesale activities, but they also facilitate conducting manufacturing, business and logistics services. Globalization of production and trade, as well as necessity of utilizing up-to-date logistics in the product distribution process have resulted in a demand for a site with innovative service offer.

Modern warehousing facilities are situated in most large urban centers or in their vicinity. This is due to the fact that the state of the road infrastructure in those

areas is relatively good and they also have convenient connections with pan--European road network (Wojciechowski 2012, p. 1382-1384).

Creation of logistics centers is a response to the progressing changes both in national and international economy. Determining clear needs of improving the standards of logistics services constituted the basis for creation of junctions in logistic networks, where the goods could be unloaded, repacked and consolidated accordingly to the requirements of fragmented distribution.

Distribution centers vs logistics centers

The term 'logistics centers' requires defining because clusters of warehousing facilities built mainly by developers are also associated with them, even though it is not necessarily always correct when we consider their organization and functionality (Brzozowska, Łyduch 2017, p. 229-236).

Logistics center is a functional-spatial object with infrastructure and organization where logistic services are implemented. Those include goods receipt, storing, distribution, apportion and dispensing as well as complementary services rendered by entities independent of consigner or consignee (Fertsch 2006, p. 79).

Distribution center is an organizational unit engaged in warehousing goods which belong to suppliers and distributing those goods to recipients pursuant to, instructions of the goods' owner (Fechner 2004, p. 100-114).

Distribution center's infrastructure consists of:

- the board's facilities,
- warehouses and manipulative equipment,
- terminals with loading ground and access road,
- IT networks,
- catering facilities.

In comparison with traditional warehouses, whose only function is storing, distribution centers additionally enable movement of goods (receipt, assorting, assembly, disassembly, packing, loading, etc).

Peculiarity of distribution center depends on numerous factors that could be categorized into three levels.

The strategic level comprises of territorial borders of the area where the center operates, its geographic location and access to transport network (Grondys, Kott, Sukiennik 2017, p. 237-245).

The tactical level concerns structure and size of vehicle fleet, number and type of warehouses as well as the type of the load unit (cardboard, bulk box, pallet, case, container, etc).

Operational level regards completing orders, route planning, warehouse management, scale of receipt and release of goods, etc. (Fechner 2009, p. 292).

The tasks of distribution centers include:

- planning and effective realization of transport links between contractors,
- provision of proper reloading technique and technology,
- providing storage services,

- packing and phytosanitary control provision,
- enabling load completion and disassembly,
- enabling reloading from one means of transport to another.

Distribution center may function in two models of distribution: centralized and decentralized. In a centralized model, the clients are serviced from one site which keeps stocks, i.e from a distribution center. On the other hand, in a decentralized model, mass-produced goods are distributed to final recipients by means of several distribution centers (local and regional) (Hodczak-Sekulska, Redmer 2010, p. 2-4).

Centralized model allows to reduce secure stock level and to maintain high level of customer service at the same time (Brzozowska, Senczyna 2017, p. 178-193). As a result, the cost of keeping the stock, as well as labor and administrative cost declines. The model is not flawless, though (Brzóska, Jelonek 2015, p. 48-55). Cooperation within the framework of centralized model entails additional costs related to implementation of up-to-date IT technologies. What is more, there is much to be said against the distance from the distribution center to the client, which also requires additional financial outlay.

Characteristic feature of the decentralized model is accumulating high level of secure stock, which guarantees high level of customer service. A relatively small distance between a distribution center and a client results in a relatively low transportation cost and makes is possible to reach a wider range of potential clients.

Attracting new clients is a basic factor of most companies' development strategy and it is a prerequisite for success (Seroka-Stolka 2016, p. 60-67). The wider the geographic reach that the center operates in, the more likely it is to acquire more new clients.

Despite the fact that in most cases distribution centers carry out similar functions, they differ considerably. Disparities stem mainly from the requirements imposed on them and from their territorial scope. Alongside with development of Polish economy, it has been endeavored to make distribution centers operate in the largest area possible, with the reach even over 500 kilometers.

Considering territorial borders of the area supported by the center, we distinguish three types of centers:

1. International distribution centers, which are characterized by the following features (Ząbkowski, Jałowiecki 2011, p. 24-25):
   - full and developed logistic infrastructure (transport, warehousing facilities, means of information processing, etc.),
   - integrated information system supporting management,
   - fully developed system of offered logistics services,
   - they have the largest capacity among all the discussed center types and they handle the largest territorial area.
2. Regional distribution centers, characterized by:
   - relatively well developed logistic infrastructure,
   - well developed information system,
   - they offer selected logistics services.

3. Local distribution centers, which are distinguished by the following factors:
   - low level of logistic infrastructure development,
   - offering logistic services of a limited range,
   - among the mentioned types of distribution centers, a local center has the smallest capacity and operates within the smallest territorial area.

Additionally, a specific group among distribution centers are sectorial logistic centers which handle some specific industries or particular enterprises (Skowron-Grabowska 2010, p. 10-12).

One must remember that term 'distribution center' should not be used interchangeably with 'logistic center.' They are two disparate types. As there are many definitions of the logistic center, we must focus on three conditions that such center should comply with. The scope of activities of a logistics center goes considerably beyond distribution, including logistic operations, as it is supplying the manufacturers, e.g. by combining deliveries from many vendors into assembly sets and forwarding them to the manufacturers according to the production schedule (Skowron-Grabowska et al. 2016, p. 7-16).

E. Gołembska describes logistics center as interregional economic entity coordinating warehousing and transporting services over both short and long distances, incorporating flow of information and control system of this entity (Gołembska 2017, p. 102).

S. Abt, in his definition of logistics center, identifies it as a center that logistically coordinates services and transportation over various distances and guarantees interoperating combination of transport and information flow (Abt 2001, p. 102).

I. Fechner, on the other hand, depicts a logistics center as functional-spatial entity with infrastructure and organization, where logistic services connected with goods receipt, their storing, apportion and distribution, as well as complementary services rendered by entities independent of consigner or consignee (Fechner 2004, p. 22).

J. Fijałkowski defines logistic center as "an independent entity, whose aims is providing logistic services and realization of deliveries and distribution within a particular area" (Fijałkowski 2001, p. 14) [own translation]. The author believes that a logistics center consists of the following elements:

- designated area and facilities such as buildings, loading ground, roads,
- technological infrastructure including means of relocating and storing,
- human resources consisting of qualified personnel.

J. Miklińska belives that "a logistics center is a designated (with respect to procedural, organizational and technical relation) area on which infrastructural and suprastructural facilities belonging to organizations of the transport and logistics industry and other specializations are concentrated. Logistics center is a complex object consisting of an easily accessible external and internal infrastructure and suprastructure" (Miklińska 2008, p. 157) [own translation].

In order to understand the nature of the logistics center, it is necessary to pay attention to such characteristics as:

- location at the crossroads of various transport corridors,
- providing logistic services, warehousing services, customs agencies, etc.,
- the fact of being utilized by various enterprises of diverse specificities.

Following the definition, in Poland we have distribution centers and places which aspire to become logistics centers. Logistics centers constitute an important factor of economic development of cities and regions. Organizing, construction and functioning of logistics centers lead to realization of infrastructural investments which entail increased demand for services and construction materials and increase in labor demand. What is more, logistics center plays an important role in the sphere of environmental protection through elimination of nuisance that may result from logistic activities.

Localization of logistics centers

Localization of a logistics center is an essential issue. Taking into consideration enterprises which carry out logistic processes on the basis of a contract, one of the most crucial decision regarding their strategy is the localization of the center. The basic premises of the aforementioned facts are issues related to the following:

- logistics centers are essential link of the supply chain,
- creation of a logistics center imposes incurring high investments costs related to acquisition of a large site and building and equipping the facilities,
- transporting infrastructure influences the decision regarding the location of the center,
- functioning of the logistics center in the supply chain, together with the increased requirements in that domain, determines the basis for creation of comprehensive logistic services.

In order for a center to fulfill its functions, it must be situated in modal points of logistic networks, i.e. at the intersection of transportation routes (rail, overland, air, maritime, etc.). Proper localization ensures effective realization of transport links between contractors. What is more, it enables reloading from one means of transport to another, e. g. from a truck to a railway carriage, as well as performing operations related to storage (Fechner 2004, p. 22).

Planning and development of logistics centers in Poland depends on many conditionings that impact locational decision-making on the regional level.

Economic and social implications for an agglomeration or a city in which a particular logistics center is established is an issue of great importance. They can be of various nature and that is why the question of creating a logistics center should be considered both from the perspective of benefits as well as negative aspects.

Positive aspects of creating logistics centers arise mainly from the fact that their existence in a particular region / agglomeration contribute to attracting new investments, especially those related to manufacturing and commerce requiring logistic services. The centers, as new, not occurring before forms of business activity in the region, force development in its infrastructural system (Jedliński 2006, p. 12-16). Their existence usually entails necessity of implementing changes

in the whole infrastructural system. There is a need for development in road and telecommunication infrastructure, computerization, as well as for network facilitating a fast relocation of people and commodities over significant distances.

Centers of logistic services properly situated within the area of urban agglomerations usually relieve residential areas from heavy vehicle transport. If this is the case, it is the responsibility of the regional government to support these kinds of investment endeavors. Existence of logistics centers may constitute a factor that regulates communication processes in the city / agglomeration / region. For it is in the interest of a functioning logistic center to create conditions for building bypasses, expressways and other elements of communication infrastructure.

As a consequence, so common nowadays in urban agglomerations negative occurrences connected with urban transport may be alleviated. These include the situations when the so called over-concentration, accumulation or congestion becomes an obstacle to a proper functioning of the whole agglomeration (Kaźmierski 2012, p. 103). As a result, logistics centers begin to function as contractor in relation to the city (agglomeration), which may be for the benefit of the city.

The role of a logistics center as "a regulator of communication infrastructure" in relation to the city or agglomeration is crucial also for the economy because it means a number of permanent jobs. Hence, it may also contribute to reducing one of the most important obstacle of the economic development, i.e. unemployment (Kaźmierski 2006, p. 50-51).

Evaluation of the centers' share in realization of development objectives of Bełchatów district

One of the most flourishing sphere of services in the whole Łódź province is logistics. The province is ranked third (right after Warsaw and Upper Silesia) as far as warehousing, logistic and reloading areas are concerned. One of the largest logistic hub of the country is the so called 'golden triangle', i.e. the area between Łódź, Piotrków Trybunalski and Stryków. At present, there are 15 business and logistics parks in the region operating in the fields of commerce, logistics and manufacturing and also many warehousing centers with single entities operating in them. From among all the parks, as many as four are located in the vicinity of the examined Bełchatów district, in Piotrków Trybunalski, and one of the warehousing centers is located in the district.

The market of logistics services in Łódź province is developing mostly in the areas of new sections of motorways, in the vicinity of Piotrków Trybunalski and vicinity of the provincial capital. A big asset of the examined area is cheap workforce, which makes the region competitive and that is why investors are eager to choose it when creating new logistic facilities. In order to analyze the influence of logistics centers on realization of development objectives of particular communes, two matrixes of influence were created. For the purpose of the research, six operational objectives of Bełchatów district were chosen:

- a well-developed economic system based on knowledge and innovation,
- comprehensive technical and road infrastructure in particular communes,
- regularization spatial management / reasonable environmental management,
- activation practices of the commune residents / an increase of employment level,
- improvement of educational provision adapted to market needs,
- increased economic accessibility of the region / good transport connections between the communes and main urban centers.

The first matrix presents different types of logistics centers and their impact on the chosen development objectives of the Bełchatów district, while the second matrix shows influence of the following logistics centers on the realization of the aforementioned operational objectives:

- Logistic City – Piotrków Distribution Center,
- ET Logistik Sp. z o.o.,
- ROHLIG SUUS Logistics SA,
- Prologis Park Piotrków,
- Prologis Park Piotrków II,
- Prologis Park Rawa,
- Prologis Park Stryków.

Table 1. Matrix of the influence of particular types of logistics centers on operational objectives of the Bełchatów district

Type of the logistics center /Strategic objective	Increased economic accessibility of the region / good transport connections between the communes and main urban centers	A well-developed economic system based on knowledge and innovation	Activation practices of the commune residents / an increase of employment level	Improvement of educational provision adapted to market needs	Regularization of spatial management / reasonable environmental management	Comprehensive technical and road infrastructure in particular communes	Sum
International logistics centers	3	3	2	2	1	2	13
Regional logistics centers	3	1	3	3	2	3	15
Local logistics centers	3	1	3	3	2	3	15
Concentrated	3	0	2	1	2	1	9
Modular	3	0	2	1	2	1	9
Dispersed	3	0	3	1	2	2	11
Public-private	1	2	2	0	0	2	7
Private	1	2	2	0	0	3	8
Universal	2	2	3	1	1	1	10
Sectorial (trade)	2	2	2	2	1	1	10
Specialized	2	2	1	3	1	3	12
Sum	26	15	25	17	14	22	

Source: Own study

The utmost importance in realization of operational objectives of the Bełchatów district has the functioning of regional and local logistics centers. Then there are international and specialized logistics centers. Of the least importance and impact on objectives realization is the issue of ownership of the logistics center (private or public-private) as well as spatial integrity (concentrated, modular, dispersed).

Analyzing operational objectives of particular communes of Bełchatów district, one can notice that logistics centers are of the most importance while implementing the following objectives:

- Increased economic accessibility of the region / good transport connections
- between the communes and main urban centers,
- Activation practices of the commune residents / an increase of employment
- Level,
- Comprehensive technical and road infrastructure in particular communes.

By the same token, as far as implementing the following objectives are concerned: a well-developed economic system based on knowledge and innovation; regularization of spatial management / reasonable environmental management as well as improvement of educational provision adapted to market needs, their functioning plays only an insignificant role.

Table 2. Matrix of the influence of particular types of logistics centers located within Łódź province on operational objectives of the Bełchatów district

Type of the logistics center /Strategic objective	Increased economic accessibility of the region / good transport connections between the communes and main urban centers	A well--developed economic system based on knowledge and innovation	Activation practices of the commune residents / an increase of employment level	Improvement of educational provision adapted to market needs	Regularization of spatial management / reasonable environmental management	Comprehensive technical and road infrastructure in particular communes	Sum
Logistic City-Piotrków Distribution Center	3	2	3	2	2	2	14
ROHLIG SUUS Logistic SA	2	2	2	2	2	1	11
Pannatomi Park Łódź East	2	2	2	2	2	1	11
Prologis Park Piotrków	3	2	3	2	2	2	14
Prologis Park Piotrków II	3	2	3	2	2	2	14
Prologis Park Rawa	1	1	1	1	1	1	6
Prologis Park Stryków	2	1	1	1	1	2	8
Sum	15	11	14	11	11	12	

Source: Own study

The influence analysis has been performed from the point of view of each logistics facilities location, type, size, spatial integrity as well as function and services carried out by the center. As the above matrix shows, the biggest impact on realization of operational objectives of the Bełchatów district have the following centers:

- Logistic City – Piotrków Distribution Center,
- Prologis Park Piotrków,
- Prologis Park Piotrków II.

The main reason for such a result is the location of all of those three facilities in the immediate vicinity of Bełchatów district (33 km maximum). Such close location renders the selected centers of great importance in case of:

- Increased economic accessibility of the region / good transport connections between the communes and main urban centers – in this case with Piotrków Trybunalski,
- Activation practices of the commune residents / an increase of employment level – logistics centers offer many jobs and therefore residents of the Bełchatów district can find employment, which results in decreasing unemployment,
- Comprehensive technical and road infrastructure in particular communes – creating logistics centers in the immediate vicinity of Bełchatów district might be a factor that propels public authorities to create new and to improve the already existing road and technical infrastructure.

In the middle of the classification there are Panattoni Park Łódź East and ROHLIG SUUS Logistics SA. These two facilities are located practically in the center of Łódź. Their activity has a great impact on, among others, good transport connections between the communes and main urban centers (with Łódź in this case).

The least importance in realization of operational objectives of Bełchatów district have Prologis Park Stryków, located in Stryków, over 60 km from Bełchatów, and Prologis Park Rawa, which is located over 85 km from Bełchatów.

Apart from the location of logistics centers, what matters are: complexity of offered services (which, among other things, influences the type of the offered positions), form of transport handled by the center (which is of key importance in realization of objectives connected with transport infrastructure) and size of the center (the bigger the facility, the more jobs it offers).

Conclusions

Logistics centers are one of the most important elements influencing economy and they constitute a direct factor of this economy's development. Thanks to their impact on the flow of goods, services and information, they are indispensable in matters of increasing efficiency of logistics channels and they also enable realization of those processes practically in any conditions.

The study shows that the key factors in the region's development are: a dispersed spatial integrity of the particular center and the range of its influence

(local and regional logistics centers of dispersed spatial integrity). On the other hand, the type of the center's ownership as well as centers of the concentrated and modular spatial integrity are of the least importance. Interpretation of the matrixes from the point of view of operational objectives shows that functioning of logistics centers is the most significant when we consider realization of the following operational objectives:

- Increased economic accessibility of the region / good transport connections between the communes and main urban centers,
- Activation practices of the commune residents / an increase of employment level,
- Comprehensive technical and road infrastructure in particular communes.

By the same token, existence of logistics centers plays an insignificant role in realization of the following objectives: a well-developed economic system based on knowledge and innovation; regularization of spatial management / reasonable environmental management as well as improvement of educational provision adapted to market needs. The second matrix presents the results of the analysis of the influence of seven selected logistics centers on the region development. In this case, the most significant for the specified objectives are centers located the nearest to the area that has been examined, i.e. within Piotrków Trybunalski. Such result indicates that one of the factors conditioning the logistics center influence on regional development is its distance from the given region (centers situated in Łódź were listed in the middle of the classification, while those in Stryków and Rawa scored the least points). Interpretation of the obtained data from the point of view of the objectives clearly shows that the selected logistics centers, as in case of the first matrix, impact the increased economic accessibility of the region and activation practices of the commune residents / an increase of employment level the most.

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WPŁYW CENTRÓW LOGISTYCZNYCH NA ROZWÓJ REGIONU NA PRZYKŁADZIE POWIATU BEŁCHATOWSKIEGO

Streszczenie: Centra logistyczne uznawane są za dobre inwestycje ożywiające lokalną gospodarkę i uruchamiające nowe przedsięwzięcia, związane z napływem nowych podmiotów. Artykuł przedstawia istotę działania centrów logistycznych i centrów dystrybucji oraz ich główne zadania i funkcje. Celem publikacji jest przybliżenie definicji i klasyfikacji centrów. Ponadto, odnosząc się do ich lokalizacji, zauważyć trzeba, że potencjalnymi miejscami lokalizacji centrów logistycznych są główne aglomeracje miejskie, punkty mogące obsłużyć kilka województw, wraz z ich głównymi aglomeracjami, wreszcie lokalizacje o dużej koncentracji przemysłu i usług logistycznych. Przykładem takiego rozwiązania jest powiat bełchatowski.

Słowa kluczowe: centrum logistyczne, centrum dystrybucji, lokalizacja, rozwój