ATINER CONFERENCE PRESENTATION SERIES No: PLA2020-0180

ATINER's Conference Paper Proceedings Series
PLA2020-0180
Athens, 9 June 2020

Planning Practice of Industrial Parks in Lithuania by the Measures of Country Development Level of Infrastructure

Vaida Vabuolytė
Marija Burinskiene

Athens Institute for Education and Research
8 Valaoritou Street, Kolonaki, 10683 Athens, Greece

ATINER's conference paper proceedings series are circulated to promote dialogue among academic scholars. All papers of this series have been blind reviewed and accepted for presentation at one of ATINER's annual conferences according to its acceptance policies (http://www.atiner.gr/acceptance).

© All rights reserved by authors.

ATINER's Conference Paper Proceedings Series
PLA2020-0180
Athens, 9 June 2020
ISSN: 2529-167X

Vaida Vabuolytė, PhD Student, Vilnius Gediminas Technical University, Lithuania
Marija Burinskiene, Professor, Vilnius Gediminas Technical University, Lithuania

Planning Practice of Industrial Parks in Lithuania by the Measures of Country Development Level of Infrastructure

ABSTRACT

One of the most important objects of Lithuania is to create a more efficient economy and raise labor productivity. Industrial park territories are being developed for such a purpose. The creation of industrial parks requires significant investments in its construction. More than 56 million euros, from the budget of the country and European Union support, have been already invested in the development of these zones in Lithuania. Such amounts would not be significant if these territories would achieve its' goals, which is mainly to attract major investors. However, there are many proofs of such investment projects failure in Lithuania and even more around the world. From the scientific point of view, there are many kinds of researches on the topic of industrial zones, but it still lacks the answers, why one projects thrive, and others fail to succeed. This work aims to analyze the spatial planning features of the existing industrial parks of regions of Lithuania in the context of the development level of country infrastructure. In this context, we question the rationality of the spatial position for some of these zones. The object of the research is industrial parks and free economic zones in the Republic of Lithuania. In this article, using statistical and spatial analysis (GIS) methods, we assess the infrastructure development level of industrial zones in Lithuania. We compare different industrial parks and their infrastructure development level, as well as how industrial parks are changing, i.e., expanding or diminishing. The results prove that in the context of Lithuania, free economic zones type is more successful than industrial parks. The paper provides insights into the development of industrial park territories.

Keywords: Industrial park, free economic zone, infrastructure planning, suburban planning, urban planning, regional development

Introduction

Industrial parks (IP) whose projects are commonly implemented in suburban or urban areas should be considered as inherent parts of modern smart cities as well as regions. Various types of special economic zones (SEZ) are found in about 70 % of developed countries (World investment report 2019). By the number of SEZs in developed economies countries, Lithuania takes 3rd place (16 SEZs), after United States (262 SEZs) and Poland (21 SEZs) leaving Croatia (11 SEZs) and Bulgaria (9 SEZs) behind. In Lithuania, these parks are used as a tool for regions development.

Industrial parks come in various forms e.g., free economic zones (FEZ), special economic zones, industrial estates, industrial parks, free zones, etc., but generally, it is possible to identify them by the three most common features:

- a clear geographically demarcated area,
- supporting infrastructure,
- a special regulatory regime that is different from the rest of the economy.

Finding the right location for the industrial parks usually becomes a challenge, as the possibility of the most cost-effective development of infrastructure has to be considered. The development of sufficient infrastructure can be one of the main factors influencing the development of the park. Start-up speed becomes by far the most important criterion when choosing a production base, and each month saved can mean hundreds of thousands or millions of income.

Currently, by the report of the World Economic Forum Competitiveness Study (2019), Lithuania takes 39th place out of 141 countries. Industrial parks can enhance the country's competitiveness by attracting investment and job creation.

Well-developed IPs attract the highest investments and validate their existence. They provide benefits, especially social and economical, for nearby cities and the whole region as well. As an example, the increased value and efficiency of urban land use, the creation of workplaces, social inclusion, the rise of the economy, etc. In the report of Free economic zones in Lithuania (2019) prepared by Invest Lithuania, the net positive effect in such developed territories in Lithuania is calculated 6.6 times higher the value of the costs involved. Moreover, it tends to grow over the years. However, in Lithuania, we have at least two failures of IP development projects with a loss of investments of more than 16 million EUR.

The importance of such zones' successful development leads to the main aim of this paper, which is to analyze the spatial planning features of the existing industrial parks of regions of Lithuania in the context of the development level of country infrastructure. The research object is defined as industrial parks and free economic zones in the Republic of Lithuania.

This paper complements the existing publications on the research of industrial parks expediency creation in the context of the regions of Lithuania published by the authors before and is part of the Ph.D. thesis.

Literature Review

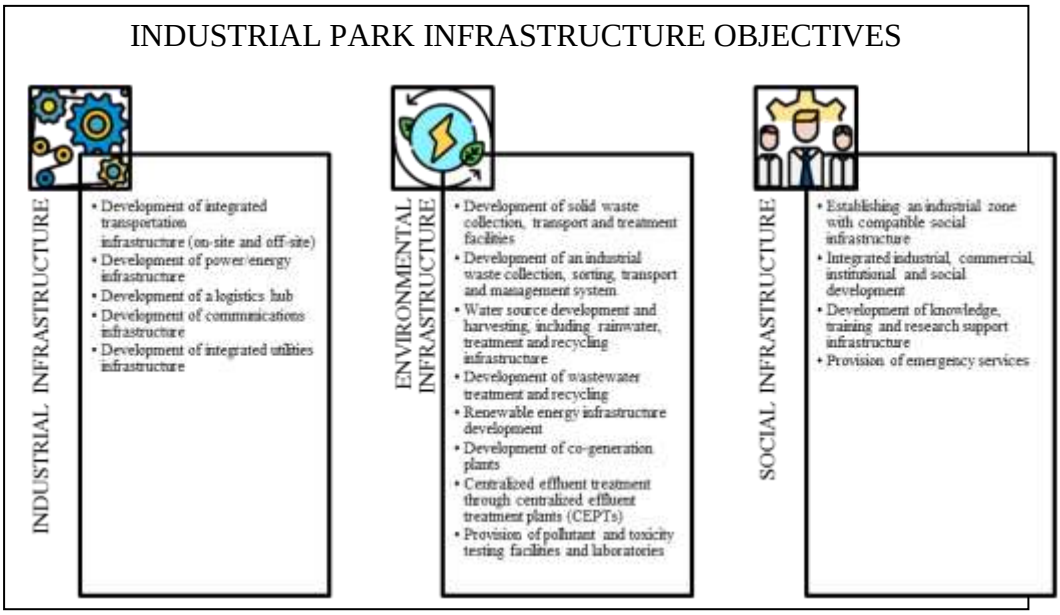
The general description of IP types and distribution of these zones in Lithuania have been already published in Vabuolytė and Burinskienė (2019) research paper. There are three main types of industrial estates in Lithuania: free economic zones, industrial parks, and science/technology parks/valleys. Considering the European or world context, the parks developed in Lithuania can be called quite traditional.

The creation of industrial estates is based on economic, territorial and environmental objectives. Industrial estates are subdivided into lots according to a comprehensive plan providing common facilities (water, electricity, sewage disposal, gas, optical fibres, etc.) and amenities (security services, cleaning services, service stations, restaurants, recreational and social equipment, etc.) (Fonseca *et al*. 2015). Economic development in a nation requires connectivity between production centres and processing industries. Infrastructure plays a crucial role as a prerequisite for transporting people and goods from one area to another (Berawi & Susantono, 2012; Berawi et. al., 2017). *Fonseca* et al. (2015) also add that the success of an industrial estate is highly dependent on appropriate planning (location, facilities, and amenities provided at the site, etc.) and on adequate management (maintaining the infrastructure and promoting the space).

Recently, The United Nations Industrial Development Organization (UNIDO) has published the International Guidelines for Industrial Parks. It is a systematic guide to advise industrial park regulators, developers, operators, tenants, partners (such as multilateral development agencies) and financial institutions on the planning, development, and operation of industrial parks. UNIDO indicates that the guidelines are applicable to both existing and new industrial parks in various international contexts, with a focus on the needs and challenges that developing countries and middle-income economies face.

These guidelines define concentrated critical infrastructure to support the development of the industrial sector in general and, sometimes, of targeted industries in particular. The main objectives of the IP infrastructure divided into three groups: industrial, environmental and social infrastructure (Figure 1).

Figure 1. *Industrial Park Infrastructure Objectives*



Source: Readjusted from International Guidelines for Industrial Parks, 2019.

Recent year's researches have started to look at industrial parks from a different perspective, with a strong focus on sustainability. Low-carbon, eco, smart, sustainable, and zero-carbon emphasize the sustainability niches for next-generation urban development fighting to climate change (Kylili and Fokaides, 2015; Reiter and Marique, 2012; Yu, 2014; Wang *et al*., 2019). And as a result, eco-industrial park (EIP) term emerged. The transformation of conventional industrial parks into eco-industrial parks (EIPs) presents an effective opportunity to attain inclusive and sustainable industrial development (van Beers et al. 2019). The pilot projects of EIP have been implemented in Vietnam, Marocco, India, China, Colombia, etc.

The aim of an eco-industrial park is to improve the economic performance of the stakeholders while minimizing environmental impact (de Sousa Silva *et al*. 2015). Authors emphasize that industrial parks should reduce soil occupation and promote green areas in a high percentage of the industrial land area.

Assessment of Existing Industrial Parks Infrastructure of Lithuania

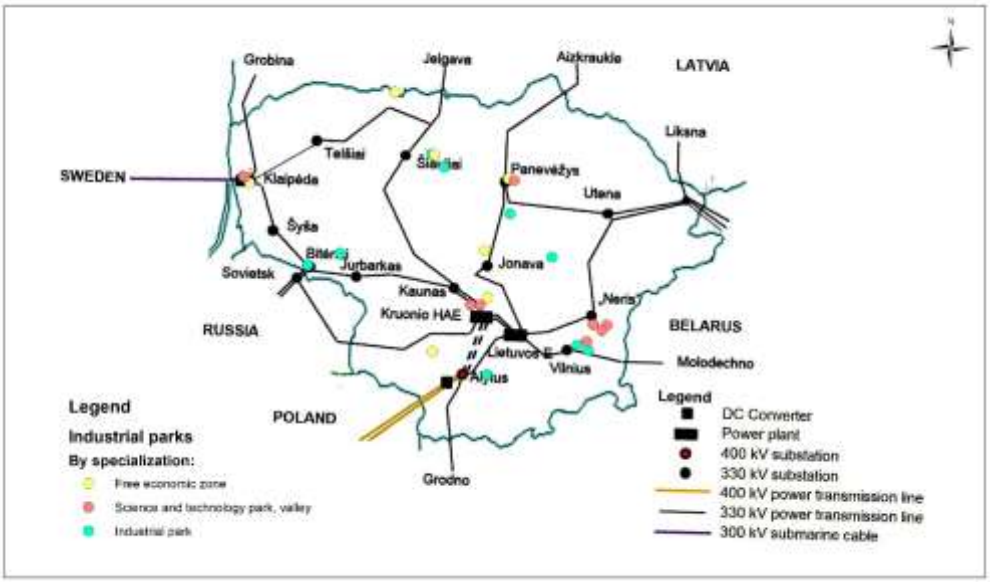
The basic engineering and communication infrastructure that is typical when developing IPs' in Lithuania is a water supply, sewage, electricity supply, site access roads, and lighting. The entire park infrastructure is developed in stages. Usually, the infrastructure implemented in the parks is brought to the border of the sites.

Electricity Infrastructure

Major investors' electricity demand for new facilities may exceed 1000 kW. That is why the security and availability of electricity supply are so important for developing industrial parks project. It affects the ability of potential investors to operate. The current electric grid (Figure 2) passes near the most region centers of Lithuania with a high capacity of 330 kV. Less powerful - 110 kV grid is connecting even more of Lithuania cities and towns.

Although the electricity network is quite well developed in the territory of the Republic of Lithuania, several industrial parks require transformer development to meet the electricity demand. Lack of electrical power is felt e.g. Kaunas FEZ, Panevėžys FEZ, Kėdainiai FEZ, etc. However, the Lithuanian Energy Distribution Operator, following a sector analysis, is currently implementing a transformer development project. It will be able to supply some IPs with sufficient electrical power. Unfortunately, in other areas where development is not foreseen, the connection may take up to one year if there is a higher demand for electric power. Even now, with so much competition for fully-fledged sites in industrial parks across Europe and globally, such a long period could lead to the loss of a potential investor.

Figure 2. *Electricity Transmission Network Scheme of Lithuania, 2016*



Source: Adapted according to "Lietuvos elektros energetikos sistemos 400-330–110 kV tinklų plėtros planas 2015–2024 m."

When analyzing infrastructure development in IP, some areas, e.g. in Klaipėda and Kaunas regions, there is a positive tendency to use renewable energy sources. The energy produced by biofuel in Klaipėda centrally supplied to FEZ by "Kaipėdos energija"; while some companies operating in the territory of Kaunas FEZ invest in solar energy collectors, effectively utilizing, for example, the space on the rooftop of buildings. With the development of

renewable energy infrastructure, these areas are moving closer to the concept of eco-industrial parks. However, due to the lack of open data, it is not possible to determine the share of renewable energy in the total IP consumption. But the fact that companies are investing in renewable energy sources themselves shows the importance of such infrastructure development that can help attract new investors whose brands declare environmental caution.

Water Supply and Sewage

In the overall assessment of the water supply system, it is important to note that Lithuania is one of the most abundant countries in Europe in terms of freshwater supplies. Groundwater resources constitute a significant part of Lithuania's national wealth. Water reserves are almost seven times higher than we can consume. Approximately 15-20% of the total amount available is consumed during the day. Water is usually centrally supplied and available in all IP territories. The wastewater treatment system is also centralized or otherwise local.

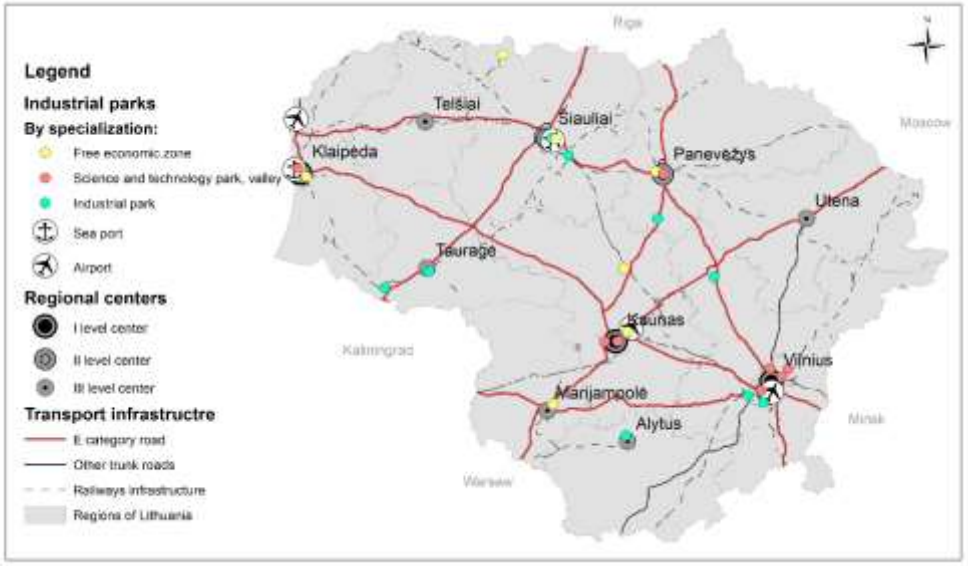
Transport and Communication

The main purpose of IP is to attract foreign investors. Large companies export their products to other countries, which makes international transportation infrastructure particularly important. International transport and communication network of Lithuania include (Figure 3):

- Four international airports in Vilnius, Kaunas, Palanga, and Šiauliai, which provide access to all major European cities within 2-4 hours flight.
- Klaipėda seaport - largest ice-free port in the Baltic States. It is 14.5-15 meters deep with a capacity of up to 65 million tons of cargo per year.
- Railways infrastructure – 56.8 million tons of cargo transported in 2018. Currently, the Rail Baltica project is in the development stage. It will connect the Baltic States with Europe. The project will expand the capacities of cargo transport and will improve the accessibility of nearby located industrial parks too.

Road network. The total length of the national significance roads of Lithuania is 21249 km. Six main roads of Lithuania have been included in the E category roads of Europe. Two routes of international European transport corridors (TEN-T) cross Lithuania: North–South direction: the corridor No.I – the motorway “Via Baltica” and the railway line “Rail Baltica”, on the route Tallinn–Riga–Saločiai–Panevėžys–Kaunas–Kalvarija–Warsaw, and its branch No. IA (Tallinn–Riga–Šiauliai–Tauragė–Kaliningrad); East–West direction: the branch IXB (Kiev–Minsk–Vilnius–Klaipėda) and the branch IXD (Kaunas–Kaliningrad) of the corridor No. IX.

Figure 3. *Transport and Communication Infrastructure of Lithuania*



Source: Prepared by the Authors.

Analyzing the map in terms of international transport infrastructure clearly distinguishes four IPs with the best strategic location. Klaipeda, Kaunas, Šiauliai and Vilnius stand out in the context of other regions. Klaipėda FEZ has the most convenient access to all four transportation modes.

When evaluating transport infrastructure, it is important to mention not only the international context but also the local accessibility of the parks. From a social point of view, it is important to consider how the staff will come to the workplace. If developed successfully, the IP is potentially a major attraction, creating thousands of jobs. For example, in 2018, the Klaipėda FEZ had about 5,400 employees. To avoid the "pendulum" effect of rush hour traffic, when traveling one-way in the morning and reversal in the evening by car, it is necessary to provide alternative ways of traveling. Promoting sustainable mobility requires the provision of infrastructure for public transport, cycling, and walking paths, linking the city and the industrial zone where possible. That way, the park is integrated into the urban area, becoming a separate campus in the city rather than a production park.

Most industrial parks in Lithuania, which are located close to larger cities, set a good example in the context of sustainable transport and have developed public transport infrastructure by connecting it to the city network. For example, Panevėžys FEZ is a part of the city network and is well connected via public transport and bicycle routes for workers' convenience and accessibility. Furthermore, car-sharing and seasonal bike-sharing network infrastructure connect Klaipėda FEZ with Klaipeda city. There are 5 bike-sharing stations in the FEZ area and as an incentive, FEZ staff can use bikes for free. Other cities' IP do not offer this practice and infrastructure.

Buildings

As we mentioned earlier, it is a common practice in the initial implementation phase of an IP project in Lithuania to develop basic engineering and transport infrastructure to the limit of the leased site. Additional infrastructure or special purpose properties usually occur when the park is receiving investments and expanding businesses. While investors often want to get started as soon as possible, most IPs do not have ready-to-rent buildings for production/logistics or other activities.

Leased buildings, at an early stage of the project, are more often offered in private IPs. For example, Ukmerge IP has 22,000 sq.m. renovated offices and production facilities for a quick start. Another private IP in Taurage also has more than 100,000 sq.m. of industrial premises ready for business. Klaipeda FEZ, one of the largest in Lithuania, has developed more advanced social infrastructure. The area has a canteen, fire station, football, basketball and tennis courts. It also offers a Flex Start building for quick investor placement. It is a manufacturing facility designed to be easily adjusted and adapted to each tenant in less than 1-2 months.

The ability to set-up and start business quickly is a crucial factor when choosing a place to invest. This can only be achieved in full-developed sites where construction work can be started immediately. According to the current situation, the development sites, which require additional investment in infrastructure, account for almost 50% of the total area (Table 1). Statutory all the total area of the FEZ consists of sub-leased and reserved areas for companies and areas where activities are not possible (infrastructure, buffer zones, etc.) (Investuok Lietuvoje, 2019).

Table 1. *Level of the Developed Areas in FEZ of Lithuania*

	Region	Name/Type	Total area, ha	Area for infrastructure, protection zones, ha	Leased and reserved area for businesses, ha	Free area to be developed which needs additional infrastructure investment, ha
1	Alytus	Alytus IP	63	n/a	45.70	n/a
2	Kaunas	Kaunas FEZ	534	56	104.00	374
3		Kėdainiai FEZ	131	38	13.00	80
4	Klaipėda	Klaipėda FEZ	412	75	60.00	277
5	Marijampolė	Baltic FEZ	78	0	65.00	13
6	Panevėžys	Panevėžys FEZ	47	13	16.00	18
7		Ramygala IP	12.4	n/a	12.40	n/a
8	Šiauliai	Akmenė FEZ	99	14	61.00	24
9		Šiauliai FEZ	133	26	13.00	94
10		Šiauliai IP	53	n/a	36.85	2.2
11		Radviliškis IP	15.5	n/a	15.50	n/a
12	Tauragė	Pagėgiai IP	30	n/a	30.00	n/a
13		Tauragė IP	20	n/a	n/a	n/a
14	Vilnius	Ukmergė IP	n/a	n/a	n/a	n/a
15		Vilnius IP	180	n/a	n/a	n/a
16		Pagiriai IP	84	n/a	n/a	n/a

Source: Data from Investuok Lietuvoje, 2019.

More than 60% of the total area still needs additional investments to infrastructure development in 4 out of 7 FEZ of Lithuania (Kaunas, Klaipėda, Kėdainiai, and Šiauliai). The least additional investments are required in Baltic FEZ (16.7% of total area) in Marijampolė and Akmenė LEZ (24.2%), which is logical as these zones are one of the smallest by area.

The total area for IPs and FEZ development in Lithuania is almost 1,900 ha. Comparing the parks, the distribution of areas is very uneven. The IP sizes range up to 43 times, from 12.4 ha in Ramygala IP to 534 ha in Kaunas FEZ. Kaunas and Klaipėda FEZ, which make up 50% of the total area, occupy the largest share.

Discussion and Conclusions

To sum up, industrial park is potentially a major object of attraction, both from the perspective of foreign investors and residents of the surrounding cities. Planning a successful industrial park is a complicated task. IP infrastructure is one of the essential parts of this challenge to solve. Well-developed infrastructure makes the area more attractive as it is easier and faster for potential investors to set-up businesses.

A significant part (almost 50%) of the areas designated for FEZ in Lithuania are still lacking infrastructure and need to be developed. In a competitive industrial park environment, being able to start a business quickly is a key factor in choosing an investment location. Undeveloped areas are less attractive to be leased. Therefore, the supply of prepared plots should be increased.

The analysis also revealed that the most successful industrial territories in Lithuania according to the attracted investments are Kaunas and Klaipėda FEZ. Ramygala and Pagėgiai IPs remain the most unsuccessful. In general, FEZ in Lithuania performs better than IP. This could be due to some reasons. Information on industrial parks' current state is very limited and not sufficiently presented publicly. Free economic zones are much more advertised to potential investors. There could be several possible reasons for this. One of them is the management model. The chosen operator manages FEZ, while municipalities that lack initiative regularly manage public IPs.

Lithuania's experience in developing projects like these provides insights that the creation of basic infrastructure alone is not a decisive indicator for attracting an investor, there are other factors involved. Additionally, the indicator of sustainability is also significant in the improvement of infrastructure. Renewable energy sources, sustainable mobility, connectivity, infrastructure for sharing services, the circular economy, etc. are the cornerstones of present and future industrial park infrastructure to move closer to the concept of eco-industrial parks. Also, the use of renewable energy parks not only contributes to the goals of the state to reduce climate change, but also contributes to the goals set at the 2015 Climate Change Conference in Paris.

References

Berawi, M.A., Susantono, B., 2012. Developing Conceptual Design of Mega Infrastructure Project: Creating Innovation and Added Value. *Value World*, Volume 35(1), pp. 12–20

Berawi, M. A., Miraj, P., Berawi, A. R. B., & Agdhitya, R. 2017. Increasing Added Value for the New City of Walini Through Infrastructure Project Development. *International Journal of Technology*, 8(6), 1141-1149.

de Sousa Silva, C., Lackóová, L., & Panagopoulos, T. 2017. Applying sustainability techniques in eco-industrial parks. *WIT Transactions on Ecology and the Environment*, 210, 135-145.

Fonseca, F., Ramos, R. A. R., & da Silva, A. N. R. 2015. An agent-based model to assess the attractiveness of industrial estates. *Journal of Artificial Societies and Social Simulation*, 18(4), 13.

Investuok Lietuvoje. Laisvosios ekonominės zonos Lietuvoje. 2019. [online]. [cited 04 February 2020]. Available from Internet: https://investlithuania.com/lt/medziaga-parsisiuntimui/apzvalgos/visi-sektoriai/.

Kylili, A., & Fokaides, P. A. 2015. European smart cities: The role of zero energy buildings. *Sustainable Cities and Society*, 15, 86-95.

Lietuvos elektros energetikos sistemos 400-330–110 kV tinklų plėtros planas 2015–2024 m. 2015. Vilnius

The Global Competitiveness Report 2019. 2019 [online]. World Economic Forum. [cited 05 February 2020] https://bit.ly/2AGlQ7I.

UNCTAD. 2019. World Investment Report 2019 Special Economic Zones [online]. United Nations Conference on Trade and Development [cited 07 February 2020]. Available from Internet: https://bit.ly/374QrrW.

UNIDO. 2019. *International guidelines for industrial parks* [online]. The United Nations Industrial Development Organization [cited 08 February 2020]. Available from Internet: https://www.unido.org/resources-publications/latest-publications.

Vabuolytė, V., & Burinskienė, M. 2019. Pramoninių parkų išsidėstymas Lietuvos Respublikos teritorijoje/Distribution of industrial parks in the territory of the Republic of Lithuania. Mokslas–Lietuvos ateitis/Science–Future of Lithuania, 11.

van Beers, D., Flammini, A., Meylan, F. D., & Stucki, J. 2019. Lessons Learned from the Application of the UNIDO Eco-Industrial Park Toolbox in Viet Nam and Other Countries. Sustainability, 11(17), 4687.

Wang, Y., Ren, H., Dong, L., Park, H. S., Zhang, Y., & Xu, Y. 2019. Smart solutions shape for sustainable low-carbon future: A review on smart cities and industrial parks in China. *Technological Forecasting and Social Change*, 144, 103-117.

Yu, L. 2014. Low carbon eco-city: New approach for Chinese urbanisation. *Habitat International*, 44, 102-110.