

Evaluation of industrial parks efficiency for sustainable land use

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Abstract. Implementation of industrial parks had become a worldwide trend in recent decades to promote economic growth and reducing social differences among the regions. However, worldwide examples show that many poor decisions were made in the planning stage. As a result, we have a lot of inefficiently working, obsolescence and even abandoned parks. The purpose of this paper is to analyze the theoretical and applicable aspects of the rational planning of efficiency operating industrial parks. The authors presented the comparative analysis of two industrial parks in Tauragė region in term of efficiency. The results proved industrial parks demonstrate better performance (by the number of investors attracted to the park) and have to be developed near major cities to ensure the supply of labor force for developing industries.

Keywords: industrial parks, regional analysis, the efficiency of industrial parks, sustainable land use.

Introduction

Development of industrial parks has been a popular trend for the last decades around the world. Recent studies estimated that nowadays there could be more than 20,000 parks of various types in the world (Salonen, 2010; Sakr, Baas, El-Haggar, & Huisingh, 2011; Ramos & Fonseca, 2016). This is a result of policymakers who use industrial zones as one of the main tools to promote economic growth and development as well as reducing social differences among the regions. Social exclusion is one of the high challenges the country of Lithuania is facing constantly. According to the Eurostat database, in the period between 2016–2017, there were 29.6% of people at risk of poverty or social exclusion in Lithuania. It is more than 7% higher than the average rate of all European Union (EU) Member States (EUROSTAT, 2019). In 2017th Lithuania approved “Lithuanian Regional Policy White paper for harmonious and sustainable development 2017–2030”. The White paper (2017) aim is to develop guidelines for sustainable regional policy and one of the tasks is to encourage implementation of industrial parks among Lithuania regions (National Regional Development Council, 2017).

In perfect conditions, industrial parks look like an ideal solution to the problem presented above. However, in practice, implementing industrial park territory so it would operate efficiency is a challenging task. Creating an industrial park involves considerable investment in land construction, infrastructure, and facilities (Yang, Hao, & Cheng, 2018). Nevertheless, there are a number of examples around the world how municipalities provided an unreasonable amount of land for industrial area. It is causing a number of problems such as high vacancy rates in parks (Fernandez et al., 2015), obsolescence, deterioration of property and reduced quality of public space as well as low prices on new industrial estates so reinvestment on existing locations are not made (Krabben & Van Dinteren, 2010) and also urban sprawl (Louw & Bontekoning, 2007). Unsupported decisions in urban planning lead to investment losses and threaten the emerge of brownfields areas.

This leads to the main purpose of this paper, which is set to evaluate the efficiency of industrial parks. The object of the research is defined to Tauragė region in Lithuania. Having an evaluation model can contribute to more sustainable and rational decisions for urban planners and decision-makers in the field of territorial planning.

1. The efficiency of industrial parks

In territorial planning documents of Lithuania industrial parks are defined as specific areas, which have developed engineering and communication infrastructure and managed by one operator, and where industrial development investment projects are implemented. In scientific literature terms such as industrial district, industrial estate, industrial zone, business park, free economic zones, science, and technology parks are also widely used. They have some

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differences in their purpose, size, facilities, organization etc., but are united by common feature as they are all industrial clusters operating in the defined geographical area, managed by a single authority having defined jurisdiction with respect to tenant companies (Phuong, 2002).

Because of the different framework conditions between and within the country, there is no one-size-fits-all model, when talking about the planning of a new industrial park. To maximize the chances of success and efficiency, several strategic decisions must be taken during the planning stage. These include the strategic objectives of the park, financing, the type of companies and sectors that the park wants to attract, and the range of services to be supplied to the tenants (United Nations Industrial Development Organization, 2012).

Different authors generalize three key factors to be considered through the planning process of a new investment project of the industrial park (Table 1).

Table 1. Evaluation factors for the industrial park planning process

Factor	Description	Authors
Accessibility	For people and goods as well as proximity to a port or an airport, and road/railway transportation to the infrastructure and the nearest urban center.	Fernández & Ruiz, 2009; Louw & Bontekoning, 2007; UNIDO, 2012; Ramos & Fonseca, 2016
Infrastructure and service provision	For investor security and cleaning services, service stations, etc. For the employees' canteen, public transport, etc.	UNIDO, 2012; Fonseca, Ramos, & Silva, 2015
Acceptable price of land	In exchange for high investments, employment growth and for (in)direct taxes on business operations.	Du & Peiser, 2014

It is possible to use these factors not only in the planning process but also for the analysis of the efficiency in the existing industrial park. Additional factors could be also considered:

- Location – it has to ensure the size of the plots as well as a large supply of working force at a reasonable cost (UNIDO, 2012).
- Type of the territory used – brownfield or greenfield area. Parks established in the existing but desolated facilities of former companies are known as brownfields and those developed in new industrial subsectors as greenfield. In Lithuania, most of the state-owned industrial parks, free economic zones, and other estates for industrial purposes are planned in greenfield areas and rarely with reinvestment in brownfields. Brownfield areas had been analyzed in Bielinckas (2018) doctoral thesis. The author points the need for conversion of such areas and suggests 6 possible scenarios for the redevelopment of brownfields. One of the possibilities is to use it for an industrial area. Revitalized brownfield area adds a high value to the surroundings. However, usually, such territory is limited in size in case of the need for an expansion.
- Innovation linkages – a nurturing environment is required to foster vibrant industrial development. Ensuring access to vital services that support innovation and learning is a critical part of establishing such an environment (UNIDO, 2012). For example, science and technology parks require a comfortable linkage with universities as well as other special conditions (green areas, services etc.).

2. The case of Tauragė region

Analysis of industrial parks can be performed in a local, regional or national level. For this research, the territorial division has been set to a regional level, which in Lithuania is presented by 10 counties. Since 2010, such division represents only territorial, not an administrative division of the country and equates to regional partitions.

The principle is that 10 regions with three hierarchical centers are formed: the three largest cities (Vilnius, Kaunas, Klaipėda), two intermediate centers (Šiauliai, Panevėžys), and five regional centers (Alytus, Marijampolė, Tauragė, Telšiai, Utena) (Figure 1).

For this analysis of the relatively successful implementation of an industrial park, the example of Tauragė industrial park (TIP) has been chosen. TIP demonstrates efficient land usage and sustainable decisions in the built environment as it is established in a mixed brownfield and greenfield area type of land. It is a privately owned industrial park, geographically located in the Southern part of Tauragė city. During recent years, in 20 ha territory, TIP has attracted 6 large foreign tenants, who invested more than 40 million Euros and created more than 1,000 of working place. This industrial park can be an example of efficiently operating industrial estate in Lithuania. Several reasons could be the result why is it so?

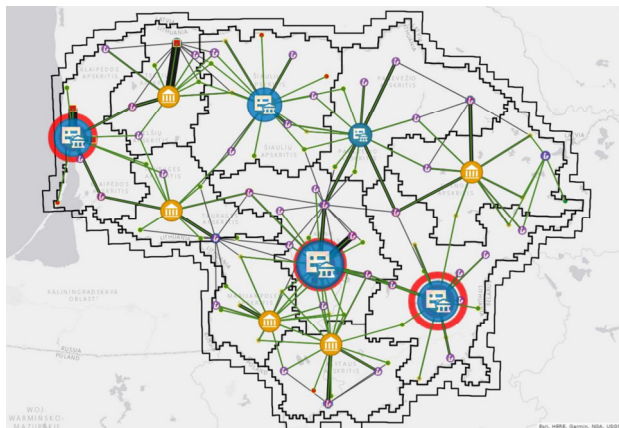


Figure 1. The system of regions and their centers of Lithuania (source: Lithuanian Regional Policy White Paper..., 2017)

Demography

Although Tauragė region is the smallest of all Lithuania regions, in terms of population (95,817 people in 2018 by official statistical data of Lithuania), the park itself is located in a strategically good location – the largest municipality as well as the center of the region – Tauragė city (38,921 people in the district) (Figure 2).



Figure 2. Transport and communication scheme of Tauragė district (source: Master plan of Lithuania 2020–2030)

Accessibility

For the last few years, not only private capital but also city Municipality has invested in industrial areas: bicycle and pedestrian paths, which are very important for the employees, the rainwater system is finished, improving the condition of the roads. In the distance of about 500 m, public transport operates, providing an important connection to the employees to reach the industrial park not only by car but also by a more sustainable kind of transport.

At the global level by car or freight transport, TIP is connected to the international highways – E77 and E85 (37.4 km). TIP is alongside the Via Hansa route (E77), following its historic intention to connect Germany, Poland, the Russian Federation, Lithuania, Latvia, and Scandinavia.

Compared to most of the regions, Tauragė is one of the closest to the ice-free port of Klaipėda – the distance is 111 km. Seaport provides the largest capacity (40,000 tones) on the Baltic coast with ro-ro, cargo and passenger lines to international ports.

By rail transport, it is connected to the railway branch linking the Europe Union with the Eastern markets. Two international airports: Palanga and Kaunas could be reached in less than 160 km, while the biggest Lithuanian airport in Vilnius city, can be reached within 239 km by road transport.

Environment

Tauragė region produces green energy from biomass, wind power, hydro energy, and solar systems. The quantity of production in the region is greater than consumed in Tauragė. Sustainable - environmental friendly solutions in the regions add value to industrial estates.

There are two industrial parks in Tauragė region, but another one – Pagėgiai industrial park could not be presented as an example of efficient land use for the industrial area (Table 2). Although it has a total area of 30 ha and 0.35 million Eur were invested in the creation of the lots and infrastructure in the greenfield area, the park has not attracted any investment. However, according to the official list of industrial parks and free economic zones provided by Ministry of the Economy and Innovation of the Republic of Lithuania this park exists, in reality, for more than 10 years, since its start in 2008, it has not generated any surplus value.

Some of the reasons for such inefficiency can be location choice as well as a poor demographic situation. Firstly, unless the place has to offer some strong advantages, investors are interested to come to the center of the region, not to the periphery of it. Secondly, the size of the city has to be even more important, as bigger ones can provide an investor with sufficient labor force. For example, the population of Pagėgiai municipality was 7,793 people in 2018, which makes it the smallest municipality in the whole region. Considering children and elderly people, which even more reduces the number of working age people, this makes small city uncompetitive compared to major cities in the region.

Table 2. Comparative analysis of industrial parks in Tauragė region

Factor	Tauragė industrial park	Pagėgiai industrial park
Type of the territory	mixed type: brownfield and greenfield	greenfield
Accessibility by road transport	+ E77 E85 (37.4 km / 33 min)	– E77 E85 (67 km / 56 min)
Accessibility to railway	+	+
Accessibility to airport	+ Kaunas 154 km / 1 h 44 min Vilnius 241 km / 2 h 36 min Palanga 143 km / 1 h 43 min	– Kaunas 184 km / 2 h 6 min Vilnius 270 km / 2 h 59 min Palanga 118 km / 1 h 39 min
Accessibility to Klaipėda seaport	– 116 km / 1 h 25 min	+ 90 km / 1 h 22 min
Demographic situation of the municipality	+ 38.921	– 7.793
Operator	Private	Public
Investors	+ 6	– 0

*Pluses and minuses system represents not the presence and absence of certain indexes, but better value in terms of corresponding meanings.

Finally, TIP is set up by a private capital initiative and managed by private operator accordingly to pay off. For this reason, the results of similar business structures in the same region can be fundamentally different.

Discussion and conclusions

Example of industrial parks in Lithuania exposed that not every industrial park can be attractive to investors. Analysis of Tauragė region and its industrial parks sustains the theory, that industrial parks demonstrate better performance results and have to be developed near bigger cities. To define the minimum limit of the size, more detailed research needs to be continued. Comparative analysis of 2 industrial parks in the same regions proved that demographic situation – labor force and location of the city are important for attracting investors and for the efficient operation of the park. TIP also presents slightly better accessibility results to major airports as well as road transport.

The analysis of TIP provided insights that similar business structures in the same region can perform fundamentally different depending also on the management type – if it is private or public. In case of a private operator of the industrial park, the private-public partnership is still very important. Making not only industrial park, but also surrounding areas well-developed in terms of quality infrastructure and public services for the investor and its employees is another factor, which adds value to the attraction of the investments to the park and adds benefits to the municipality itself.

Proposing project implementation of new industrial parks has to be analyzed in term of its possible efficiency. This can help municipalities and other decision-makers avoid faulty investments and also waste of environmental resources. Choosing the territory for a new industrial park, the possibility of reinvestment and redevelopment of

brownfield areas is highly advisable too. Sustainable – environmental friendly solutions, such as usage of green energy in the regions also add value to industrial zones.

This paper is also an entry presentation of doctoral research in the analysis and sustainable development of industrial parks for the revitalization of regions in Lithuania. Evaluation of the efficiency of the industrial parks in all regions will continue. Applying statistical, GIS analysis, MCDM and other methods, the best industrial parks types by different types of territory, smart specializations of regions, and other criteria will be suggested for possible implementation scenarios.

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