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Increase in the Value Added of Land Due to the Establishment of Industrial Parks

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Abstract: Industrial parks (IPs) are a frequently used regional policy tool to increase economic viability and social equality. Successful functioning of such areas can increase land use efficiency and, by attracting investment, create high added value nationwide. However, the creation of IPs requires significant initial investments in the installation of their infrastructure and the preparation of plots of land, which is often realized through public financial instruments. The overall objective of the research is to present the different strategies for IP development in three different countries' economies, to discuss the outputs and added value created by such areas, and to provide insights and suggestions for the planning and development of efficient industrial land as well as to increase its value in the developing and middle-income countries. To achieve these aims, the authors of the research present and analyze IP development practices and policy tools in the developed countries of Lithuania and Portugal, and provide suggestions for the developing country of Ukraine. In this study, the authors use statistical and spatial GIS and economic data, and analyze and compare them. The results show that IPs are being developed all over Europe and the world, but each country is creating its own legal framework and appropriate incentives for companies operating in these areas, so the performance of such areas varies a great deal.

Keywords: industrial parks; free economic zones; industrial land use; tools of land value capture; policy assessment

1. Introduction

In recent decades, IPs have been widely used as one of the tools to support sustainable growth through industrial development. Different countries and literature use a broad range of concepts and definitions for such areas, including free economic zones (FEZs), special economic zones, export processing zones, industrial parks, science and technology parks, etc. One of the commonly used generalized definitions of IP is introduced by the United Nations Industrial Developments Organization (UNIDO), which describes it as a “tract of land developed and subdivided into plots according to a comprehensive plan with or without built-up factories, sometimes with common facilities for the use of a group of industries” [1,2]. Different studies estimate that there could be more than 20,000 IPs worldwide [3,4]. IPs of various types are usually established to attract foreign direct

investment, reduce large-scale unemployment, and complement the broader strategy for economic reform, or are set up as experimental laboratories to test new policies and approaches. There are many advantages such territories might have compared to detached industrial land development. These include solving problems of land acquisition for investors, permitting efficiencies of industrial grouping, avoiding adverse impacts on the surrounding environment, boosting the development of the local economy, providing an environment for high value-added production, and cultivating strategic industries. Furthermore, industrial agglomeration not only positively impacts industrial development, but also helps increase the industrial land value [5]. Moreover, industrial parks make a significant contribution to the 2030 Agenda for Sustainable Development goals, especially Goal 9, which aims to build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation, and Goal 8, which aims to promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all [6].

Although IPs have many chances to have a positive impact on the country's socio-economic performance and goals, there are many challenges that such development projects are facing. To achieve inclusive and sustainable industrial development, developing and middle-income countries must attract investment. However, many of them lack the infrastructure and the institutional framework to be attractive for investors. To reach that goal by enhancing GDP growth, promoting innovation and competitiveness, creating jobs, diversifying the economy and protecting the environment, governments have to apply well-designed industrialization strategies and industrial policies that will be able to answer current and future challenges in a sustainable way [7]. Considering the sustainable development principles in the context of land use, different authors [8–10] address the issues related to the brownfield and greenfield potential in the land development process. Both types of land can be used for IPs creation, but finding new investors for brownfield areas is challenging. Potential investors usually find it better to buy an undamaged and unaffected land, or greenfield [10]. Pavolova et al.'s research on both types (brownfield and greenfield) of IPs in Eastern Slovakia revealed that from an economic perspective, it is more favourable to allocate the investment capital to the greenfield. From a sustainable land-use perspective, however, although it cannot be considered as a rule, brownfield regeneration is prioritized over greenfield development [10,11].

In many countries, municipalities have provided so many industrial parks that these territories are causing various problems related to urban sprawl [12], oversupply of land [13], obsolescence and deterioration of old estates [14] and significant vacancy rates [15], among others [4]. Arabsheibani's [16] research on the land suitability for choosing a location for industrial parks provided insights that city proximity criterion is the top important factor suggested by practitioners. On the other hand, factors such as health care centers and land cost are under the effects of others, and this shows that based on the expert's idea, city facilities play an important role in the sustainable planning of industrial parks [16]. A Taiwanese case study on government and industrial agglomeration impact on industrial land prices indicated that the variables related to general attributes, locational attributes, industrial agglomeration and governments are determinants of industrial land prices. The inappropriate location of industrial parks and dissatisfaction with management services may impact industrial land prices, as well [5]. Therefore, when developing such large-scale and resource-intensive projects, it is important to assess the real need for it in a given location.

Industrial parks have been mostly promoted by public entities [2,4,5]. For the implementation of plans for major public projects, the availability of resources is a critical issue. This makes value capture an important consideration in the planning of projects that involve substantial public investments [17]. In addition, because governments quite often invest significantly in infrastructure and public facilities, fiscal revenue is an important prerequisite for the financial sustainability of the industrial park, including the ability to pay its own operating costs [18,19] and to evolve continuously [19,20].

The value-creation process is complex within the firm [21] and can be even more so in inter-organizational projects [22] involving both public and private sector actors [23–25]. As industrialization plays a major role in the spread of construction, industrial land-use planning is vital [26]. When assessing the development of IPs, it is important to assess whether the benefits outweigh the associated public costs and how public finances are affected. Only after answering these questions and properly assessing the readiness of the remaining empty IP territories for investment is it possible to make appropriate decisions on the future development of industrial land and expect a successful increase in its value.

In order to provide recommendations on how to improve the efficient functioning of IPs as a tool to increase the value of land, the authors set the following tasks:

1. To determine how IPs are understood in different European countries, and for what purpose they are created.
2. To assess the added value these parks create and their impact on regional development.
3. To analyze what political, legal and practical tools are used by EU countries, and how to apply them in Ukraine.

The overall objective of the research is to present the different strategies for IP development in three different countries and economies, to discuss the outputs and added value created of such areas, and to provide insights and suggestions for the planning and development of efficient industrial land as well as to increase its value in developing and middle-income countries. To reach these aims, the authors of the research present and analyze IP development practices and policy tools in the developed countries of Lithuania and Portugal, and provide suggestions for the developing country of Ukraine. Countries are assigned to the appropriate classification of the developed and developing countries according to the United Nations World Situation and Prospects Report 2020 [27]. As Ukraine is preparing to formally apply for EU membership in 2024, in order to join the European Union in the 2030s, the recommendations for the industrial land development sector from the existing member states can contribute to reaching this goal. In general, recommendations are relevant to both new and existing industrial parks in various international contexts.

This paper is organized in five parts. The introduction presents the background for the research and its objective. This is followed by the methodology, where the authors of this research present a research model for IP. Then, there is a brief summary of the legal framework on IPs in different countries, following by the state-of-art analysis of the IPs. After the analysis, we present and discuss on the value added growth in different countries. In the end, the authors present recommendations for the development of IPs.

2. Methodology

The methodology is presented further as a research model of IPs (Figure 1). Its purpose is to propose a framework with which to analyze and evaluate IPs projects with an emphasis on rational and efficient land use and the added value they create to examine the issues surrounding the development and implementation process, from site planning to its successful operation.

The authors of the study propose to examine IPs on three levels: local, regional and national (Figure 1). At the local site scale, the area plan is analyzed, along with its implementation, social, industrial, and environmental infrastructure development, land plot preparation, number of employees, etc. At the regional and national scale, the location selection of the IP, its accessibility on a national and international scale, as well as the provision of human resources are evaluated and analyzed. It is necessary to assess the added value or losses of IP. Therefore, it is very important to determine the costs of creating new industrial parks, as well as to justify sustainable social, ecological and economic development.

Empirical evidence and statistical, spatial and economic data are used for the research. The gathered data were mainly obtained from the different countries official national and international statistical databases, public institutions reports and their official websites, legislative regulations, etc. The gathered data were observed, analyzed and compared between the countries where possible. In the article, the authors analyze and compare such criteria as the size of industrial parks specific to different countries, their location, and the economic benefits created by industrial parks. Unfortunately, it should be noted that the data, which are collected by different countries, are not identical and lack unification.

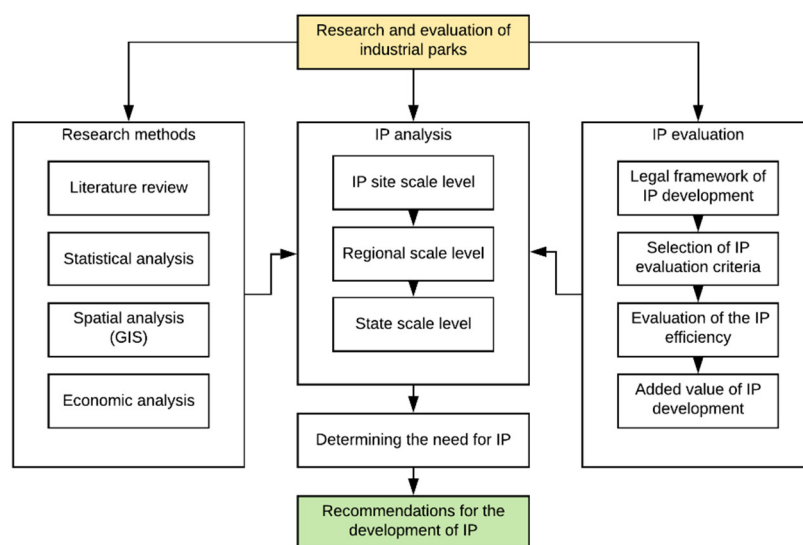


Figure 1. Research model of industrial parks.

Analysis of the data provides insights and recommendations to industrial estate land development and creation of such new territories. Rational planning and development of industrial estate territories attract significant investments, increases land-use efficiency, boosts the economy and creates jobs and high added value.

3. The Legal Framework of Industrial Parks Development

3.1. Industrial Parks in Lithuania

The development and expansion of industrial parks in the Republic of Lithuania is defined by The White Paper on Lithuanian Regional Policy (2017). Industrial parks are used as a tool to help solve the socio-economic problems that have arisen in the regions.

The Law on Investments of the Republic of Lithuania and the Law on the Fundamentals of Free Economic Zones regulate the establishment of IPs and FEZs in Lithuania. Activities which are not prohibited by the Laws of the Republic of Lithuania can be developed in industrial estates. These include trade, production, import and export, business or others. The Law on the Framework of Free Economic Zones establishes the procedure for the establishment of a FEZ. The law shall determine the boundaries of the FEZ, type(s) of zone activity, the term of zone operation, tender conditions and criteria for selection of winners of zone establishment tender, company structure, functions of its management bodies, powers, responsibilities, liquidation of the company formation procedure and others. The zone management company pays a preferential land rent—50% lower—for the leased state land and organizes the economic activity of the FEZ. The company is established for the term of the zone. The currently operating FEZs have been established for 49 years.

In the case of state industrial parks in Lithuania, the areas are planned on greenfield lands, which means that creating these areas and equipping them with the right infrastructure requires significant public investment. Most of the financial resources are dedicated to the development of the territory—for the installation of transport, electricity, water supply and domestic sewage, telecommunications and gas and heat pipeline infrastructure. Sometimes it is necessary to redeem private plots in the area. According to the Republic of Lithuania Law on Investments, the infrastructure shall be created (up to and/or within the boundaries of the land plot allotted to the investor) with the state/municipality resources following the procedure established by the Government of the Republic of Lithuania or an institution authorized by it. At the request of the investor, after obtaining the relevant permits, the infrastructure in the FEZ or the IP can be installed and (or) maintained at the investor's expense by the established procedure.

One of the public value capture tools for such areas are the taxes paid by companies operating in the industrial estate. Companies registered in the FEZ and their employees shall pay the state fee, taxes and contributions by the procedure established by the laws of the Republic of Lithuania. These include:

- Income tax;
- Personal income tax;
- Environmental pollution and natural resources tax;
- State social insurance;
- Compulsory health insurance contributions;
- Contributions to the general affairs of the zone established by the zone management company;
- Value-added tax, excise duty, turnover tax—by the procedure and in the cases established by legal acts regulating these taxes;
- Other taxes and fees, established by law.

Since 2018, by the 1 June 2018 Order No. 4-338 of the Minister of Economy and Innovation of the Republic of Lithuania, the implementation of FEZ business plans and business performance results is monitored annually. According to the order, the authorized institution prepares summary information on the activities of each zone and its management company, zone companies and economic entities operating in the zone in a specific financial year and their change dynamics compared to the previous financial year, then presents conclusions and proposals for improvement.

3.2. Industrial Parks in Portugal

Industrial parks, the most promoted conventional type of business space in Portugal [28], have been contemplated in spatial planning since 1973, defined as a “planned agglomeration of industrial units whose establishment will aim at industrial development objectives” (Decree-Law no. 133/1973). At that time, there were three types of industrial parks: government, municipal and private. It became frequent to resort to land subdivisions to enable the creation of municipal or private industrial clusters. However, such solutions have not always proved to be the most adequate.

Decree-Law no. 232/1992 (which revokes the Decree-Law no. 133/1973) regulates the installation and management of industrial parks. With it, the central government sought to favour the market at the expense of an overly interventionist conception, which foresaw the administrative fixing of both the prices for the assignment of rights on land and buildings in the industrial park and the prices of services to be provided to the industrial units installed there. There was also a need to empower the managing body of the industrial park, enabling it to regulate the settlement of the units, safeguarding urban and environmental interests by establishing, from the outset, in the (administrative) regulations of the industrial parks the definition of the legal regime to which the urban operations were to be subjected. Therefore, the creation of a sort of “industrial condominium” (with an inte-

grated management of the cluster by a single entity and common infrastructures and support services) would enable small and medium companies with mechanisms for concerted action, vital for their survival in a competitive national and global market.

The installation of industrial parks, for which there are development stages, is approved by a joint decree of the competent ministers (administrative authorization). The authorization process is based on Decree-Law no. 232/1992.

Industrial parks, whether public or private, are managed by a management entity, in the form of a commercial company, responsible for ensuring the maintenance of the industrial park and the regular functioning of services and facilities, which is able to:

- Perform all acts and carry out all useful or necessary operations for the installation of the industrial park, namely by requiring expertise, authorizations or approvals required by law;
- Develop actions to promote and publicize the industrial park;
- Ensure, by direct administration or contract, all the works necessary for the installation of the industrial park;
- Assign or dispose, under the conditions set out by law and in the regulation of the industrial park, of installations, buildings or land to industrial establishments;
- Ensure the provision of services to industrial units, in accordance with the conditions established in the regulation of the industrial park.

When the management entity is not the owner of the properties that are part of the industrial park, it must be equipped with the necessary powers to perform all these acts.

The maintenance charge of the urban infrastructures that are not the responsibility of the administrative authorities are supported by the managing entity. The regulation of the industrial park establishes the form of co-payment by industrial establishments in these charges.

Decree-Law no. 555/99 of 16 December, as amended by Law no. 60/2007 of 4 September, foresees that land subdivision projects must provide areas for green spaces and public spaces, road infrastructures and public equipment, whose dimensioning parameters are defined in a municipal spatial plan.

The Business Location Areas (BLAs), spaces dedicated to business installation, had their first legislative treatment in Decree-Law no. 46/2001. In 2003, the Decree-Law no. 70/2003 was published with the purpose of giving BLAs a legal framework more compatible with the objectives of fostering productive investment and revitalizing the business fabric underlying its creation. However, the requirements defined for the constitution of the BLA management company and the rules adopted for the licensing procedure proved to be unattractive to investors. Bureaucracy contributed to the relatively widespread lack of interest, for it deprived the BLAs of a fundamental qualitative differentiating element in relation to industrial parks and other similar areas.

With the publication of the Responsible Industry System (Sistema de Indústria Responsável/SIR), the legal and normative framework would be changed again. Business Location Areas were renamed Responsible Business Zones (Zonas Empresariais Responsáveis/ZER). (The BLA existing at the date of entry into force of DL no. 169/2012 were assimilated, for all legal purposes, as ZER, without the need for any additional formalism.) Industrial zones, industrial parks and business hosting areas can apply for a conversion to ZER. The ZER are spatially delimited areas with industrial, commercial and service vocation, equipped with pre-licensed infrastructures (supply of services: water, sanitation, energy, communications.) ZERs allow a simplified, quick and less costly location of industries, in a “turn-key” logic, thus contributing to a sustainable territorial planning. They are endowed with common services and administered by a management company.

3.3. Industrial Parks in Ukraine

At the present stage, Ukraine faces a number of problems related, in particular, to the slowdown in economic development and insufficient investment activity. In many industrial zones, unattractive enterprises have almost no prospects for restoring production potential. One of the potentially effective mechanisms that can restore the production potential is the creation of IPs.

The main law that determines the legal status and activities of IPs in Ukraine is the Law of Ukraine "On Industrial Parks" (2012, № 5018-VI). The law [29] stipulates that the IP provides for the creation of an area with appropriate infrastructure, within which economic activities in the field of processing industry, as well as scientific and technical activities in the field of information and telecommunications, are performed in accordance with the agreement between involved stakeholders. In 2021, it was suggested to supply the list of economic activities for which IP warehousing activities can be created [30].

Industrial parks can be established and created on private, communal (municipal) and state lands. The right to create industrial parks on state and communal lands belongs to the bodies of state power and local self-government, and on private lands to the owners or tenants of land parcels.

The only information system for industrial accounting is the IP Register. Information on the name of the IP park shall be entered in the Register, along with the registration number and date of inclusion of the IP park in the Register, the initiator of its creation, location, the term for which it was created, goals, objectives of creation and functional purpose, cadastral number of the land parcel on which the IP is created, IP area, management company and participants. Registration is not legally required, but to encourage registration in order to keep records, it is conceptually stated that registered IPs are provided with state support. There is really no tangible state support today. Bills on granting preferential tax conditions (2015, 2016) which proposed to exempt participants from IP from income tax for a period of 5 years were considered twice. However, they were never accepted.

Since the industrial park can be included in the Register and within boundaries of IP there is no integral industrial property complex, according to the Customs Code (2012, № 4495-VI), IPs are exempt from customs duties on imports of equipment and materials that are not produced in Ukraine. In fact, there are no more preferential regimes for the functioning of IPs, and this slows down their development in Ukraine.

The land parcel (territory), the use of which is planned for the creation and operation of the IP, may be located within or outside the settlements and must meet the following requirements:

- Belong to industrial lands;
- Be suitable for industrial use, subject to the conditions and restrictions established by the relevant urban planning documentation;
- The area of the land parcel or the total area of adjacent land plots must be not less than 15 hectares and not more than 700 hectares.

The term of use of the land parcel within the IP must be at least 30 years. Entities in the field of management of IPs may be the initiators of their creation.

The initiators of IP creation can be:

- Public authorities in relation to state-owned land;
- Local governments in relation to communal land;
- Legal or natural persons—owners of private land;
- Legal or natural persons—tenants of land in relation to state, communal and private lands.

The participants are business entities registered on the territory of the administrative-territorial unit of Ukraine, within which the industrial park is located.

4. Research and Evaluation of Industrial Parks

The authors conducted research and evaluation of industrial estates between three countries. The study revealed that different countries follow different policies and collect different data on the development and expansion of IP areas. In Portugal, for example, the current number of IPs or their spatial distribution in the country are not clear. In Ukraine, the benefits of these areas have not been assessed in any way. In Lithuania, more data are available on FEZ territories than on IP. As a result, the authors provide aggregated data by country below.

4.1. Statistical Data Analysis

There are three types of industrial estates in Lithuania: industrial parks, free economic zones and science and technology parks, the distribution of which is presented in the research by Vabuolytė and Burinskienė [31]. In total, there are 21 such state territories of different types and four privately operating IPs. Five state industrial estates belong to the type of IP, seven to the FEZ and the rest to science and technology parks and valleys. Although these numbers show the dominance of science and technology parks, due to the nature and specialization of the activities carried out, most national land resources are occupied by the territories where IPs and FEZs are established. In assessment of the case of Lithuania, only these two types of areas will be analyzed further. More than 1600 ha of the land have been allocated to these territories to establish industrial estates in Lithuania. Nevertheless, according to the amount of land divided, the FEZ type is prioritized. Their share of its land is the majority and currently reaches almost 90% or 1434 ha.

The sizes of different industrial estates in Lithuania vary from 12 to almost 540 ha. Assessing the distribution of IP by area, one third of the territories are occupied by relatively large IP of more than 100 ha of land resources (Figure 2). All these large areas are classified as FEZ-type industrial estates. By being able to offer relatively large plots to investors, these areas have the potential to focus on medium and large businesses, which can also create more jobs and higher added value. Meanwhile, industrial parks, which are under municipality organization and supervision, are typically smaller and range from about 12 to 63 hectares.

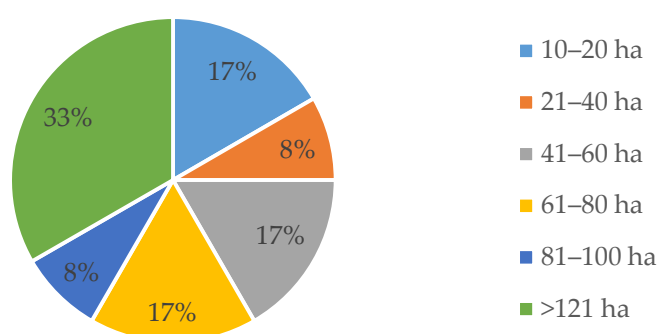


Figure 2. Distribution of Lithuanian IPs by area.

As an example between the sizes of territories and their occupancy, the authors present the data of the Lithuanian FEZ. The case of the Lithuanian FEZ shows that having a large area of an IP does not guarantee the full use of its development potential (Figure 3). Although the largest part of the leased area is in the largest FEZ, comparing the size of the leased area with the total size of it shows that the smaller FEZs performs better. On the other hand, smaller areas are less flexible in terms of plot layout and size, which can result in the loss of potentially large start-up business investors. By the evidence of the already

established businesses in the industrial estates of Lithuania, it could be distinguished that the largest ones were attracted by the largest FEZ territories.

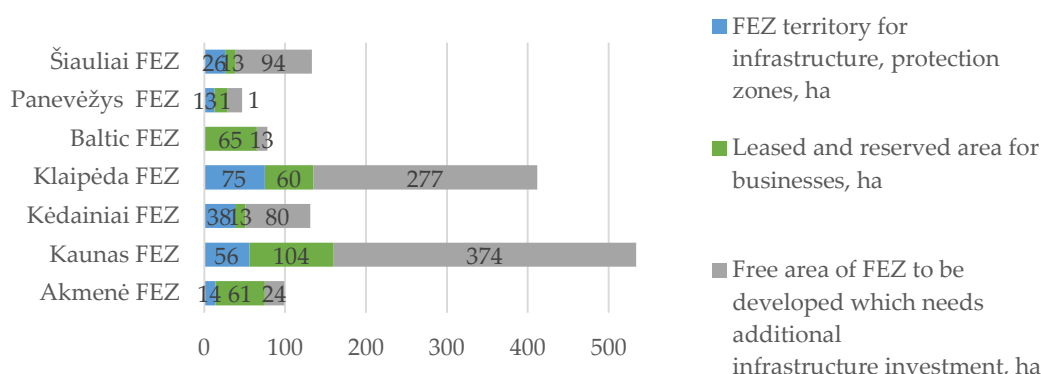


Figure 3. Defined sizes of Lithuanian FEZ areas and its occupancy distribution, ha.

As mentioned before, in Portugal, one can find industrial parks or zones, business location areas, responsible business zones, as well as science and technology parks. Oliveira et al. (2000) identified 786 industrial parks in Portugal in a study from 2000. There is no current information about the total number of industrial parks in Portugal, although it is certain that in the past twenty years, municipal policies have stimulated and promoted industrial parks, although sometimes with low levels of infrastructural, technological and service capacity, and without any management structure [32]. This problem is particularly evident in the northwest region of Portugal, where the spread of small, low-qualified parks has followed the dispersed urban pattern of this Portuguese region. This resulted in industrial parks with low occupancy rates, which are mere repositories of companies, often non-productive [32,33].

In fact, there are few regional studies for the North region [32], for the Ave Valley [34] and for the Quadrilátero [33,35]). In the so-called Quadrilátero Urbano alone, a network composed of the municipalities of Barcelos, Braga, Guimarães and Vila Nova de Famalicão, there are 79 industrial parks [35]. It is also possible to find case study research focused on a specific industrial park or area such as Batalha [36] or Beja [37]. In spite of advertisements of simpler, safer and faster procedures, there are three ZER licensing processes in Portugal in total, and currently, only one is authorized to install industrial, commercial, service and logistics establishments and waste management operators. The largest industrial park is located in Maia, a municipality in the Metropolitan Area of Porto.

The size of industrial parks and their plots in Portugal also varies a great deal. Looking at two industrial parks in Setúbal for reference, this is clear: Sapeç Bay Industrial Park has ~ 161.87 ha divided in three land subdivisions with plots ranging from 0.12 ha to ~ 35.93 ha, while Eira Park (business) has 3.5 ha with 60 fractions in pavilions that range from 0.2 to 2 ha [38].

Through this diversified offer, industrial parks are both attractive to medium and large industries. In turn, science and technology parks are subdivided into quite small units to accommodate small businesses, often serving as incubators. According to data from 2013, Statistics Portugal estimates that the industrial use area identified in the municipal spatial plans (including industrial parks) surpasses 160,396 ha, although there are no figures for the Azores and Madeira and for a couple of municipalities in Mainland Portugal [39].

The first IP in Ukraine appeared in early 2014 and the process of their formation continues to this day. Out of 47 IPs, the vast majority of local governments initiated 33 IPs (70%), 11 private enterprises (23%), 2 individuals (4%) and only 1 IP created on the joint initiative of a local council and a private enterprise.

According to the statistics of the Register of IP, as of 1 March 2021, there are 47 industrial parks in Ukraine, the combined area of which is 2055.41 hectares.

Confirmation of uncertainty in the successful development of IPs can be the fact that with the statutory minimum period of land for IP 30 years, 65% of IPs used this minimum period, 13% purchased land for 40–45 years, and only 23% for 50 years.

The analysis of the areas involved in industrial parks illustrates that with a possible range of areas from 15 to 700 ha, in fact 92% of the area of IP does not exceed 100 ha and almost half occupies an area of 21–40 ha (Figure 4). This may indicate that today, IPs are formed for small and medium-sized businesses. A similar assumption can be made by analyzing the estimated investments that are indicated by the initiators in providing the concept of IP creation.

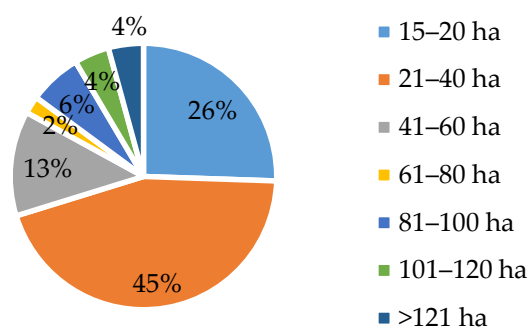


Figure 4. Distribution of Ukrainian IPs by area.

In Ukraine, there are no stimulations for the development of FEZs in frames of IPs creation. At the same time, IPs could be developed on lands of different types of ownership. That is why it is interesting to summarize the distribution of IPs depending on the ownership of land (Figure 5).

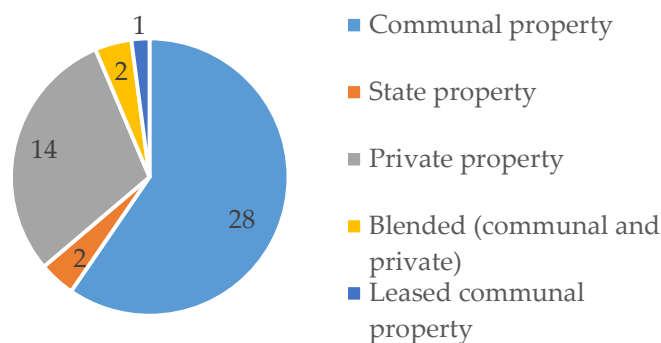


Figure 5. Distribution of established IPs according to the rights on land.

The predominance of communal lands illustrates the interest of local governments in the development of individual entrepreneurs in their territories, which is expected to create new jobs, increase revenue to local budgets and generally improve the welfare of the population of the relevant administrative-territorial entities. One of the special points that influences the potential opportunities for the development of a particular region including through the increase in taxes on the enterprise, which is registered in the relevant area. Even the potential for preferential taxation within the IP through taxes on employees can increase local budget revenues.

4.2. Spatial Data Analysis

All industrial estates are approximately evenly distributed on the scale of the territory of Lithuania (Figure 6). In most regions (80%), there is at least one or more IPs. Science

and technology parks are concentrated in the major regional centers, where science hubs—universities or their branches—are located. Most of them (four) are in the Vilnius region. Meanwhile, the establishment of FEZs and IPs on state-owned land is distributed in the rest of the country. The reason for this is partly due to the strategies applied in Lithuania. The reduction in social exclusion between the capital and the rest of the regions is part of the IP and FEZ development policy. In Lithuania, social exclusion is part of the reason for the decrease in the population, which builds barriers to economic growth [40]. On average, more than 1% of the population is declining each year nationwide. In addition, by the Eurostat data for 2019, 26.3% of the Lithuanian population lives at risk of social exclusion and poverty.

By analyzing the spatial distribution of IPs on the map, it can be seen that most are located in strategically convenient locations in terms of transport and communication: close to the main roads, rail networks, airports and seaports connecting the country.

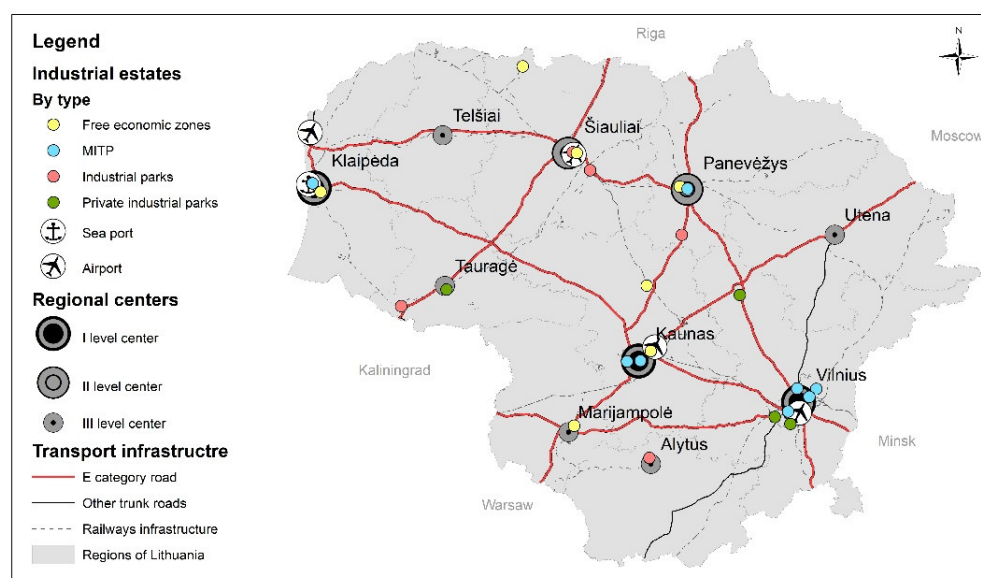


Figure 6. Industrial estates distribution in Lithuania. (Source: Prepared by the authors.)

It is important to remark that not all IPs established in the country work successfully. According to the available data, investors were not attracted by at least two industrial parks located away from larger cities, where the initial necessary infrastructure was developed. It can be assumed that these industrial areas did not succeed because they were both developed near small towns (both with approximately 1500 inhabitants). They are also more than 25 km away from the centers of the regions in which they are established. As a result, these territories are unable to provide the potential investor with the necessary labor pool, and this is considered as one of the most important indicators for the successful development of IPs.

Industrialization in Portugal was late and slow and in the 1970s, when the first industrial parks were devised, despite unskilled labor, low salaries helped industrial exports and attracted foreign investment (clothing and metallurgical industry). In the last decades of the twentieth century, as a result of globalization, many industrial units closed (e.g., in Porto) and moved first to China and later to Eastern Europe. Today, industries are mainly located on the coast and especially in the North region of Portugal. Nevertheless, industrial parks are splintered all over the Portuguese territory. According to Ramos (2000), the region of Lisbon and the Tagus Valley is the one with the highest density of industrial areas (1.42% of the land), almost three times higher than the average on Mainland Portugal. At the opposite end, there is the Alentejo (0.20% of the territory) and the Algarve (0.24%). However, the reality by municipality assumes punctually very different

values that may reach 17% of the territory (e.g., São João da Madeira). Ninety-three percent of the municipalities have an area intended for industrial use (existing and expansion) equal to or less than 6% of their territory, while only 1% of the municipalities provide more than 12% for this purpose.

The land used for development of industrial parks in Portugal is usually greenfield (with little agricultural and ecological potential) whose classification in the zoning map of the municipal spatial plan is industrial or similar. Most of the time, the land for such projects is already defined in the municipal master plan according to the plot or plots' geomorphological, accessibility, mobility and logistics characteristics.

The situation with the dispersion of the created industrial parks on the territory of Ukraine is paradoxical and illogical. In the most industrialized regions, with a large number of industrial enterprises in various industries, industrial parks are absent or isolated. The largest number of industrial parks have been created in the western (14) and central (7) parts of Ukraine.

In the eastern part of Ukraine, where the most developed industrial regions are concentrated, the Kharkiv and Dnipropetrovsk regions are home to 0 and 3 IPs, respectively (Figure 7). This can be explained by the fact that in industrialized regions, there are still industrial enterprises that provide working cities and help replenish budgets, while in western Ukraine, developed small and medium-sized businesses and the dominant formation of the tax system is based on this layer of taxpayers. It should be noted that low development of IPs in the eastern part of Ukraine could also be explained with a fact of annexation of the most industrially developed regions—Donetsk and Luhansk—since 2014. Therefore, these regions could not be involved in IP development.

If we consider such types of IPs as greenfield (these are new parks built from scratch) and brownfield (originated on the site of former industrial zones), then in Ukraine, most IPs can be attributed to brownfield.

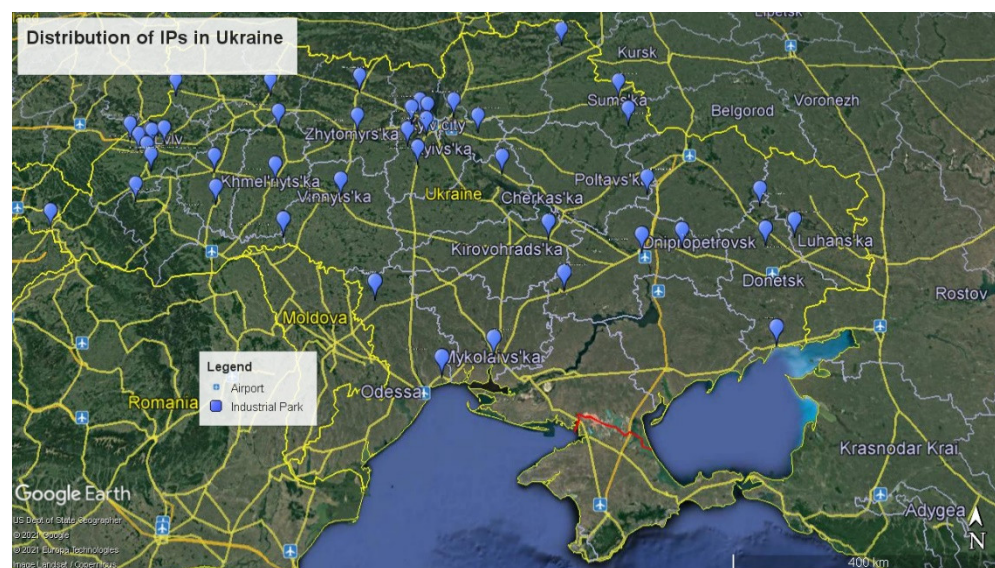


Figure 7. Distribution of established IPs in Ukraine. (Source: Prepared by the authors.)

4.3. Economic Data Analysis

According to the data of the public institution “Invest Lithuania”, until 2017, public expenditures for the development of FEZ infrastructure and land acquisition for the national needs amounted to EUR 69 million, of which 36% are state and 64% are EU funds.

When assessing costs, it is also necessary to evaluate the long-term benefits of such developed areas. According to the methodology of the Central Project Management Agency, the benefits of public infrastructure are measured by the decisive impact of such infrastructure on the added value created in the country. However, the authors point out

that not all industrial estates established in Lithuania are operating successfully, i.e., they do not attract investors, and so public investment in infrastructure can be waste.

According to the 2019 monitoring report of FEZs, the overall number of business entities engaged in economic and commercial activities located in these areas is growing in Lithuania. As a result, the number of employees is also increasing. At the end of 2019, the number of employees in the FEZ increased by 22% compared to the previous year and reached more than 7200. Companies operating and establishing in the FEZ territories invested EUR 344 million per year, which is more than 50% ahead of the 2018 investment [41].

According to the report prepared by Invest Lithuania on FEZs in Lithuania [42], the added value created by the implemented investment projects keeps increasing through the years (Figure 8). Calculations based on the data provided in the financial statements of FEZ companies and Interdepartmental Data Repositories shows that since 2002, FEZ companies have generated EUR 1.11 billion in value-added and since 2005 have earned a profit of EUR 589 million. It is necessary to consider that some companies in Lithuania would have operated even without the benefits applied in the FEZ. Thus, it is estimated that the impact of FEZs on these results was EUR 740 million and EUR 460 million, respectively [42]. During 2019, EUR 206 million in value-added was created in the zones. It accounted for 2.6% of the total result of the Lithuanian manufacturing sector.



Figure 8. Dynamics and forecast (f) of benefits generated by FEZ companies, assessing only the part that was decisively influenced by FEZ, EUR million. (Data: LEZ in Lithuania, 2019.).

In assessing the impact of FEZ on public finances, government revenue, public expenditure and the total net impact were taken into account. To summarize, the value of government revenue received up to 2017 has been found to exceed the public expenditure incurred. However, their ratio increases even more over the whole analysis period, as a large part of the costs for the development of the FEZ areas in question have already been incurred, but most of them have a positive impact in the future. The total net value of the positive effect over the whole analysis period is 6.6 times the value of the related costs [42].

Although for Portugal, there is no information on how much has been spent on the development of industrial parks, how much investment these IPs have attracted and how many jobs have been created as a result, there are general data about industry. The wealth created in companies in the manufacturing industry amounted to EUR 22,519 million in 2019 and EUR 17,676.5 million in 1996, while in companies in the extractive industry reaped EUR 469.5 million and 360.4 million in the same years (Figures 9 and 10). Population employed in the secondary sector has decreased since 1974 (1 million 246 thousand) after peaking in 2000 with 1 million 741 thousand individuals, to 1 million 192 thousand in 2020 [43]. The Portuguese State expenditure on industry has wavered significantly (Figure 11).

In this regard, in early 2017, the Portuguese Government also presented the Program for the Enhancement of Business Areas (*Programa de Valorização das Áreas Empresariais/PVAE*) (more about the PVAE: <https://www.youtube.com/watch?v=OGRuyreqaZg> (accessed on 20 April 2021)) which aimed to strengthen the competitiveness of companies, boost job creation and increase exports, representing a global investment of EUR 180 million. The Program is developed in three convergence regions (North, Center and Alentejo). EUR 78 million are foreseen for the creation and expansion of business areas, through calls for tenders for Portugal 2020 operational programs, to which municipalities can apply. Another EUR 102 million are set aside to invest in 12 road connections designed to improve accessibility between consolidated business areas and the existing road network.

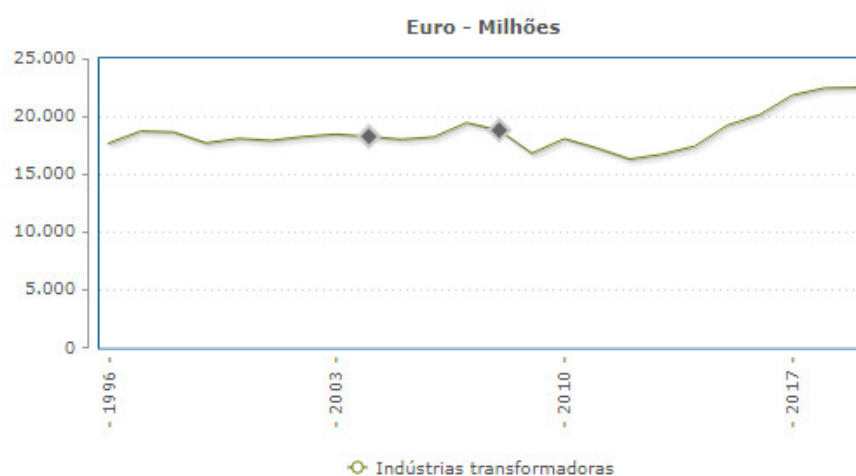


Figure 9. Gross added value of enterprises: total and by sector of economic activity: manufacturing industry (millions of euros). (Source: INE/PORDATA 2021.)



Figure 10. Gross added value of enterprises: total and by sector of economic activity: extractive industry (millions of euros). (Source: INE/PORDATA 2021.)

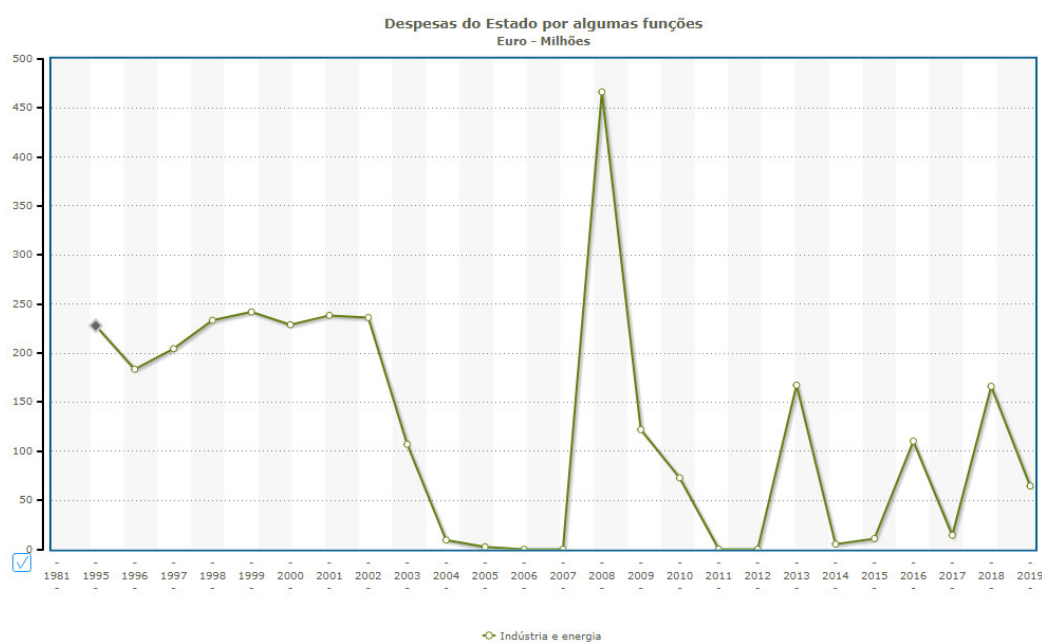


Figure 11. State expenditure on industry and energy (millions of euros). (Source: INE/PORDATA 2021.).

The assumption that in Ukraine, research and development (R&D) is focused mainly on small and medium-sized businesses is confirmed by the indicators of indicative investments that are planned to be spent per employee. Before the process of IP development starts, the initiator should present an approximate suggested amount of investments corresponding to number of employees. According to IP statistics, 74% of declared domestic investments do not exceed UAH 100,000 (EUR 3500) per planned workplace, and 88% do not exceed UAH 10,000 (EUR 350) per 1 ha of IP land development. To provide effective reforms regarding development of IPs, declared investments are not enough, and additional ones are vital.

World practice shows [44–49] that one of the most important and effective tools of state support are temporary incentive taxation of industrial parks. Tax investment incentives used by different countries for the development of industrial parks include:

- Preferential income tax rates;
- Exemption from real estate tax;
- Exemption from land tax;
- Exemption from land lease or real estate lease tax;
- Exemption from import duties on equipment and machinery;
- Preferential utility rates.

For each country, the analysis of tax incentives is conducted (Table 1).

Table 1. Comparison of tax incentives in three countries.

	Lithuania	Portugal	Ukraine
Preferential income tax rates	Yes (only in FEZ *)	No	No
Exemption from real estate tax	Yes	Yes	No
Exemption from land tax	Yes	Yes	No
Exemption from land lease or property lease tax	Yes (reduction)	Yes (reduction)	No
Exemption from import duties on equipment and machinery	No	No	No **
Preferential utility rates	No	Yes	No
Exemption/reduction from building, installation and inspection fees	No	Yes	No

* Only in Free Economic Zones (FEZ) (compared to other industrial estates) in Lithuania there is a preferential income tax rates; ** The proposals have been made according to the bill, but are still under negotiations.

In Lithuania, incentives of taxes in industrial estates depend on the type of area. The clearest benefits defined by the law are for FEZs. These areas have the highest benefits compared to other types of industrial estates. For example, corporate income is set to 0% tax for 10 years, followed by 7.5% for 6 years after. These special conditions are aimed at new investors, and the minimum qualifying investments for such benefits are EUR 1 million for manufacturing operations and EUR 100,000 for business service companies with 20 employees. Meanwhile, in IPs, which are usually under municipalities' liability, the qualified investors are often exempt from real estate and land lease taxes. Municipal councils have the right to reduce or waive the tax at the expense of their budget, and the tax is credited to the budget of the municipality where the real estate/land/leased state land is located.

In Portugal, industrial parks offer benefits for new business investors in these areas, but these vary and are mostly defined locally by the municipal government in the industrial park regulations. The land lease or price value per square meter can also vary according to the number of jobs created. To give an example, the advantages of installing an industrial establishment in a ZER include the following: pre-licensed infrastructures (supply of services: water, sanitation, energy, communications, etc.), reduction in fees both for the installation of the industrial establishment and for inspections, exemption from the Municipal Transfer Tax and exemption for 10 years from the Municipal Property Tax (IMI).

In Ukraine, the IP development process is not so rapidly growing. Thus, Ukraine has many advantages such as profitable geographic location, nine transporting corridors and well-developed railway infrastructure, but the investment level (especially foreign investment) is still low. The reason of this situation is the absence of incentive taxation.

5. Results of the Analysis

In this study, the authors sought to investigate IPs in different countries and offer recommendations for improving the efficiency of their activities in less developed countries. The analysis revealed that industrial parks are a common tool for urban and regional planning in all analyzed countries. In Portugal and Lithuania, these areas are mostly established in greenfield land, while in Ukraine, brownfield dominates. The use of brownfield land for the establishment of IPs is to be encouraged, but it also has drawbacks, as such territories are usually very limited in area, which makes their further spatial development difficult or impossible. This is confirmed by the example of Ukraine, where the average size of the territory of industrial parks reaches ~ 43 ha of land, while in Lithuania, this size reaches three times more, being on average ~ 134 ha of land. The size of the territory can determine what size businesses will be targeted and what investors such an area will be able to attract in the long term. In general, the share of land allocated to industrial

parks in Lithuania is more than eight times higher than in Ukraine. Meanwhile, in Portugal, although there are no precise data on all the industrial parks in the country, there are variations in their size in different regions (e.g., from 3.5 to 162 ha in the Setúbal region), which allows for flexibility in attracting investors and businesses of different sizes. The general comparison of industrial estates in the three countries is presented in the Table 2 below.

Table 2. Comparison of industrial estates in three countries.

	Lithuania	Portugal	Ukraine
IP types	Industrial parks, free economic zones (prioritized for production and manufacturing), science and technology parks (prioritized for R&D)	Industrial parks, Business location areas, Science and technology parks (prioritized for R&D)	Industrial parks (prioritized for processing industry, as well as R&D activities, activities in the field of information and telecommunications according to the agreement)
Prevailing type of land used for the establishment of IPs	Greenfield	Greenfield	Brownfield
IP land share in the total country land context	~0.027%	N/A	~0.0033%
The average/median of the size of IPs areas	134 ha/70.5 ha	N/A	42.97 ha/30.71 ha
Prevailing IP land ownership	Leased state land	Leased state land	Leased of state and land communal land
Total number of employees	7281 (in FEZ)	N/A	86395 (current and forecast)

FEZ—free economic zones, IP—industrial park, N/A—not available data.

The development of industrial park areas requires significant investment and allocation of land resources. The study showed that the establishment of seven FEZ territories in Lithuania required EUR 69 million of public investment. However, there is no doubt that the more investors are attracted to such areas, the more added value these areas create. Evidence from the example of the Lithuanian FEZ shows that the added value created tends to grow over the years. In Portugal, the wealth created in companies in the manufacturing industry, in general, keeps growing and amounted to EUR 22,519 million in 2019. Meanwhile, the added value created in Ukraine for similar projects is underestimated and even doubtful due to the relatively low interest of investors.

6. Discussions and Conclusions

The philosophy of industrial parks includes many different functions such as manufacturing, service, recreation, training, science and research. Industrial parks can provide regular and unusual services. Experience shows that efficiently functioning industrial parks have many advantages, such as increased land use efficiency, job creation opportunities and reduction in social exclusion and poverty.

Industrial parks are being developed all over Europe and throughout the world, but each country is creating its own legal framework and appropriate incentives for companies operating in these areas.

To identify the value such areas create, the main indicator should be the efficiency of the production process and what part of the production output is generated by enterprises located in industrial parks. However, not all countries gather such data and provide this information, which would be advisable.

Unified statistical information on IPs is not available in all European countries and therefore it is difficult to access in some places. In this regard, according to our analysis of Lithuania, Portugal and Ukraine, it was found that the statistics of the Lithuanian industrial estates were the most processed and focused on FEZ areas, while in Portugal, despite a high estimated number of IPs, it is difficult to find out even how many IPs in the country there are, not to mention their production capacity, size and infrastructure installed. In Ukraine, there is a Register of IPs. It is presented on official website of the responsible body. In the Register, there is information about approximate area of IPs, the number of employees and investment rates. It would be necessary to describe not only an IP's approximate area and name, but also its direct location.

It is considered that investment in infrastructure development and land preparation is not the guarantee of the efficient operation of the IP. One way to attract investment is through special tax incentives for newly established investors within such territories. These are applied by both Lithuania and Portugal. So far, in Ukraine, this issue is only at the level of political debate. The main purpose of tax incentives is to attract both foreign direct investment and domestic investment. The introduction of tax incentives in combination with other measures, such as the even spatial distribution of IPs in the country, attributing their specific specializations to regional characteristics, could encourage the progress of industrial parks in the country and increase the added value they create.

It should be noted that Portugal has a particularly high diversity of IP area. Meanwhile, the size of Ukrainian industrial parks is designed for more small and medium business development and is generally smaller in size. Their average size is 43 ha (median of areas ~ 31 ha). Meanwhile, the average size of Lithuanian industrial parks varies at about 134 ha (median of areas ~ 70 ha). When creating industrial parks, Lithuania relies on the White Paper of Lithuanian Regions prepared by the Ministry of the Interior in 2019. It provides for specializations in individual regions of the country according to the vocational training of employees living in the respective region of the country.

Lithuania is characterized by the most spatially even distribution of IPs. Meanwhile, in Ukraine, IPs are concentrated in the western part of the country, and due to military action in the territory, there are fewer industrial parks in the east. The authors regret that they have not been able to provide such a map for Portugal due to difficulties in data availability and data gathering.

Future research and sustainable development of industrial parks would benefit from a unified statistical and spatial database that would allow one to assess and compare the performance of industrial parks and the return on these investments, as well as to capture value created by industrial parks and draw lessons from these development processes. Additionally, in terms of sustainable land use, the possibility of more intensive re-use of brownfield areas must be considered when developing IPs in different countries. Brownfields' spatial distribution, size and suitability for industrial park projects could be an interest for future research.

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