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### INVESTMENTS IN THE INDUSTRIAL AND LOGISTICS REAL ESTATE SECTOR IN POLAND COMPARED TO THE CEE COUNTRIES<sup>1</sup>

#### Summary

*Purpose* – The aim of this article is to assess Poland’s position and its potential in the light of investments undertaken in the industrial and logistic real estate sector of the Central and Eastern European countries (CEE) as well as to identify the changes contributing to changes within the nature of such investments. Having considered the categories of facilities, supply and demand, also investment capitalization rates and the value of rents the given sector has been subjected to a thorough analysis.

*Research method* – The goal was achieved using quantitative secondary data, also the primary research was conducted among managers using the IDI method. The study was concerned with the trends of changes in the nature of investments in the sector in question in the CEE region in the context of nearshoring, shortening of value chains, and the pandemic.

*Results* – Some mechanisms and determinants, which have been declared important until recently, are insufficient to explain the currently selected options for investments location. The growing popularity of, e.g., q-commerce and the need to provide recipients with the shortest possible delivery time requires the improvement of the supply chain and logistics networks, which is associated with warehouse investments closer to the customer’s location.

*Originality/value/implications/recommendations* – The study concerns an important aspect of investment in service infrastructure. Despite the fact that the Polish commer-

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cial real estate market is very popular with foreign investors, mainly from China, the question arises how long Poland will remain the leader in Central and Eastern Europe, taking into account the differences in the capitalization rate or the level of rents in the selected countries.

**Keywords:** location, investments, development, Central and Eastern Europe region.

**JEL classification:** F210, R33, E22

## 1. Introduction

As a result of dynamic technological and geopolitical changes and the consequences of the Covid-19 pandemic, transformations in the organization of business services have accelerated, strengthening the long-term servitization of economic processes, understood as an increase in service functions both in manufacturing and in the service sector (the third sector). The factors referred to above also apply to the material infrastructure and changes in the industrial and logistics real estate market.

The aim of the article is to assess the position of Poland and its potential in comparison with the Central and Eastern European (CEE) countries in terms of investments undertaken in the industrial and logistics real estate sector, as well as to identify the changes in the nature of these investments.

The following specific objectives have also been formulated:

- Assessment of the development prospects of the production and logistics real estate sector.
- Expected changes in the structure of facilities (big boxes, SBU) and their reasons.
- The use of green certification in the presented sector.

The article presents changes in the market of production and logistics facilities in Poland from the perspective of investments, comparing Poland's position with selected countries of Central and Eastern Europe (CEE)<sup>2</sup>. The following research hypothesis was formulated: as a result of dynamic geopolitical changes and the consequences of the Covid-19 pandemic, transformations in the business model

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<sup>2</sup> This group of countries also includes Serbia, Albania, Macedonia, Croatia, Slovenia and Montenegro, but due to the lack of statistical materials, the authors have focused on the countries listed in Table 1.

and the resulting transformations in the resources and structure of industrial and logistics infrastructure are accelerating. This is due to the increased demand for facilities located closer to the sales markets (related to nearshoring) and the need for smaller warehouses in different parts of the country closer to the target customer.

To verify the hypothesis, secondary sources were used regarding the condition and supply of production and warehouse space and demand for these facilities in Poland and the CEE countries. Primary research was conducted in the form of in-depth individual interviews (IDIs) with managers of warehouse services. The analysis included categories of facilities, supply and demand, investment capitalization rates, and the value of rents.

The article is structured as follows. The first part discusses how the Covid-19 pandemic, supply disruptions and changes in business models (e.g., nearshoring) influence transformations in investments in the production and warehouse sector. The second part concerns the potential and investments in real estate for the business services sector in Poland and CEE countries, focusing on the determinants of investments in storage infrastructure in CEE countries. The last part identifies the changes in trends in the sector based on data analysis and research in a group of sector managers.

## **2. Main determinants of changes in investments in the production and logistics sector**

In addition to the traditional determinants of the location of business activities, including logistics, well described in both economic theory and spatial sciences, the current transformation of investments in the production and logistics sector is influenced by changes brought about by Industry 4.0, as well as the Covid-19 pandemic and its effects. Factors that influence the location of business activities include: 1. The values and resources of the area (access to raw materials or energy sources), 2. Technical and economic factors (scientific and technical facilities and workforce, agglomeration benefits, sales market, infrastructure), 3. Socio-political factors (law, legislation, state policy, investment incentives) [Wodnicka, 2020, p. 47].

Territorial transformation of countries, geopolitical changes, and progress in knowledge and technology imply a different perception of the regularities related to the choice of location. Some mechanisms and determinants that were considered important until recently are insufficient to explain current location choices, i.e., the classical theory of location selection, according to which the main determinants

are costs [Smith, 1996, p. 108], profit maximization [Lösch, 1961, p. 136], as well as transport, work, and agglomeration factors [Weber, 1909, p. 168]. In the case of investments in the production and warehouse sector are accompanied by other location factors, such as the geographical distribution of the distribution network, proximity and speed of delivery, and characteristics of the stored product.

In terms of the changes that Fourth Industrial Revolution brought (which goes beyond the substantive framework of the article, so it will not be discussed in detail), the essence of the revolution is the digitization of physical production resources and their inclusion in digital systems in the value chain. They ensure the exchange of information between people and devices and give access to information anytime and anywhere in the world [Schwab, 2016; 2018; Schwab, Vanham, 2022]. Technology not only technically enhances existing business services, but it also generates new types of services that can be provided remotely (offshoring of business services or nearshoring). Digital technologies strengthen the growing complementarity of goods and services, changes in the organization of markets, mainly their internationalization, the need for more effective planning and organization of economic processes, and changes in the organization of enterprises, as well as increasing the demand for services in this area. This is a fundamental megatrend in the modern economy. “In the value added chain in manufacturing enterprises, the share of services that support manufacturing is systematically increasing, with high technological advancement. Today, services are an important component of added value, a link in value creation. This is also related to the process management model, which allows for the separation of tasks, functions, and business processes for the benefit of an external operator in the contract or capital outsourcing model” [Szukalski, 2021, p. 144].

Another important factor that determines changes in the approach to choosing the location of a business, both industrial and service, is the Covid-19 pandemic, which was an exogenous shock to the entire economy. The “Black Swan”<sup>3</sup> [Taleb, 2020] phenomenon and its economic consequences are still visible. The restrictions related to the pandemic have increased the importance of inshoring (also known as backshoring or reshoring), which involves returning to the home country of economic activity separated earlier in the offshoring process. This was partly related to the consequences of breaking value chains as a result of the pandemic shock. The just-in-time delivery model used so far in business has lost its importance.

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<sup>3</sup> Introduced by Taleb, the term means an extraordinary phenomenon that goes beyond the sphere of ordinary expectations and has a drastic impact on reality.

This was a consequence of both the pandemic and changes in geopolitics. For example, there was congestion in Chinese ports as well as the blockage in the Suez Canal, which resulted in problems with the availability of goods and delays in their deliveries to Europe, North America, and Asia. There was also an increase in importers' costs, which had a direct impact on the increase in product prices.

Therefore, as part of minimizing business risk and following the principles of VUCA<sup>4</sup> [Bennett, Lemoine, 2014, p. 3], enterprises have changed strategies regarding the location of operations and shortening supply chains. Hence, globalized chains have been abandoned, having lost their flexibility. The shortening of supply chains is one of the factors that affect the demand for warehouse space and increased investments. For several years, Poland has been the target of foreign direct investment in logistics real estate, as it is an attractive market for enterprises from Western Europe, primarily from time practices in favor of stockpiling for efficient order fulfillment and production, and the rationalization of warehouse logistics. As many as 60% of investors looking for new investment locations in this sector in 2020 listed Poland as a country for these investments [www 1]. Hence, the value of investments in the sector is systematically growing. While the pandemic has not stopped current trends, there are changes in the structure and purpose of facilities.

### **3. Potential and investments in real estate for the business services sector in Poland and CEE countries**

#### **3.1. Characteristics of investments in the warehouse sector**

The warehouse market is developing dynamically, suggesting quantitative changes. There is an increase in facilities and warehouse space, changes in the landscape, especially around large agglomerations, as well as changes in the warehouses themselves, taking into account their equipment, functions, and internal structure. The most active industry in the search for warehouse space is the logistics industry, although investment in warehouses can also be seen in the automotive industry (car accessories and parts), FMCG (Fast Moving Consumer Goods), and e-commerce. Taking into account the structure of demand in the

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<sup>4</sup> VUCA is an acronym that describes unpredictable changes: V – Volatility, U – Uncertainty, C – Complexity, A – Ambiguity.

Polish warehouse market, the most active tenants are the logistics industry (30%), e-commerce (23%), traditional trade (22%), production (8.4%) and construction (5.5%) [Axi Immo, www 2].

The most desirable locations are the outskirts of large cities with intermodal transport infrastructure (motorway junctions, cargo ports, railway lines, airports). The new warehouse are modern, automated warehouses, built to high standards, enabling a facility to be easily changed for different purposes.

In warehouse logistics, there are three categories of buildings, which differ in size and function:

1. Large storage facilities, called large boxes, with an area of 20–30,000 sqm. They are located 10 to 50 km outside the city, with the addition of expressways and motorways. They act as central warehouses. The main tenants of warehouse parks are logistics companies, distributors, retail chains and companies related to light manufacturing, where it is possible to rent space from 2–2.5000 sqm and more.
2. Medium box (city Logistics) facilities. They are 10–15,000 sqm and serve as transshipment centers. Customers are mainly e-commerce entities, courier companies, medium-sized production companies, and distributors.
3. Buildings of the “Small Business Unit” (SBU) type, with an area of less than 10,000 sqm. They are an alternative to large-area warehouses. It is possible to rent smaller spaces (up to 1000 sqm). They are often a combination of warehouse and office space. Hence, they have a higher standard of finish than typical warehouse facilities. They are located within cities, most often in business and industrial districts, with good access to the city center and public transport. They are chosen for businesses that require short deliveries to the end customer. It is a convenient form for e-commerce companies. Due to the sector of activity, SBU tenants are very often companies from the IT, pharmaceutical, service or commercial industries, as well as companies that distribute to the local market.

Investments related to large warehouse areas or determined by specific arrangement or functionality are implemented in one of two variants, which differ in how they are financed:

1. BTS (build-to-suit) – a warehouse built in the lease structure for a specific client according to its specific requirements. The developer is the owner of the facility, and the client is the tenant for a specified period (at least 15–20 years). This means that, at the design stage, the investor already has a contracted tenant or buyer of the warehouse and does not have to spend time commercializing the property.

2. BTO (build-to-own) – a warehouse built for a customer who bears the investment cost. This formula does not preclude the lease option because when changing its strategy, the client may decide to sell the facility in the sale and leaseback formula, allowing the owner to sell the facility to a financial institution and then become a lessee of the same facility.

BTS/BTO projects account for about 90% of the space under construction; the rest are speculative (without contracted tenants due to the growing demand for warehouses) [Axi Immo, *www* 3]. Investors in logistics and industrial warehouses are obliged to obtain the green certification of buildings, showing that they meet ecological and social requirements. The share of green-certified warehouse space certified is 41% [Polskie Stowarzyszenie Budownictwa Ekologicznego, 2022, p. 12]

At the end of 2021, there were 398 multi-criteria certified logistics facilities in Poland, which is 29.3% of facilities, 359 warehouse investments had BREEAM<sup>5</sup> certification, and 26 and 13 facilities were LEED<sup>6</sup> and DGNB<sup>7</sup> certified, respectively. In 2021/2022, the number of certified warehouse facilities increased by 75% year on year. Poland is a leader in terms of the number of certified buildings (including office buildings, warehouses, multi-surface stores, and hotels) among CEE countries, with 45% of all buildings certified in the region located there. For comparison: Czech Republic – 562, Romania – 375, Hungary – 262, Slovakia – 148, Lithuania – 97, Bulgaria – 78, Estonia – 43, Latvia – 38 [Polskie Stowarzyszenie Budownictwa Ekologicznego, 2022, p. 16].

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<sup>5</sup> BREEAM, or Building Research Establishment Environmental Assessment Method, dates back to 1990, when BRE Global decided to introduce it in the UK to standardize the assessment of green building. The system soon gained international coverage and is currently used in 87 countries around the world. According to the BRE Group, 572,661 certificates have been granted so far, and the number of buildings registered for assessment exceeds 2 million. Facilities are evaluated in 10 categories: management, health, energy, transport, water, materials, waste, land use and ecology, pollution and innovation.

<sup>6</sup> LEED (Leadership in Energy and Environmental Design) is a building quality assessment system that is a standard in Europe and around the world. It was created and developed in 1998 by the American organization Green Building Council. It has three levels of certification: Silver, Gold or Platinum. The categories in which to score points are: Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources, and Indoor Environmental Quality. Two other categories can earn extra points: Innovation in Design and Regional Priority.

<sup>7</sup> DGNB (Deutsche Gesellschaft für Nachhaltiges Bauen e.V – DGNB) is a German multi-criteria assessment system for buildings. It was established in 2008 on the initiative of the German Sustainable Building Council, and is present in 21 countries. It bases on an approach based on the life cycle of buildings and takes into account ecological as well as economic and socio-cultural aspects, i.e., the three pillars of green construction. The assessment categories are: Ecology, Economy, Social and functional aspects, Technology, Processes, and Location.

### 3.2. The industrial and logistics real estate sector in CEE countries

The resources of the warehouse and logistics sector have grown steadily since 2004. Among the countries of the region, Poland is a definite leader, with 49% of all facilities of this type in CEE. Out of over 49 million sqm, in Poland, there are 23.8 million sqm (data for 2021). There are 6.8 million sqm under construction, of which almost 62% is being built in Poland (Table 1).

TABLE 1.

Warehouse space in the CEE countries as of 2021

Country	Total area in m <sup>2</sup>	Structure %	Buildings under construction in m <sup>2</sup>	Structure %	Vacancy rate in %	Rate euro/ month	Profit rate %
Bulgaria*	862,800	1.75	95,400	1.41	9.00	5.2	8.5
Czech Republic	9,614,300	19.51	1,107,500	16.32	1.30	5.0–6.0	4.0
Estonia	2,320,000	4.71	202,000	2.98	3.00	4.9–6	Nd
Lithuania	1,252,800	2.54	248,000	3.66	1.70	4–4.5	6.5
Latvia	972,000	1.97	1,675,000	24.69	21.00	4.2–4.9	6.5
Poland	23,790,000	48.27	4,200,000	61.90	3.80	2.7–4	4.1
Romania	5,630,000	11.42	470,000	6.93	6.00	3.5–3.9	7.5– 8.0
Slovakia	2,081,200	4.22	190,800	2.81	7.20%	3.2–4.4	6.0
Hungary*	2,760,000	5.60	271,000	3.99	3.20	4.75–5.75	5.8
Total	49,283,100	100.00	6,784,700	100.00	–	–	–

\* Data refer to facilities located in capital cities

Nd – no data

Source: authors' own elaboration based on: Colliers, ExCEEDing Borders CEE [2022].

About 40% of the facilities in question are located in capital cities. The leaders are Hungary and Bulgaria (100%) – although this is partly due to the lack of data from other regions – and Estonia, where 77% of warehouses are located in Tallinn. In Poland, this percentage is only 41% (Warsaw and the surrounding area), which



means greater regional differences. Out of 4 million sqm of total warehouse space, as much as 1 million sqm was built in regions of Poland with which have fewer production and warehouse investments (Trójmiasto, Western Poland): 32.2% are in Upper Silesia, and 26.5% are in Central Poland [Cushman, Wakefield, 2021].

Poland is the sixth-largest warehousing market in the European Union (EU) and is second (behind Germany) in terms of investments. The Polish market maintains a high growth rate. Since 2014, the stock of industrial and logistics space has increased by over 10% annually, and in the last five years, it has grown by as much as 15% annually. Thus, it is the fastest-growing warehouse market in Europe [www 4].

In the entire CEE region, the industrial and logistics market is developing at a fast pace. 11.5 million sqm of new warehouse space have been put into use in the last three years.

At the end of 2020, the total stock of modern industrial and warehouse space in CEE was over 39 million sqm, of which more than half (51%) was located in Poland. In 2021, it had grown to 49.3 million sqm in the region (Table 1), i.e., an increase of almost 26%. The markets in Poland, the Czech Republic and Romania are developing the fastest.

In the first half of 2022, the volume of investments in CEE cooperation increased by 8.5% year-on-year, reaching EUR 5.3 billion. As a result, throughout the current year, the value of investments in the sector ranges from EUR 9.0 to 10.0 billion [Colliers, 2022]. Investors still see the CEE investment market as an attractive place to invest capital.

Interestingly, while this capital in Poland is of foreign origin, in the Czech Republic and Hungary, it is domestic.

The CEE region has the largest inflow of capital from Asia. In Poland, about 20% of warehouses belong to Asian capital. The value of investments in CEE countries is steadily growing, although this market was slightly affected by the negative effects of the Covid-19 epidemic. A slowdown was recorded in 2020, with warehouse space increasing by 2.0 million m<sup>2</sup> (compared to an increase of 2.8 million sqm in 2019). At the end of 2020, it amounted to 20.6 million sqm. In addition, several new industrial and logistics facilities have appeared on the Polish market since the beginning of the pandemic.

Taking into account the structure of the resources of warehouse and logistics facilities, SBU resources account for 6.5% of the total warehouse area. Sixty-one percent of SBUs are located in Poland. Their share in the total area of warehouses in Poland it is 8.4%. Bulgarians have the largest share of SBU space in the total stock of warehouses – 59% (Table 2).

TABLE 2.

Warehouse space in the SBU sector in the surveyed countries, 2021

Country	Total area in m <sup>2</sup> of SBU companies	Structure %	Share of total resources %
Bulgaria	511,900	15.9	59.3
Czech Republic	Nd	0.0	0.0
Estonia	228,000	7.1	9.8
Lithuania	33,700	1.0	2.7
Poland	2,000,000	62.1	8.4
Romania	74,000	2.3	1.3
Slovakia	15,000	0.5	0.5
Hungary	358,000	11.1	13.0
Total	3,220,600	100.0	6.5

Nd – no data

Source: authors' own elaboration based on: Colliers, ExCEEDing Borders CEE [2022].

The dynamic growth in the volume of real estate investments in the CEE region raises the question of their most important determinants. They have been systematized into four groups, but in many cases, they overlap:

#### General:

- The general economic situation of the country and investment climate.
- Population potential.
- Development of e-commerce.
- Creation of convenience stores.

#### Closely related to real estate investments:

- Capitalization rates.
- Prices of land for production and logistics investments.
- The amount of rents.

#### Changes in customer expectations:

- Growing demand for SBU/LML facilities,
- Warehouses closer to the end customer (regionalization),
- Demand for “green facilities” – buildings that meet ecological standards,
- Better use of storage space (higher buildings).

Changes in business organization:

- Strong tendency towards nearshoring as a consequence of disruptions in supply chains.
- Reducing the importance of the “just-in-time” supply system.
- Shortening the supply chain.
- Gradual (or permanent?) tendency to withdraw manufacturing processes from China.

Considering the above, Poland has strong advantages among these CEE countries, which is why such a large percentage of space is located here. Despite a radical decrease in the investment rate in Poland in recent years (investments to GDP), investments in the industrial and warehouse real estate sector are growing. This is favored by the rapidly growing e-commerce and good investment parameters, which are discussed below.

Comparing the population potential in these countries does not require much comment. Poland, with a population of over 38 million, exceeds the population potential of each of the other CEE countries many times over. The size of e-commerce services in Poland is also not surprising. Between 2018 and 2021, the average annual growth rate of the sector was 23% [PwC, 2022]. In 2020, online sales had a 14% share in the value of retail sales, which was influenced by the pandemic and the accelerated development of e-commerce platforms.

E-commerce turnover is increasing in line with the general development trend of this form of sales in Europe. In 2021, it was valued at EUR 170 billion, 17% higher than the previous year. Germany had the largest e-commerce turnover (EUR 32 billion), followed by France (EUR 29 billion) and Spain (EUR 11.3 billion) [www 9]. It is estimated that in 2022, there will be a further increase of 30%, and the market will reach EUR 220 billion. The highest annual growth rate was recorded in the Asia-Pacific region (25%), followed by Latin America, the Middle East and Africa at 21%, and Central and Eastern Europe at 19%. (Wodnicka, Skurpel, 2021, p. 1126).

The capitalization rate plays an important role in investments in the real estate sector. It is the quotient of the annual operating income that a given real estate is able to generate based on its current market value and current market rates, taking into account the fees related to real estate management and maintenance.

$$\text{Capitalization rate} = \text{net operating income} / \text{current market value}$$

For an investor purchasing real estate, the capitalization rate is the expected rate of return on the investment. If the owner of a commercial property wants to

sell it and estimates the profits it can bring from the lease, based on investment offers of similar properties, the value of the property as a quotient of net operating income by the capitalization rate.

$$\text{Property Value} = \text{Net Operating Income} / \text{Capitalization Rate}$$

Net capitalization rates in Poland, Slovakia, and Hungary are much higher than in the countries of the “old EU”. The same applies to land prices (Table 3).

TABLE 3.  
Average base rents, capitalization rates, and land prices in selected EU countries 2021

	Rents per year (EUR sqm)			Capitalization rates net (%)	Land prices EUR million/ha
	Big Box	Medium Box	SBU	–	–
Poland	38.40–42.00	39.60–44.00	39.60–63.00	5.30–5.75	0.20–1.40
Slovakia	39.60–48.00	41.40–51.60	46.80–54.00	5.25–6.25	0.30–1.20
Czech Republic	44.50–60.00	47.00–62.50	48.00–67.00	5.25–5.50	0.42–1.30
Hungary	45.00–50.00	47.50–57.50	47.00–67.50	5.50–5.80	Nd
Estonia	49.00–65.00	49.00–65.00	60.00–120.00	6.20–6.70	Nd
Lithuania	42.00–49.00	43.00–50.00	90.00–110.00	6.20–6.50	Nd
Latvia	40.00–4.70	42.00–49.00	70.00–85.00	6.20–6.50	Nd
Germany	66.0–86.50	62.50–81.50	80.40–102.00	3.60–3.80	2.00–5.50
United Kingdom	75.0–190.00	75.00–190.00	70.00–315.00	3.25–5.00	0.30–21.00
Spain	57.50–59.00	42.00–68.40	58.00–87.00	4.60–6.75	2.25–4.70
France	42.00–54.00	45.00–68.00	85.00–100.00	3.50–3.90	0.44–2.00
Italy	20.00–70.00	36.00–90.00	38.00–90.00	5.50–7.50	0.80–1.50

Nd – no data

Source: authors' own elaboration based on: [www 5, www 3, www 6, www 7, www 8].

A comparison of capitalization rates in CEE and Western European countries shows that in the former, they are 50% higher than in the latter, despite an

increase in the last year (data based on large cities – Table 4). This is an important argument when choosing an investment location. Poland maintains its position as a mature market that offers good quality real estate at relatively lower prices than Western Europe, ensuring more attractive returns on investment than other countries.

TABLE 4.  
Capitalization rates in selected European cities, Q1 2020/Q1 2021 (%)

	Q1 2020	Q1 2021	Relation 2021/2020*
Munch	3.5	3.7	1,057
Berlin	3.5	3.7	1,057
Hamburg	3.5	3.7	1,057
Frankfurt	3.5	3.7	1,057
Manchester	3.8	4.0	1,067
Paris	3.8	4.0	1,067
Helsinki	4.5	5.1	1,133
Madrid	4.3	4.9	1,153
<b>Average of Group I</b>	<b>3.8</b>	<b>4.1</b>	<b>1,084</b>
Budapest	7.7	7.7	1,000
Riga	6.9	6.7	0,971
Warsaw	4.5	4.7	1,044
Katowice	4.8	6.2	1,305
Poznań	4.7	5.0	1,064
Bratislava	6.3	6.3	0,992
Tallinn	6.9	7.5	1,087
<b>Average of Group II</b>	<b>6.0</b>	<b>6.3</b>	<b>1,055</b>
Relation II/I	1,579	<b>1,535</b>	–

\* The column expresses the ratio of capitalization rates in the mentioned periods, and the last line gives the ratio of capitalization rates for separate groups of cities.

Source: authors' own calculations based on: [www 4].

Similarly, rents are lower in the CEE countries (Table 3). Asking rents in big box warehouse facilities range from EUR 2.75 to EUR 4.5 per sqm per month. Rental rates in last mile or SBU urban warehouses remain at EUR 4 per sqm per month, and in the case of some large cities, they can be as high as EUR 6 per sqm per month. Rents in Poland are significantly lower than in other CEE and Western European countries (Table 5). The differences between Poland and other CEE countries result from greater regional differences. In Poland, smaller facilities are located outside large cities (mentioned earlier) with relatively lower rental rates. Rents are higher in smaller Medium Box and SBU schemes. This is partly due to the different standard of finishing of the buildings and their intended use (i.e., warehouse and office buildings). The situation with land prices is similar.

TABLE 5.  
Differences in the level of rents in selected countries by type of facility (%)

	Big Box	Medium Box	SBU
Poland	100	100	100
Slovakia	109	111	98
Czech Republic	130	131	112
Hungary	118	126	112
Germany	190	172	178
Spain	144	132	141
France	119	135	180
Italy	137	151	125

Source: authors' own elaboration based on [www 5, www 3, www 6, www 7, www 8].

Taking the above factors into account, the Table 6 shows the countries discussed.

TABLE 6.

Comparison of CEE markets from the point of view of investments  
in the production and logistics sector

	Poland	Czech Republic	Hungary	Bulgaria	Romania	Baltic countries
<b>1. General</b>						
Population potential	<b>h*</b>	m	m	m	m	m
E-commerce development	<b>h</b>	m	m	m	m	m
Development of <i>convenience store</i>	<b>w</b>	w	w	w	w	w
<b>2. Closely related to real estate investments</b>						
Capitalization rates	<b>h</b>	m	m	m	m	m
Land prices	<b>h</b>	m	m	m	m	m
Amount of rents	<b>h</b>	m	m	m	m	m
<b>3. Changes required</b>						
"Green buildings"	<b>w</b>	w	w	w	w	w
Growing demand for SBU/LML	<b>h</b>	?	?	?	?	?
Regionalization	<b>h</b>	w	w	w	w	w
Taller buildings	<b>w</b>	?	?	?	?	?
<b>4. Changes in business organization</b>						
Nearshoring	<b>h</b>	h	h	h	m	m
Reducing the importance of "just-in-time"	<b>h</b>	h	h	h	h	h
Shortening the supply chain	<b>h</b>	h	h	h	h	h
The tendency to withdraw business from China	<b>h</b>	m	m	m	m	m

\* h – high impact, m – moderate, w – weak, ? – difficult to define

Source: authors' own elaboration.

Using SWOT analysis, Table 7 summarizes the discussed CEE countries.

TABLE 7.

SWOT analysis of the CEE market and investments in warehouse real estate

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>- Population potential and dynamic growth of e-commerce.</li> <li>- Relatively lower land prices compared to Western EU countries.</li> <li>- Stable rate of capitalization of investments in the sector and much higher than in Western countries.</li> </ul>	<ul style="list-style-type: none"> <li>- Relatively low share of "green buildings".</li> </ul>
Opportunities	Threats
<ul style="list-style-type: none"> <li>- Persistent trend towards nearshoring.</li> <li>- Shortening the supply chain.</li> <li>- Locating warehouse space close to the location of production and final consumers.</li> </ul>	<ul style="list-style-type: none"> <li>- Disruptions caused by high inflation.</li> <li>- Increased prices of building materials.</li> <li>- Tax policy and deterioration of the climate for foreign investment.</li> <li>- Escalation of the war in Ukraine.</li> <li>- Disruptions in the energy market.</li> </ul>

Source: authors' own elaboration.

#### 4. Trends that suggest changes in infrastructure investments in the production and logistics sector. Findings

Identifying changes in infrastructure investments in the production and logistics sector in Poland and other CEE countries was based on research conducted among Polish managers, observed transformations in the sector over the past three years, and changes that are taking place in the global economy.

The research methodology involved individual in-depth interviews (September 2022) with three groups of respondents: investors in industrial and logistics real estate, tenants, and experts. In total, 15 interviews were conducted.

The selection of respondents was intentional. The following criteria for the selection of respondents were used: a/ the respondent holds a managerial position in each of the given types of enterprises (investors, tenants, experts); b/ respondents represent entities from various regions of the country - in the study, these were the ones located in the Mazowieckie, Łódzkie, Górnośląskie and Pomorskie Voivod-



ships. The condition of the managers was to remain anonymous. Respondents also did not consent to the publication of their personal data and company names. The respondents' age, sex and education were not taken into consideration.

The research focused mainly on the Polish production and logistics real estate sector. The opinions among all three groups of respondents are consistent regarding the development of the sector and changes in the structure of facilities, which is why they have been included together. The conclusions from the interviews are presented in Table 8.

TABLE 8.

The most important conclusions from the interviews

#### What are the prospects for the development of the production and logistics real estate sector?

- The warehouse sector gains from the dynamism and development of e-commerce and the shortening of the supply chain (nearshoring).
- The migration of food distribution from the current model based on traditional stores towards grocery e-commerce provides an opportunity to develop the warehouse sector.
- The development of multi-channel trade services affects the differentiation of the warehouse product and the development of "last mile" warehouses, courier hubs, and BIG-BOX warehouses.
- Increasingly, developers are undertaking brownfield investments, mainly in urban/SBU warehouses, due to the lack of available locations for investments within cities.
- The development of the sector may be influenced by the amendment to the Act of 7 July 1994 – Construction Law (i.e., Journal of Laws of 2020, item 1333) introduced by the Act of 13 February 2020 amending the Construction Law Act and some other acts (Journal of Laws, item 471). Building permits are now issued faster, and applications and projects are more efficiently accepted.

#### Expected changes in the structure of facilities (big boxes, SBU) and why?

- Courier companies (CEP – courier, express and postal – parcel – services market), in particular, choose last-mile logistics facilities, i.e., SBU warehouses, located close to large urban agglomerations. It is why developers are delivering more and more facilities of this type to the market. This is also dictated by the development of the CEP market and the development of last-stage delivery services.
- The development of multi-channel trade services affects the differentiation of the warehouse product and the development of last-mile warehouses, courier hubs, and big box warehouses.
- Developers are increasingly starting investments in urban warehouses – SBUs – on a speculative basis, as opposed to big boxes, which are implemented in the BTS/BTO formula.
- The current SBU warehouses are mixed-use facilities, i.e., modern facilities that combine the warehouse, office, and retail sectors, making it possible to serve retail customers (they can pick up their orders individually).
- In Poland, there is an increase in developers' interest in smaller agglomerations and cities.

### To what extent will green certification be used in the sector?

- Along with the development of food e-commerce, there is a growing demand for specialized warehouse space equipped with modern technologies, including temperature controls.
- The development of the automation of logistics implicates the creation of friendly work environments, the so-called green jobs.
- Growing pressure on the development of sustainable construction in terms of optimizing costs related to the operation of warehouse facilities.
- Tenants are looking for modern and innovative spaces; they expect warehouses with eco-certificates.

Source: authors' own elaboration.

## 5. Conclusions

Taking into account the above considerations and the survey of managers, certain investment trends can be observed in the warehousing sector in Poland and the CEE countries. Firstly, there has been a systematic increase in demand for smaller warehouse and office facilities. They ensure quick deliveries to customers, determined by the systematic and dynamic development of e-commerce sales, which is one of the most important accelerators of the development of the warehouse market. According to PwC, in 2026, the gross value of the Polish e-commerce market will reach PLN 162 billion, marking an average annual increase of 12% [PWC, 2022].

Sales of food products and procedures in the health and beauty category will soon increase. In 2020, the online channel had a 14% share in the value of retail sales in Poland, which was influenced by, among others, the Covid-19 pandemic and the accelerated development of e-commerce. Between 2018 and 2021, the average annual growth rate of e-commerce was 23% [PwC, 2022]. By 2027, the projected value of the e-commerce market in Poland will bring PLN 187 billion. Fifty-four percent of the increase in the value will come from fashion, electronics, and health and beauty. Thus, it will be necessary to optimize the delivery system when developing small warehouse facilities.

The trends observed during the Covid-19 pandemic may have initiated changes in the warehouse market. There is an increasing demand for smaller warehouse facilities (SBU) near or in large agglomerations, used primarily by commercial companies from the e-commerce sector. This is also related to the dynamic development of courier services (CEP market), which usually choose

SBU warehouses close to large urban agglomerations. Thus, more facilities of this type can be expected.

There has been a change in business philosophy. It is partly a result of the Covid-19 pandemic, but also the intensification of nearshoring related to moving production closer to markets, locating production closer to the home country, and limiting the use of just-in-time strategies in favor of maintaining larger stocks of products and materials. Many foreign companies decide to shorten the supply chain, including locating their production plants closer to the market. The pandemic caused some supply chains to stop completely, leaving the world without certain basic goods. Therefore, many entrepreneurs strive to minimize the risk of disruption to the supply chain. They have abandoned central warehouses in favor of smaller warehouses located in different parts of the country.

Tenants have different expectations of facilities under construction. Warehouses are being built higher and higher (up to 12 meters high), and they are becoming increasingly ecological, e.g., they are certified with the BREEAM method at the highest Outstanding<sup>8</sup> level. The trend for greener warehouses will continue in the coming years.

The CEE region is still an attractive investment destination for Western European and Asian capital. Lower prices of land for investments, lower rents, and higher capitalization ratios will encourage international capital to locate investments there. More and more capital comes from home countries, and its share in the volume of outlays is likely to increase (e.g., in the Czech Republic and Hungary).

There are exogenous risk factors related to the escalation of the war in Ukraine and other countries in the region that may affect market development. However, a possible next wave of the Covid-19 pandemic should not pose a significant threat to investments in production and logistics facilities. The growing popularity of Q-commerce<sup>9</sup> and the need to provide customers with the shortest possible delivery time requires the improvement of the supply chain and logistics networks, which is associated with warehouse investments closer to the customer.

Inflation, both anticipated and actual, carries risks. Anticipated risks may intensify inflationary tensions, while a high level of actual inflation has a paralyzing effect on entities, disrupting rational economic calculation. For investments in logistics and warehousing, it may interfere with the estimates of investment capitalization. Another aspect related to high inflation is the increase in the prices

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<sup>8</sup> There are already buildings certified at this level in Poland (e.g., Panattoni Park Sosnowiec I).

<sup>9</sup> Q-commerce is an electronic commerce model (also known as “delivery on demand”), which assumes the shortest possible delivery time.

of building materials, which is already taking place. In this context, investments in Poland are exposed to the effects of inflation, as are countries with a much lower inflation rate, but to a lesser extent. Relatively high inflation may correct nominal rental rates, although many experts believe that a radical increase in real rental rates should not be expected.

Taking into account the experience from previous years and the growing demand, the vacancy rate in the warehouse market is unlikely to increase significantly in the near future. Last year, it amounted to 3.8% in Poland, which is the result of the natural movement of demand and supply in this market. Lower vacancy rates were recorded in Lithuania (1.7%) and the Czech Republic (1.3%). Latvia, on the other hand, had over 24%.

Production and warehouse investments in Central and Eastern Europe are systematically growing. Poland is a definite leader and an important player in the European market. Investors in this sector were highly active, which is the result of structural changes in international supply chains and the dynamic development of the e-commerce market. The question arises how long Poland will remain the leader in Central and Eastern Europe, taking into account the growing investment costs and the functioning of industrial and logistics facilities, including the possible increase in rents in most Polish locations.

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