JOURNAL
OF EUROPEAN ECONOMY
Vol. 18. № 3 (70). July–September 2019
Publication of Ternopil National Economic University

Regionalization in European Economic Area

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THE CONCEPT OF LOGISTICS CLUSTERS AND EFFICIENCY OF ECONOMIC ENTERPRISES

Abstract

In Poland, Europe and worldwide, business strategies are implemented to ensure economic growth as a result of the impact of innovation and regional competitiveness. One of the effective and already proven methods of this strategy is building a competitive advantage based on the development of regional clusters. In their operations, clusters use the benefits of agglomeration, scale, range as well as local facilities resulting from production processes and distribution of knowledge. The concept of logistics clusters perfectly fits the aims of business clusters.

The efficiency of logistics processes is perceived through the prism of cluster's efficiency and effectiveness; the cluster philosophy can be used in logistics activities in order to seek optimization of its processes. Combining a cluster project with a logistics activity is one of the ways to improve competitiveness. Logistics clusters have the ability of a wider use of solutions developed by individual companies forming a cluster as well as solutions developed by companies from other sectors with which such enterprises cooperate. It is possible due to the development of innovative solutions in customer service, based on the experience

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and cooperation of enterprises which can be considered as logistic and entities from other sectors of economy. The emergence of logistics clusters is stimulated by processes of internationalization and liberalization of material and capital flows, permanent search for new sources of competitive advantage, e. g. by optimizing logistics processes leading to cost reduction and by minimizing development disproportions of EU regions. The influence of market environment and existing trends causes that the analysis of a value chain and its network of connections as well as the course of processes should lead to a stage of selecting the most beneficial structures of this chain and the sequence of processes in this chain (Obłój, 1998, p. 215).

As a consequence, logistics clusters including, for example, companies from freight-transportation-logistics (FTL) industry, will be looking for more effective ways of functioning. While examining the impact of logistics processes implemented in cluster initiatives on company's financial results, it is necessary to determine the share of logistics costs in total costs and their impact on other areas of this company.

Key words:

Business clusters, logistics processes, efficiency, profitability, supply chain management.

JEL: C53, E27.

Purpose of the article

The aim of the article is to indicate that an optimal use of logistics potential of a cluster improves effectiveness and efficiency of company's economic activities.

The article presents a method of calculating benefits (reducing total logistic costs) gained as a result of cooperation between various economic and social entities of a particular logistics cluster.

The method of measuring benefits presented in the article was based on profitability rates of turnover, assets, equity, human resources as well as logistic

cost effectiveness factors (transport capacity, storage costs, inventory and administration). Expanding the size of operations (cluster initiatives) will increase the total costs of an enterprise.

The applied research method indicates what size and structure of unit costs to concentrate on (organizing logistics processes) so that the total costs are as low as possible.

1. The importance of logistics clusters for business development

The importance of the concept of clusters for development of business entities and all other institutions of the region in which they operate is noticeable and appreciated. A characteristic feature of a cluster is cooperation in accordance with its set goals and gaining potentials necessary to produce products and services. Activities of clusters bring measurable quantitative and qualitative benefits and, what is the most important, they help to achieve a competitive advantage on the market. The effects are achieved at the level of both enterprises and the region.

The quality of its development potential, i.e. the level of development and use of internal resources, is of key importance for regional development. Competitive advantages can be divided into internal and external. Internal factors include high qualifications of workforce, innovativeness of regional enterprises, resources and forms of capital, transport infrastructure as well as funding opportunities for research and development (Richert-Kaźmierska, 2007, p.194). External factors are primarily all kinds of capital and material investments. The development and improvement of a regional logistics system depends to a large extent on local authorities that can support entrepreneurs' activities in the area, create conditions and encourage e.g. through application of reliefs for entrepreneurs to set up logistics-freight hubs or to develop transport.

Logistics clusters are particularly important in globalization of supply chains due to their inter-functionality, among others in terms of size, types and directions of flows, ability to establish individual solutions, to create value added at a particular stage of a supply chain, as well as opportunities as regards access to markets of local suppliers and buyers (Frankowska, 2015, p. 5633).

The concept of logistics clusters can be perceived as a new form of organizational solutions in logistic activities, i.e. a situation in which a logistics cluster is created on the basis of an already existing logistics network. Creating a cluster based on already existing processes and logistics systems means connecting new entities from areas of business and local authorities. They join the already

initiated process supporting the development of supply, production and logistics distribution chains. A regional logistics system based on a cluster concept can be rebuilt through the development of logistics services for enterprises operating in the cluster. The policy of cluster development support constitutes a tool to improve competitiveness of local enterprises. It stimulates entrepreneurship which is an activity for better understanding of opportunities offered by the environment. It also facilitates removal of threats and overcoming difficulties through cooperation of entities within a cluster (Kaźmierski, 2009, p. 211). Logistics clusters can also be established as an initiative of many enterprises and institutions possessing some useful «logistics resources» (warehouses, transport, freight depots, qualified staff) in order to optimally use skills, resources and experience to gain a competitive advantage. They are created on the basis of organized networks that allow them, through internal cooperation, to function and develop at a particular competitive level. Entities that create these ties can base them on providing a diverse and complementary set of logistics services or competing with the same offer. As a result, there is a qualitative and organizational- technological progress of logistics service providers in an increasingly developed form – from a traditional formula of logistics and distribution hubs through logistics platforms to logistics clusters (Zrobek, 2011, p. 7). A logistics cluster acquires and shares its resources in the most effective way, which is why it is effective and efficient in its operations. The effects of individual logistics enterprises are parts of a larger entity for which the cluster has been established, and it affects its more increased effectiveness than in the case of individual activities. The concepts of logistics clusters enable to achieve the assumed logistic goals thanks to some adopted solutions:

- minimizing costs at an assumed level of customer service,
- increasing the quality of customer service at a given level of costs.

Participation in cluster initiatives allows cluster participants to achieve benefits synergy of logistical goals. Higher production capacity and involvement of specialized, innovative potential favors the reduction of unit logistic costs, allowing at the same time to improve customer service by providing customers with better quality and availability of goods and services. Convenient location and infrastructure facilities which support the centralization of logistics and transport companies in a region may initiate the formation of logistics clusters. In this case, the construction of a logistics system is primary in nature and functioning system must be designed to support global streams of goods and the task of this system will be to prepare adequate capacity and at the same time provide an attractive price and service quality. A logistics cluster, while performing its tasks, will use both transport and logistics facilities as well as benefits of cooperation in a group of other entities. An innovative and future-oriented concept of clusters combined with a modern logistic system which assumes minimization of costs and strategies focused on time, quality and innovation, contributes to the formation of clusters that are strictly logistics clusters.

Although a logistics cluster may have various forms of activities, its organizational structure will usually have a leading enterprise and will cooperate, in spatial terms, with entities on a large territorial extent of logistics cluster, unlike in the case of a traditional group. A logistics cluster, while seeking the best efficiency and profitability of logistics processes, should be characterized by an advanced technological level in a full supply chain, high innovation capacity, growing potential resulting from joining new participants as well as by a strong market position resulting from these factors. The assumption of logistics clusters, like in the case of traditional clusters, is to achieve better market results than these achieved by potential rivals. The advantage is obtained through cooperation and having active, specialized entities and institutions in their structures. Integrated companies create common utilities with potentials borrowed for joint operations. A team of partners with a defined goal that takes into account the risk of failure of the project shapes a friendly environment conducive to obtaining positive effects. Logistics clusters can be established on the basis of the concept of business clusters, bearing in mind their specific conditions such as transport and long distances between locations of logistic bases. The properties of clusters from FTL (freight-transportation-logistics) industry, their ease of covering distances and an increasing territorial range associated with the search for economies of scale will be conducive to a disperse of clusters. A logistics cluster must absorb all innovations in order to be effective and competitive now and in the future. Also, all partners expect clusters to be open for initiatives, acquisition of new solutions or creative inspirations and implementation of innovation on a larger scale. A cluster increases possibilities of expanding logistics potential and eliminating or at least reducing barriers in this respect for all its participants. A modern concept of a supply chain management assumes optimization of logistics processes in all areas of cost creation. Cluster relations, modern technological and organizational solutions, convenient access to serviced locations as well as a higher degree of internal and external integration of the entire chain of goods and services flows contribute to the rationality of logistics activities and open up new markets. The need to create flexible and fast storage and transportation systems that would correspond to coordinated operations carried out by producers and their suppliers cooperating in one organization results from changes and expectations in production and distribution systems. Enterprises, especially in the logistics industry, have switched from mainly domestic supplies to international purchases and distribution, thus increasing requirements for logistics systems.

The concept of a logistics cluster is based on logistics management elements which provide specialized logistics service applying mutual cooperation procedures within the network and on formalized cooperation of cluster hubs with administrative institutions.

Economic benefits- including reduction of logistics costs being an important element of overall operating costs of each enterprise- are very important, identified benefits for cluster enterprises. Logistics clusters, thanks to their flexibility and innovativeness, allow just like business clusters to limit the risk of run-

ning a business. The areas that create a competitive advantage are (Kruczek, Żebrucki, 2017, p. 236):

- costs related to access to limited and often rare resources, which allows to implement a time compression strategy of completing tasks and reducing transaction costs,
- technology and new solutions based on innovation,
- an organization created on the basis of various forms of cooperation which is capital and cooperative in nature in the value chain.
- dynamising development,
- greater innovative ability,
- reducing the costs of services provision, lower investment costs,
- creating a specialized offer,
- development of networks and roads,
- integration of local business.

The existing cooperation ties between participants of a logistics cluster allow gaining advantages in very important areas including the unit and total costs and in the quality of services provided. A competitive advantage and improvement of a market position are obtained by all enterprises of a logistics cluster, both those with an established position which are just strengthening their position, and also enterprises less significant, «struggling» to stay on the market. Cooperation of companies in a cluster and their specialization in the field of, e.g. transportation, storage or distribution ensures greater competitiveness and greater absorption of innovation. The more the cluster companies are connected with one another and are able to use their advantage resulting from their specialization and optimization of logistic processes, the higher their level of competitive ability. Logistics clusters, while trying to win as much market share for long-term benefits as possible, gain advantage and also access to new resources, which strengthens their advantage and maximizes their competitiveness.

Cluster initiatives will have to limit the risk of running a business by increasing innovative and investment flexibility of a company. However, the factors that create a competitive advantage over rivals will include more efficient logistics processes thanks to achieving economies of scale with lower unit costs for transportation, storage, inventory, human resources involved in logistics processes and better use of the potential.

Logistic processes include both tangible and information processes as well as certain elements of financial processes. As part of existing processes, flows of goods and services are carried out in a targeted manner, taking into account their

economic, technical and administrative nature. The activities related to goods include, above all, transportation, storage, completing, packaging, service activities and others. The information area of flows will include activities of receiving, preparing and transferring orders as well as administrative preparation and launching of goods flows.

Participation of enterprises in logistics clusters allows these companies to improve their efficiency and effectiveness of logistics processes and the level of customer service, create new values in supply chains and reduce logistics costs. This is achieved by increasing their ability to innovate, by additional funds obtained for financing business enterprises, initiating positive trends and directions of business development, new sales markets and cooperation between various economic and socio-scientific entities, rationally using the potential already possessed.

2. Profitability rates as a way of calculating benefits resulting from optimization of logistics processes in a cluster

Logistics clusters are conducive to increasing profitability of companies, because they can use the accumulated potential more effectively to reduce costs. Flexible coordination of raw and ready material flows allows minimizing costs mainly in the areas of transportation and maintenance of inventory. However, there is still a question of quantifying the benefits of participating companies in a cluster.

The logistics theory distinguishes many types of cost distribution. According to prof. Dariusz Milewski (Milewski, 2017, p. 1) – who, among others, deals with the impact of logistics on reduction of total costs-logistics costs include: transportion costs related to the supply of raw materials and distribution of finished products, storage costs of raw materials and finished products, maintenance costs of points of sale, administration costs and frozen capital. The specific kind of logistics costs depends on industry and size of a company and a country while the share of logistics costs in total costs is on average 20–30%. According to K. Kowalska, the main logistics costs are: transportion and storage costs (Kowalska, 2009, p. 341).

It must be remembered, however, that the reduction of global costs is not an objective in itself; it would be a method of achieving high profitability rates in a short period of time, but it would bring benefits and harms difficult to determine from the point of view of

a company's strategy. Therefore, the focus should be on the number and structure of unit costs by methods that allow indicating the sources of their origin and their reduction by organizational methods, bearing in mind market objectives. An increase in total costs, e. g. related to an increase in expenditure on inventory, advertising or employment, does not always fulfill its role, i.e. production will increase. In other words, the point is to incur such expenditures that increase efficiency.

In the areas of costs considered as logistic, it is possible to distinguish a cost-consumption rate and identify areas where logistics methods can be used.

Assuming the following form of a logistic cost factor (own elaboration based on Gabrusewicz, 2002, pp. 301–317):

$$W_{KLOG} = \frac{\sum M_{LOG} \times C_{LOG}}{\sum P \times P_C} \quad (1)$$

A logistics cost rate will always be lower when we manage rationally larger centralized inventory, eg by creating logistics hubs or minimizing inventory, using transport potential more efficiently, making full use of its transport area/surface, planning transport routes more efficiently.

It is important that a logistics rate in the period just after the implementation of a logistics cluster strategy is smaller than a rate of the base period, i. e.:

$$W_{KLOG^1} > W_{KLOG^{1+n}} \quad (2)$$

A lower logistics rate means that logistics processes are more rational and allow reducing costs, which as a result has some impact on financial results.

The assessment of the impact of logistics processes on financial results of an enterprise / logistics cluster can also be performed in relative values using profitability rates: turnover, assets, equity, human resources.

The basic criterion for distinguishing these rates is the profit reference basis.

The formula for profitability is:

$$R = \frac{Z}{P}, \text{ where} \quad (3)$$

Z – profit,

P – income

In order to demonstrate the impact of logistics processes on profitability, it is necessary to specify those components which mostly affect them (Dmuchowski, 2011, p. 16), they include:

- logistics costs (*Klog*) as part of the total costs of an enterprise (*K*)

- value of tangible assets involved in logistics processes (M_{tl}) as a component of fixed assets (M_t) of a company,
- value of material inventories (M_z) as a component of current assets (M_o).

Assuming that the total costs of company's activities (K) will be the sum of two components: remaining costs (Kp) and logistics costs ($Klog$), profit can be calculated as the difference of revenues to the sum of logistics costs and other costs, i.e.

$$Z = P - (K_p + K_{log}) \quad (4)$$

Using the previously presented cost-absorbing formulas, one can develop a formula for calculating profitability:

$$R = \frac{P - (K_p + K_{log}) \text{ x } 100}{P} \quad (5)$$

assuming that $K_{log} = W_{KLOG} \text{ x } P$

$$R = \frac{P - (K_p + W_{KLOG} \text{ x } P) \text{ x } 100}{P} \quad (6)$$

$$W_{KLOG} = [(W_{KT} \text{ x } P) + (W_{KM} \text{ x } P) + (W_{KZ} \text{ x } P) + (W_{KA} \text{ x } P)] \quad (7)$$

Due to the fact that the presented profitability rates do not show the relationship between increase in expenditures on development of logistics systems and the increase in profitability, they should be presented in a dynamic way, assuming that during the period under analysis significant changes in the development of logistics would take place. Thus, starting with the original formula, the following comparisons should be made:

$$R^1 < R^{1+1} < R^{1+n}, \text{ on the assumption that} \quad (8)$$

K_p = constans or $K_p < K_{log}$

A dynamic analysis of profitability would meet the postulate

$R^1 < R^{1+1} < R^{1+n}$, assuming the following ratio of logistics cost factors:

$$W_{KLOG}{}^1 > W_{KLOG}{}^{1+1} > W_{KLOG}{}^{1+n} \quad (9)$$

Acting on one of the elements of W_{KLOG} rate will result in changes in profitability corresponding to the share of this element in the group of logistic costs. On the other hand, acting on more or all elements will result in a cumulative effect and greater improvement in the profitability rate.

Conclusions

Enterprises from freight-transportation-logistics (FTL) industry are good examples of the development of logistics clusters in Poland and the EU countries. Seeking possibilities of gaining a competitive advantage by increasing efficiency of activities in freight and transportation environment, companies and various institutions have begun to combine their potentials and opportunities, establish strategic relationships and integrate into clusters.

The effects of logistics clusters are particularly important for small transport companies, because they strengthen their competitive abilities and apply innovative solutions used within a cluster.

The integration of enterprises in the area of logistics is easier due to possibilities offered by cluster initiatives. The establishment of logistics clusters by institutional and organizational entities brings many economic and market benefits and, above all, should ensure higher profitability of business activities of enterprises.

The following thesis is obvious and does not require proof that more efficient and modern management of greater resource potential favors the improvement of logistics processes efficiency.

However, the question still arises: How can these benefits are assessed?

The methods of measuring effectiveness presented in the article allow researchers dealing with clusters to make proper assessment.

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The article was received on 24 July, 2019.