EUROPEAN SECURITY

SELECTED LOGISTICS CENTRES IN THE EUROPEAN UNION

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Abstract

The paper deals with logistics centres. Author presents some various definitions, identifies main functions and classifies logistics centres. The main purpose of the article is to characterize selected logistics centres located in member countries of the European Union and to show their comparison.

Key words: *Logistics centre, Nodal infrastructure*

Definition of Logistics Centre

Contemporary literature offers many different definitions of logistics centre, which in some countries is also known as freight village (Great Britain), interporto (Italy) and Güterverkehrszentrum / GVZ (Germany). One of them prepared I. Fechner, who says that logistics centre is "a spatially functional object with infrastructure and organization, in which there are realized logistics services connected with reception, storage, distribution and delivery of goods, as well as complementary services provided by economic entities dependent neither on the sender nor on the receiver" [1].

Similar definition is presented by EUROPLATFORMS, i.e. the European Association of Freight Villages, which states that a logistics centre is "a 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". Referring to the definition mentioned above it is worth to add, that the operators may be either owners or tenants of the buildings or facilities (distribution centres, offices, storage areas, truck services, warehouses etc.) built there. In order to comply with free market rules, a logistics centre must be accessible to all companies involved in the activities of this kind [2].

D. A. Tsamboulas offers definition strictly related to the idea of intermodalism. Following his proposition, a logistics centre should be perceived as "an 'integrator' of various transport modes, able to promote intermodal transport". Accordingly, an essential element of the logistics centre is mainly an intermodal terminal, which is the fundamental component of the intermodal transport chain, constituting the node where the transhipment of goods from one mode to the other takes place [3].

Although the presented definitions are not the same, all of them have a similar nature. Generally, they present logistics centre as part of the nodal infrastructure and emphasize the role of it for realizing different logistics processes (e.g. transport, warehousing). This is a one main way of defining logistics centre that can be found commonly in a literature. For the second responsible are those authors who tend to think that a logistics centre is a generator of business. This approach appears mostly in China, Japan, Singapore, United States of America and some countries in Europe. One of those representatives is R. Palsaitis, who refers to a logistics centre as a place of logistics services provision or logistics activities concentration place, through which large companies realize business service tasks of their customers [4].

General Features and Classification of Logistics Centres

Logistics centre is one of the most advanced types of logistics facilities, comparing the range of the offered services, scale of functionality and complexity. Figure 1 shows the hierarchy of them according to the each facility's size, functions and value added activities [5].

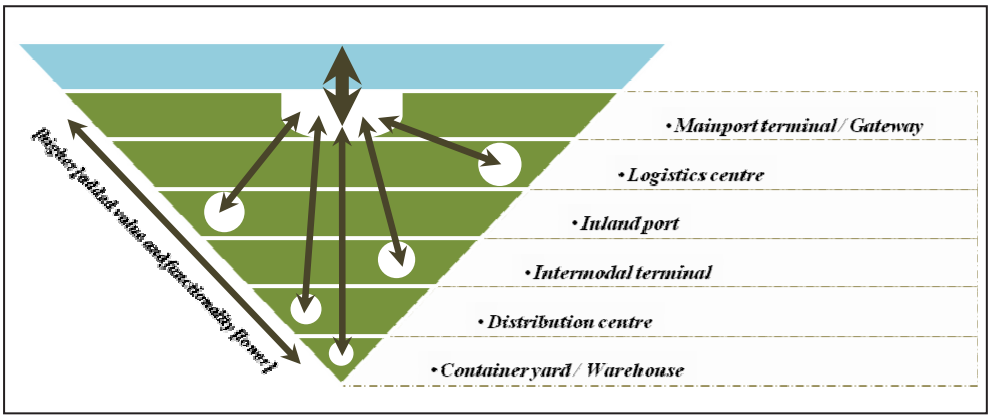

Figure 1. Hierarchy of logistics facilities

Logistics centres are the largest inland facilities being commonly important elements of many national and international supply chains connected with almost every kind of goods. Among the many different tasks carried out by this type of objects are: transport (carriage), shipping, transhipment, warehousing, order picking, packaging, labelling, palletizing, customs clearance, insurance, containers rental, technical services for vehicles and many more. Figure 2 shows the tasks divided into three main groups, in accordance with the approach proposed by I. Fechner [6].

Logistics functions	Support functions	Additional functions
• transport • warehousing • transhipment • stock management • packaging • order picking • order management	• shipping • customs clearance • insurance • loading units circulation • containers, pallets rental • IT services • marketing	• technical services for vehicles • sale of fuels and oils • loading units repairs • hotel services • parking services • catering services • banking services • accounting services • telecommunications services

Figure 2. Tasks carried out by logistics centre

Customers (e.g. manufacturers, retailers, distributors) in one place can take advantage of a wide range of services together forming a comprehensive logistics product offered by many different companies specialized not only in transport or warehousing, but also in labelling, sampling, packaging or marketing. In addition to the cargo streams integration, logistics centres are actively involved in the processes of creating added value of the transported goods. Loads during their stay in the logistics centre not only can be transhipped from one mean of transport to the another, but also can change their character. Due to the support and additional services partially mentioned above, goods can increase their value and be adapted to the requirements of the final clients. In some cases in logistics centres are made even simple production processes. All in order to meet the growing needs and expectations of the market. However, following B. Skowron-Grabowska tasks of fundamental importance are those, which reinforce synchronised flow of goods and information necessary to control it. In her view, logistics centre should affect the increase in efficiency of logistics processes and create the value of acting within the supply chain. Naturally, the tasks listed in the last two groups are also important, but their character seems to indicate supplement functions to the logistics ones which are strictly connected with the movement of goods from the points of origin to the points of destination [7].

Logistics centres, like many other logistics facilities, are not homogeneous and their classification can be made on at least a couple of ways. Centres can be classified, among other things, by operational range, spatial integrity, their functions, the type of served goods, transport accessibility, as well as ownership.

In the case of the first criterion, there are international, regional and local logistics centres. First of them are global. They are engaged in many business processes realized beyond national borders and they have the greatest radius of the operation. Some of the experts states that regional centres are dedicated to the companies located no more than ca 50-80 km from the facility. Local ones work on a small area. They are engaged mainly in distribution processes [8, 9, 10].

With regard to the spatial integrity, logistics centres can be divided into concentrated, modular and dispersed. In the case of concentrated facility, the whole infrastructure belonging to a logistics centre or its individual users is located in one area and subjects to the rules set by the board of management. Modular centre is characterized by the fact that is divided into functionally

distinct modules. The structure of ownership, organisation and management of them can be different. But they are subject to the common rules set by the mission of the logistics centre. Dispersed facilities are unified in term of organisation, but divided into parts spatially separated due to the following reasons: availability of properties, infrastructure, economic conditions etc. [11].

According to the third criterion, following B. Skowron-Grabowska logistics centres can be divided into dedicated for supply, manufacturing and distribution. In these first performs a lot of consolidation operations of goods intended for production. In addition, centres of this kind often participate in delivering cargo to the industrial enterprises. Assembly processes (e.g. welding car body sheets in the centres serving the automotive companies) are characteristic for the logistics centres of the second type. Logistics distribution centres are specialized in the packaging and delivery of the goods to the final recipients [12].

Another criterion classifies logistics centres according to the type of served goods. Universal ones support all kind of cargo without restrictions to their nature and physical form. Industrial logistics centres are limiting the collected goods to the certain ranges due to the concentration of a given type of production in its surroundings, while specialized ones provide support for selected types of loads. Specialization may result from the nature of products or required additional authorisations for standard operating activities [11].

In addition to the mentioned above and summarily characterized criteria in a literature can be found at least two others, which classify logistics centres. One of them is an ownership. On the basis of this criterion there are private, public and public-private logistics centres. Public are owned by the public sector while private are built from own funds of the investors and oriented primarily towards market targets. Public-private logistics centres differ a little bit. Their formation involves both the public and the private sector. These centres are usually initiated by the public side, whose investment contribution are mainly real estate and development of local infrastructure. In addition, the public sector takes administrative and legal actions to facilitate the realization of the investment. The private sector participates in investment capital, carries out and finances infrastructure and objects for personal use, and usually performs management functions in logistics centre after completion of its construction [12].

The last criterion applies to the transport availability and divides logistics centres into the two main groups. Intermodal logistics centres are those which thanks to the terminals give the ability to create an integrated transport chains involving several different modes of transport in the process of the movement of goods, in accordance with the idea of intermodalism. A second group is formed by the non-intermodal logistics centres. These facilities to a limited extent allow the use of several different modes of transport and intermodal loading units (e.g. containers, swap bodies). In many cases this type of the logistics centre is dominated by road transport [9].

Returning to the D. A. Tsamboulas' definition, nowadays in member countries of the European Union operates at least tens of logistics centres that fulfil the requirements connected with offering two or more different modes of transport and enabling the movement of goods in one and the same loading unit from the point of origin to the point of destination – as it is specified in a "Terminology on combined transport", document published in 2001 by a team composed by the United Nations' (UN), the European Commission's (EC) and the former European's Conference of Ministers of Transport (ECMT) representatives [13].

Due to the certain historical circumstances, most of them are located in the western member countries of the European Union. Examples of good practices in the aspect of intermodal logistics centres come from Austria, Germany, Italy and other.

Cargo center graz

One of the best European logistics centres according to the report published in 2010 by the Deutsche GVZ-Gesellschaft mbH, a German organisation that supports operation and development of logistics facilities of this kind, is a Cargo Center Graz. It is located in the South-Western part of Austria, in Styria region, in the close vicinity of the Graz city. Operated since 2003 object with a wide variety of reasons is often given in the literature as a model example of a logistics centre. This is, among other things, due to the fact that Cargo Center Graz is very advanced in terms of functionality and infrastructure, which has. In addition, organisational, technological and technical solutions applied to contribute to build a strong and

stable position of the centre. The presence of contractors not only from Austria, but also from Italy, Slovenia and Hungary, confirms the attractiveness of the centre and its adaptation to the requirements of the European logistics market. Moreover, Cargo Center Graz calls the attention due to the formula of realization. Facility was created as a result of the successful cooperation between the public and private sectors within the Public-Private Partnership (PPP) [14].

Presented in Figure 3 centre takes a total of about 500.000 square metres, of which, among other things, more than 130.000 sqm is the area of the halls, ca 33.000 sqm is intended for the storage of containers, swap bodies and trailers and ca 15.000 sqm is an office space. Uncovered space is another approximately 150.000 sqm.

Intermodal terminal, which is one of the most important parts of the centre, is equipped with:

- 4 craneable tracks with a length of 700 m each (dedicated for the service of the containers);
- 2 free loading tracks with a length of the 750 m each;
- 1 main track with a length of the 780 m;
- 1 track with a length of the 610 m dedicated for the Ro-La service (rolling road).

Transhipment of the loading units is made with the use of 2 gantry cranes and other mobile handling equipment with front spreader (e.g. reach stackers).

Infrastructure of the centre also gives ability to handle specialized loading units in the form of refrigerated containers or cooling and heating tanks. There is also an interim place for the storage of containers with dangerous goods [14, 15].

Logistics centre offers a very wide range of services. Besides the basic, associated with transport (carriage), shipping, transhipment and warehousing of cargo, Cargo Center Graz provides the opportunity to take advantage e.g. of the vehicle service and gas station for cars and trucks. For employees and many truck drivers arriving a restaurant also was opened. Centre states that service facility and house service allow partners a complete outsourcing of all cleaning and repair work in offices, halls, gates etc. With the customs office all the necessary official and bureaucratic steps can be dealt with. Cargo Center Graz also cares about the security in its area. Special service prevent burglary, theft and criminal damage. All in accordance with the idea to create a centre that offers to the logistics

companies in one place everything that is needed and enables to focus on their core business. Figure 4 shows the general plan of the Cargo Center Graz with marked functional zones [14].

Figure 3. Cargo Center Graz

Logistics centre is located in one of the largest and strongest economic regions in Austria, near the Hungarian and Slovenian border. According to the latest concept of TEN-T (Trans-European Transport Network) object is an important element of the core net corridor Baltic-Adriatic and is involved in the service of goods moved in a North-South direction in Europe, among others from Sweden and Poland to Slovenia and Italy [14, 16].

Austrian logistics centre operates per day about 300 trucks and several trains. The maximum storage capacity is ca 2000 of 40' containers, that come with other types of intermodal loading units from Antwerp, Hamburg, Rotterdam and other main economic areas in the whole Europe. Some of them come to the Center via the railway shuttle connections.

Among dozens of logistics entities that carry out their activities within the centre are located those of native and international nature. The first group is made by Hödlmayr Logistics GmbH, Rail Cargo Austria and Wenzel Logistics GmbH, while DB Schenker, DHL, Panalpina and others create the second [14].

Figure 4. Plan of Cargo Center Graz

With regard to the organisational structure, the centre is divided into three divisions. The first one is the intermodal terminal, the second is real estate, while the third is connected with regional development [14].

Interporto Bologna

Another important European logistics centre based on the information provided by Deutsche GVZ-Gesellschaft mbH is Interporto Bologna. History of the object dates back to 1971, when was founded the company Autoporto Bologna SpA, two years later renamed into Interporto Bologna SpA in order to highlight the intermodal nature of it. The first years have passed under the sign of site selection, land acquisition and negotiations with the Italian railway infrastructure company. In the 1980s there has been a development of the first area of the centre and the rail terminals. In that time, the first warehouses and other storage facilities has appeared and first logistics companies have begun to carry out their different activities within the Interporto Bologna. The last decade of the twentieth century was connected with enlargement of the centre by the development of its second area and obtaining financial support from the Italian government, which at that time promoted actions aimed at changing the modal structure of the transport system and shifting cargoes e.g. from road to rail [17, 18].

The ownership structure of Interporto Bologna is mixed. Public side has a majority of the shares. Combined share of Municipality of Bologna and the Province of Bologna is over 52%. Among the other participants with smaller shares are Generali Italia (Italian branch of global insurance company), Trenitalia S.p.A. (Italian railways), UniCredit S.p.A. (Italian international bank) and more than a dozen others [17].

Presented in Figure 5 Interporto Bologna is one of the largest logistics centres in Europe. Object covers a total fenced zone of ca 4.200.000 square metres, of which ca 3.500.000 sqm creates the logistics area. Covered warehouses are located at about 415.000 sqm, while the yards at about 260.000 sqm. The surface of the car parks is ca 60.000 sqm, while the office space is about 55.000 sqm. Field for future development is ca 1.200.000 sqm.

Three intermodal terminals create the rail area which is a total of approximately 700.000 sqm. They are: container terminal, swap bodies terminal and bulk terminal. Their characteristics are as follows:
– total area: ca 130.000 sqm / ca 140.000 sqm / ca 50.000 sqm;
– storage area: ca 38.000 sqm / ca 42.000 sqm / ca 10.000 sqm;
– number of tracks: 6 / 15 / 2;
– average track length: 600 m / 550 m / 460 m;
– maximum train length receivable: 750 m / 550 m / 550 m [17, 18].

In total, at terminals work 7 front stacker cranes for handling operations. In 2011 on all terminals served a total of 5500 trains and ca 75.000 wagons. The mass of cargo amounted to about 2.000.000 tonnes (containers: ca 750.000 tonnes and swap bodies: ca 780.000 tonnes). Handled almost 90.000 different intermodal loading units, which correspond to almost 160.000 TEU. In the case of road transport, in 2011 was more than 580.000 trucks served in the logistics centre, and the mass of the conveyed cargo amounted to almost 4.500.000 tonnes.

Object has more than a dozen railway connections. Some of them are between Interporto Bologna and sea ports in Rotterdam and Zeebrugge, as well as river port in Duisburg. In the timetable appear many domestic connections, either with other cities with logistics centres. All of those connections are managed by several Multimodal Transport Operators (e.g. Cemat, GTS and Hupac), while the railway carriage is performed only by a few entities. Among them an important position has Trenitalia Cargo, a member of the Italian national railway group [17, 18].

Figure 5. Interporto Bologna

The core business of Interporto Bologna is mainly represented by the offer of warehouses for logistics and rail and intermodal services. Road transport, handling and other different value added activities complete a wide range of available services. In total, more than 100 companies from the logistics industry conduct their businesses in the Interporto Bologna. In addition to the aforementioned entities are e.g. Ceva Logistics, DB Schenker, DHL, Gefco, Geodis Logisitcs, Kuehne + Nagel, Panalpina, Röhlig and Arco Spedizioni, Gruppo CDS, Logista Italia, Taroni, Terminali Italia, TIE Transporti Intermodali Europei. They represent logistics operators, rail operators, terminal managers, customs brokers, shipping agents, road carriers and others [17].

In the logistics centre is also truck wash, gas station, and even workshop for rail wagons. In connection with paying much attention to the issues of the environmental protection and ecology, there are also special services set up to maintain green areas. Figure 6 shows the overall plan of the Interporto Bologna [18].

Interporto Bologna is well connected with the rest of the country and the whole European continent. It has railway and road connections. Three national motorways lead to the city of Bologna. Moreover, logistics centre is located along three core net corridors of the TEN-T – Baltic-Adriatic, Scandinavian-Mediterranean and Mediterranean. They are both in a North-South direction in Europe, as well as from West to East [16]. High transport accessibility significantly affects the competitiveness of the logistics centre, which in many publications is located in the forefront the best facilities of this kind in Europe.

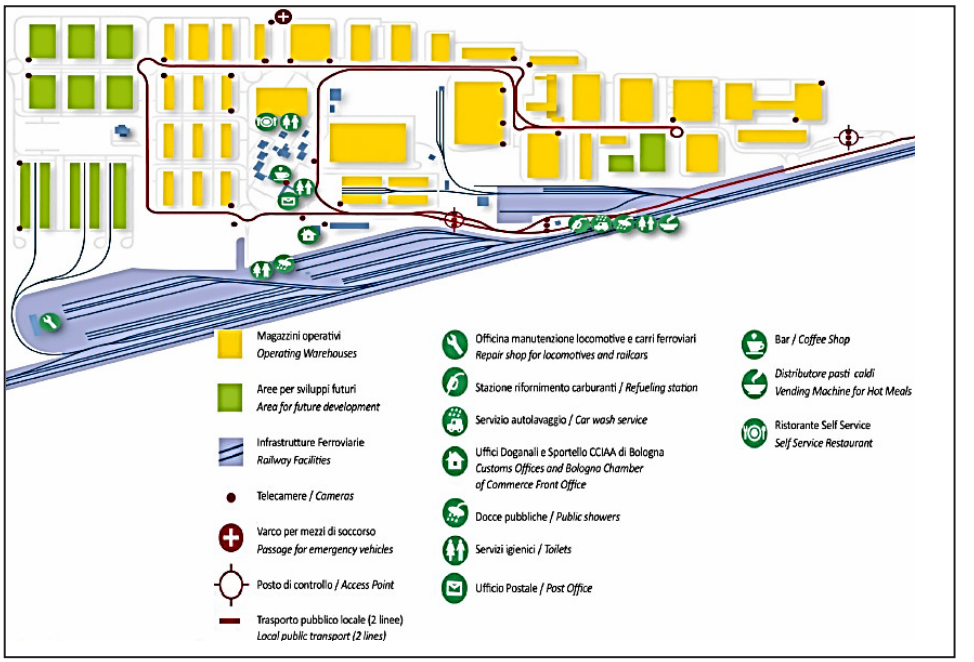

Figure 6. Plan of Interporto Bologna

Similarly, as the Cargo Center Graz, logistics centre in Bologna is divided into a three specialized companies, which deal with the management of the whole object and the services provided by it, real estate planning, building and management, as well as research and development [17, 18].

GVZ Bayernhafen Nürnberg

In the list of the best European logistics centres, according to the survey conducted by the Deutsche GVZ-Gesellschaft mbH, are also some objects located in Germany. One of them is the GVZ bayernhafen Nürnberg. This logistics centre is placed in the South-Eastern part of the country, in the region of Bavaria and it functions on the basis of a river port on the Main-Danube canal, dating back to 1972. With the access to a waterway with a length of close to 3500 km, connecting the North Sea with the Black Sea, the centre has a direct connection with almost

10 European countries like the Netherlands, Austria, Slovakia, Hungary, Romania and a few more [19].

GVZ shown in Figure 7 takes into area of ca 3.370.000 square metres, of which about 2.450.000 sqm occupy sites to conduct business, and more than 230.000 sqm is the area of water reservoirs. For warehouses and other storage areas is approximately 760.000 sqm.

Four docks allow the service of the vessels and the length of quays is about 5500 m. Transhipment of the goods transported by water can be made using 9 full gantry cranes (lifting ability up to 40 tonnes each). Moreover, logistics centre has own train station and railroad tracks with a total length of about 50 km (11 km of them are electrified). The available infrastructure provides the ability to handle full trains of up to 700 m length [20].

Figure 7. GVZ bayernhafen Nürnberg

Access to three different modes of transport (road, rail and inland waterway) gives a large flexibility in constructing the optimal transport chains for more than 260 companies settled in the GVZ, while modern handling equipment enables transhipments of intermodal loading units in the form of containers and other. In the close vicinity of the centre are located 4 motorways (A3, A6, A9, A73), as well as the railway to Munich.

Among the group of companies that operate in the GVZ are those with a business profile associated with transport (carriage), shipping, transhipment, warehousing,

production, recycling and other complementary services. In addition to the above processes are carried out activities connected with order picking, packaging and even with production finalizing.

Both are branches of international corporates such as DB Schenker, DHL, DPD, UPS and national companies with family traditions such as Winkler Fahrzeugteile GmbH and Hassold - Logistik GmbH & Co. KG. The overall plan of the object presents a Figure 8 [20].

Intermodal terminal, which occupies a land area of about 17.000 sqm operates since the first decade of the 21st century. Its characteristics are:
– 4 gantry cranes (max. capacity 41 tonnes each);
– 10 loading tracks (700 m length each);
– 2 storage tracks (700 m length each);
– 1 reach stacker (max. capacity 40 tonnes);
– 1 port basin (116 m length and 25 m broad).

According to the data by 2013, in the GVZ served close to 270.000 TEU and the total weight of all types of cargo amounted to more than 14.800.000 tonnes. Rail and river shipping in the structure of goods transport was close to 30%, which corresponded to about 4.300.000 tonnes (rail – ca 3.800.000 tonnes, inland waterway – ca 500.000 tonnes). These loads came to the centre via more than 500 ships and approximately 8.500 railway wagons [19, 20].

The object has a number of intermodal connections with the largest container ports in Europe (Bremerhaven, Hamburg and Rotterdam), as well as economic centres such as Bremen, Hannover, Munich and Verona. Some of these connections coincides with TEN-T core network corridors, two of which run through the city of Nuremberg. There are corridors: Rhine-Danube and Scandinavian-Mediterranean. The first links the South of Germany with Romanian ports situated on the Black Sea coasts (Constanta and Sulina). While the second integrates markets of Finland, Sweden and Denmark with the Central and Southern Europe (Germany, Austria, Italy and Malta) [16, 19].

Similarly, as in the case of two previously characterized logistics centres in the GVZ bayernhafen Nürnberg is a customs office. With regard to the organisational structure, the company that manages this GVZ is part of a German group

bayernhafen Gruppe, which operates logistics facilities located in six different places along the Main-Danube waterway [19].

Figure 8. Plan of GVZ bayernhafen Nürnberg

Comparison of Characterised Logistics Centres

Logistics facilities that were characterised above have both common, as well as diverse features. Figure 9 presents synthetic comparison based on several parameters that allow to show the most important similarities and differences between the characterised objects with respect to their size, location, number of settled entities and others.

The object of the greatest traditions is the GVZ, while the Austrian Cargo Center Graz operates the shortest among the analyzed group. Each of three logistics centres has access to rail besides road transport. In addition, German one is the only that is located on the banks of river and offers the ability to construct tri-modal transport chains (rail-road-inland waterway). Taking into account the size, object located in Bologna is the largest and has three intermodal terminals, while everyone else has only one terminal, but with gantry crane, as opposed to the Italian one.

Over year the biggest amount of intermodal loading units according to the criterion of TEU service object located in Germany. It is estimated that this number corresponds to the results of the other two logistics centres combined. In addition, GVZ bayernhafen Nürnberg has the biggest handling capacity from presented group.

Parameters	Cargo Center Graz	Interporto Bologna	GVZ bayernhafen Nürnberg
Activity since	2003	1986	1972
Country	Austria	Italy	Germany
Location	inland	inland	on the river
Modes of transport	rail, road	rail, road	rail, road, inland waterway
Total area	ca 500.000 sqm	ca 4.200.000 sqm	ca 3.370.000 sqm
Intermodal terminals	1	3	1
Gantry cranes	2	---	4
Handled intermodal loading units	ca 100.000 TEU [2012]	ca 160.000 TEU [2011]	ca 270.000 TEU [2013]
Capacity [TEU/year]	ca 260.000 TEU	ca 300.000 TEU	ca 530.000 TEU
TEN-T Core Network Corridors	1. Baltic-Adriatic	1. Baltic-Adriatic 2. Mediterranean 3. Scandinavian-Mediterranean	1. Rhine-Danube 2. Scandinavian-Mediterranean
Number of settled entities	ca 25	ca 100	ca 250
International / national companies	+ / +	+ / +	+ / +
Support and additional services	+	+	+
Place in the Ranking 2010 [Deutsche GVZ-Gesellschaft mbH]	13th	4th	3rd

Figure 9. Comparison of characterised logistics centres

Comparing objects in the context of their locations in the structure of TEN-T (Trans-European Transport Network), the most attractive is the Interporto Bologna. This is an important component of three core net corridors, while German GVZ has two connections of this kind and Austrian Cargo Center Graz only one.

With regard to the number of entities which operate within logistics centres clearly excels object located in Nuremberg. A common feature of all presented

objects is that each of them has own representatives in the form of the world's largest logistics corporations, as well as domestic companies. This is due to the conditions offered by the objects. Each of them offers a wide range of support and additional services that are complementary to the standard activities connected with transport (carriage) or warehousing.

In the report published in 2010 by the German organisation that supports operation and development of logistics centres – Deutsche GVZ-Gesellschaft mbH, GVZ bayernhafen Nürnberg was best ranked, then the Interporto Bologna and Cargo Center Graz. Without advanced analysis of their results, it is obvious that each of them belongs to the specific logistics "Champions League" and gives example of best practices in this field for new investments of this kind in the Central and Eastern Europe, where is a special need for new logistics centres.

References

1. FECHNER, I.: Centra logistyczne. Cel-realizacja-przyszłość. Poznań: Institute of Logistics and Warehousing, 2004, pp. 14. ISBN: 83-87344-56-7.
2. EUROPLATFORMS EEIG, Logistics centres. Directions for use, 2004, pp. 3.
3. TSAMBOULAS, D.A., KAPROS, S.: Freight village evaluation under uncertainty with public and private financing, Transport Policy, 2003, Vol. 10, Issue 2, pp. 141-156.
4. MEIDUTĖ, I.: Comparative analysis of the definitions of logistics centres, TRANSPORT, 2005, Vol. XX, No 3, pp. 106-110. ISSN 1648-4142.
5. HIGGINS, C. D., FERGUSON, M. R.: An exploration of the Freight Village Concept and its Applicability to Ontario. Hamilton, Ontario: McMaster University, 2011, pp. 164.
6. FECHNER, I.: Centra logistyczne. Cel-realizacja-przyszłość. Poznań: Institute of Logistics and Warehousing, 2004, pp. 22-23. ISBN: 83-87344-56-7.
7. SKOWROŃSKA-GRABOWSKA, B.: Centra logistyczne w łańcuchach dostaw. Warsaw: Polskie Wydawnictwo Ekonomiczne, 2010, pp. 37-44. ISBN: 978-83-208-1905-2.
8. FECHNER, I.: Centra logistyczne. Cel-realizacja-przyszłość. Poznań: Institute of Logistics and Warehousing, 2004, pp. 17-19. ISBN: 83-87344-56-7.
9. MINDUR, L.: Centra logistyczne. In Technologie transportowe XXI wieku. Warszawa-Radom: Instytut Technologii Eksploatacji – Państwowy Instytut Badawczy, 2008, pp. 365. ISBN: 978-83-7204-611-6.

10. RYDZKOWSKI, W.: Usługi logistyczne. Poznań: Institute of Logistics and Warehousing, 2004, pp. 99-100. ISBN: 83-87344-81-8.
11. FECHNER, I.: Role of logistics centres in national logistics system, LogForum, 2010, Vol. 6, Issue 2, No 2. ISSN: 1734-459X.
12. SKOWROŃSKA-GRABOWSKA, B.: Centra logistyczne w łańcuchach dostaw. Warsaw: Polskie Wydawnictwo Ekonomiczne, 2010, pp. 43-46. ISBN: 978-83-208-1905-2.
13. Terminology on combined transport, New York-Geneva: the United Nations Economic Commission for Europe, the European Conference of Ministers of Transport, the European Commission, 2001, pp. 17.
14. http://www.cargo-center-graz.at
15. Cargo Center Graz – corporate materials
16. http://ec.europa.eu
17. http://www.interporto.it
18. Interporto Bologna – corporate materials
19. http://www.gvz-hafen.com
20. GVZ bayernhafen Nürnberg – corporate materials