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## Article

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# Study of the competitiveness of industrial parks using conjoint analysis

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## ABSTRACT

In an environment of high competition, globalization, war and certain restrictions of the World Trade Organization, Ukraine is forced to look for new ways to revive its economy. Today, one of the tools for the future development of Ukraine's economy is the creation, development and operation of industrial parks. The article analyzes the market of industrial parks in Ukraine: current state and development prospects. Using the PESTEL analysis, the author studies the factors influencing the strength of competition in this area. The analysis of scientific sources and the results of the authors' research suggests that the level of competitiveness of industrial parks in Ukraine depends on the rental price of office and production space, the cost of labor in the region, the level of infrastructure development, the developer's image and the distance to the border with the EU countries. Conjoint analysis is a popular and reliable statistical method for studying the preferences of future consumers of a product or service. With this tool's help, the article determines the importance of factors that affect the competitiveness of industrial parks in Ukraine. It should be noted that this method also makes it possible to assess the level of competitiveness at given values of each factor, which will allow concentrating the efforts and resources of the enterprise (industrial park) on increasing the level of the most important ones.

## Introduction

Industrial parks (IP) are special industrial territories with certain infrastructure and a set of necessary services, with simplified regulatory procedures and a package of investment incentives for manufacturing enterprises (Halasiuk, 2018). Industrial parks are used all over the world as a tool for stimulating industrial development. It is also an effective way to increase the country's competitiveness and business by creating quality conditions for companies seeking to locate their production facilities there (Halasiuk, 2018; Soshnykov and Yerushova, 2021). The effectiveness of IP has been proven in such countries of the European Union as Poland, Hungary, Germany, etc. (Chirychenko and Kotko, 2014; Waligóra, 2015; Kalat, 2020). The positive impact on the development of the economy through industrial parks can be observed in the example of countries such as Turkey and China (Boyko, 2019; Ekonomichna Pravda, 2021), where an effective competitive environment for industrial parks has been created, investments have been attracted, and jobs have been created.

In scientific research, considerable attention is paid to developing industrial parks from the point of view of the economic development of

Ukraine and the attraction of investments (Ekonomichna Pravda, 2021; Lekar, 2017). Some authors conduct their research in the direction of regional development at the expense (Shevchuk, 2021; Shevchuk, 2021; Stimulating the development of industrial parks: European experience and opportunities for Ukraine, 2020; Kushnir and Karmazina, 2022) of the modernization of existing areas and their restructuring to increase their profitability and competitiveness (Table 1).

In these countries, the saturation of industrial parks is quite high, which causes competition between functioning industrial parks and forces park owners to look for solutions for the competition for residents. Issues of economic development are also relevant for Ukraine, which, according to the authors, has two ways of development through industrial parks:

1. Attracting foreign investments to create industrial parks.
2. Developing enterprises based on industrial parks and forming such conditions on these parks' territory would promote qualitative competition between parks.

As a result of the military aggression of the Russian Federation

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**Table 1**

PESTEL analysis of the operating environment of industrial parks in Ukraine.

POLITICAL (P)	ECONOMICAL (E)
(+) The course of the ruling party of Ukraine is aimed at supporting industrial parks; (+) The course of Ukraine's state policy toward European integration; (+) European orientations of Ukraine, state policy, and support of the EU and the USA will contribute to the development of the project  (-) The lack of political stability and the lack of a consequent succession of authorities may, in the future, have an impact on the project; (-) The issue of tax preferences for subjects of Industrial Parks, which is not regulated by law, may complicate the processes related to the implementation of the project.(-) Permitting procedures in construction and state supervision (control) in the field of economic activity is quite complex and bureaucratized;(-) Escalation and a possible long-term war with Russia.	(+) Strategic planning of promising types of activities on the territory of the Industrial Park will allow to obtain preferences and attract investors, which will be defined in the legislation; (+) Due to the lack of implementation of similar projects and, as a result, high rental rates, the quick payback possibility for such a project; (+) Restoration of the state's economy due to the relocation of enterprises from territories close to or located in the war zone to safe regions of Western Ukraine; (+) Creation and development of industry clusters in the region and the state; (+) Developed business environment (Fedushko, Ustyianovych, Syrov, & Peracek, 2020), high level of business activity; (-) Unfavorable business conditions and deterioration of the investment climate in the state; (-) The projected increase in the inflation rate will have a negative impact on business in Ukraine, but the existing support programs for IP will reduce the impact on the project; (-) Unsettled issue of connecting industrial parks to communication networks.
SOCIAL (S)	TECHNOLOGICAL (T)
(+) High level of education of the population; developed international scientific cooperation; (+) Improvement of social infrastructure, provision of maximum accessibility of basic social services to broad sections of the population; (+) The homogeneous ethnic composition of the population with a high sense of patriotism, and religiosity, oriented towards Ukrainian traditions;  (-) Labor and educational migration of the population from the country to the European Union;(-) "Aging" of the population;(-) Low purchasing power needs to be raised through job creation and competitive wages.	(+) Development of the research base and technology transfer infrastructure at academic institutions and universities; (+) Increasing the volume of innovative products of industrial enterprises of the region; (+) Increasing the share of high-tech export products; (+) Increasing the number of young people engaged in scientific, scientific, and technical activities; (+) Ensuring the commercialization of innovations (Marhraoui and Manouar, 2018; Obeng and Mkhize, 2017); financial and grant support of youth projects at the stage of manufacturing prototypes. (-) Outdated and partially worn out engineering infrastructure;(-) Low level of use of modern technologies by existing enterprises;(-) A decrease in the level of funding for research and development works leads to the outflow of valuable qualified scientific and technical personnel.
LEGISLATIVE (L)	ECOLOGICAL(E)
(+) Current Ukrainian legislation on the creation and operation of industrial parks; (+) Changes to tax and customs legislation; (+) Amendments have been made to the legislation of Ukraine on State trust funds. (-) The issue of tax preferences for subjects of Industrial Parks is not regulated by law;(-) Permitting procedures in construction and state supervision (control) in economic activity are quite complex and bureaucratized.	(+) Improving the ecological situation, forming a consumption culture, saving energy, and handling household waste.  (-) Inefficient operation of wastewater treatment facilities, pollution of rivers with solid/liquid domestic and industrial waste;(-) Unsettled issue of connection of industrial parks to centralized water supply and drainage, gas supply, and electricity networks.

against Ukraine in 2022, many production facilities were destroyed, and enterprises' access to resources and raw materials sales markets was complicated. This primarily concerns enterprises located in the territories where active hostilities are taking place. Despite such a difficult situation, the beginning of the war gave a new impetus to the industrial park development of Ukraine. There has been a relocation of enterprises from the eastern and central regions to the west of Ukraine, and only 10% of the existing industrial sites currently meet the requirements of IP participants (Kirilko, 2022). To meet these needs of enterprises, it is necessary to develop industrial parks and the services they provide. This will allow the quick launching of existing industrial facilities, stimulating the growth of new directions, attracting investors, developing human capital, and creating new jobs (Program, 2022). Also, future European integration of Ukraine will contribute to this and the state's and partner countries' assistance (Boiko, Vasiutkina, & Kondratiuk, 2020).

### Related work

Competitiveness (lat. rivalry, struggle to achieve the best results) is one of the main concepts actively used as a subject of economic analysis. The following classical concepts are used in the study of this multifaceted concept: comparative costs (D. Ricardo) (Ricardo, 2005), comparative advantages (E. Hecksher, B. Olin) (Svatyuk & Khabko, 2014), comparison of competitive advantages, management factors and productivity of resources (M. Porter), the competitive status of the firm (I. Ansoff).

The existence of different approaches to determining competitiveness is due to the fact that the very concept and indicators of its level, assessment methods, and ways of increasing it are studied by different economic sciences, each of which offers its own visions. In a general sense, competitiveness is the subject's ability to face competitors and defeat them in a specific environment and time.

In order to form a model of the competitiveness of IP, the authors consider industrial parks as an object created (by a private, state-owned company) on the territory of Ukraine for conducting business by companies that locate their production there. Participants of the industrial Park use the infrastructure and buildings of the park and pay for it.

Enterprise competitiveness should be understood as its ability to carry out effective economic activities and ensure the achievement of a profitable result, taking into account the conditions of the competitive market (Kadyrus, 2014; Verkhovod, 2019; Vinichenko and Polehenka, 2019).

IP is considered in the research as an enterprise that provides certain services for residents. According to the authors, competitiveness in the market of industrial parks in Ukraine will depend on certain factors. These factors are formed by studying the operating environment of industrial parks using PESTLE analysis.

### Materials and methods

Any socio-economic phenomenon is characterized by a list of signs that can acquire both quantitative and qualitative values. The study of

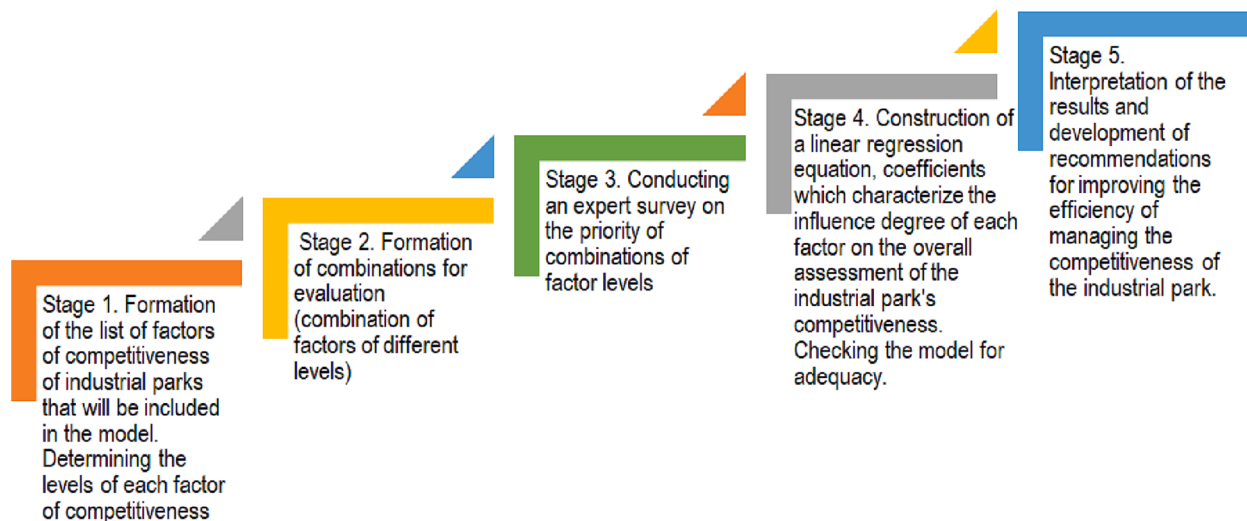


Fig. 1. The sequence of application of combined analysis for assessing the competitiveness of the industrial park.

such phenomena is reduced to solving the problems of multidimensional analysis. At the same time, an effective method of analysis - combined analysis, which can be used for market segmentation and optimization of product characteristics - becomes important. Scientific research in the field of mathematical psychology by American psychologist Duncan Luce and mathematician Joan Tukey (Luce & Tukey, 1964) became the fundamental basis for the emergence of conjunctive analysis. Later, the applied aspect of conjunctive analysis in marketing research was proved by Green Paul and Vitala Rao (Green & Vithala, 1971). Today, conjunctive analysis, as a method, is widely used in economics, management, marketing, and psychology for the joint comparison of characteristics or factors that have a positive or negative impact on the decision to choose one or another alternative. In particular, there is a need to study the specified method in assessing the competitiveness of industrial parks.

The authors of the article propose the use of combined analysis to determine the importance of influencing factors on decision-making by potential participants of the industrial park and to establish priority directions for the formation of competitive advantages.

The process of applying the combined analysis to assess the competitiveness of the industrial park is presented in Fig. 1.

### Research environment

Post-war reconstruction, finding and attracting resources to restore the economy, infrastructure, and industry will become urgent. The primary sources of such resources will obviously be mostly long-term loans, to a lesser extent grants, from Western countries, as well as financial assistance through the funds of international organizations, in particular the UN, but for targeted programs related to humanitarian aid, demining, and reconstruction of settlements.

The question of the development of industrial parks is more pressing than ever.

Industrial parks, in accordance with Ukrainian legislation, are areas equipped with the appropriate infrastructure, within which the participants of the industrial park can carry out economic activities in the field of processing industry, processing of industrial and/or household waste (except waste disposal), and as well as scientific and technical activities, activities in the field of information and electronic communications, with tax and customs incentives and a simplified regulatory regime for businesses located there (Law of Ukraine, 2013). Similar industrial "islands" as economic development catalysts exist in many countries. However, their basis is mostly not tax benefits but access to

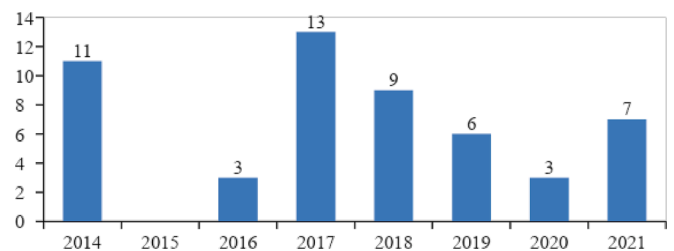


Fig. 2. The number of industrial parks entered into the Register of IP in Ukraine, April 1, 2022.

infrastructure (railway track, energy, water, and gas supply), as well as logistics (ports, roads) and labor resources.

Today, there are about 15,000 such parks around the world. China, the USA, Turkey, the Czech Republic, and South Korea can be singled out from the countries where such territory for business introduction is mainly concentrated. Also, a large number of technology parks (Aliyev and Shahverdiyeva, 2017; Aliyev, 2019; Aliyev and Shahverdiyeva, 2018) are located in neighboring Poland.

The process of creating industrial parks in Ukraine is at an initial stage, despite the fact that the history of their formation began in the 90 s of the last century. Then, taking into account the successful world experience, many regions of Ukraine initiated the creation of such parks on their territories and prescribed the relevance of the creation of industrial parks in the strategies of socio-economic development of the regions.

At the legislative level, this process was established only in 2012, when the Law of Ukraine, "On Industrial Parks" was adopted and the concept of creating industrial parks was developed.

In Ukraine, as of today, 52 industrial parks have been entered into the register, of which 9 are actually operating (Fig. 2).

Industrial parks included in the Register do not demonstrate significant development dynamics. In some industrial parks in Ukraine, state-owned activities are already being carried out. However, most of them are still at the initial stage of development, in particular, as a result of a number of systemic deficiencies in the process of preparation and implementation of initiatives for the creation of industrial parks, imperfect legislative regulation of certain aspects of the establishment and operation of industrial parks, the need for significant investments in the creation of infrastructure, lack of experience of the initiators of the creation of industrial parks and management companies in the

**Table 2**  
Factors affecting the competitiveness of the industrial park.

Factor	Factor assessment level	Conventional designation
1. Rental price	Low	x <sub>1</sub>
	Average	–
2. Image of the developer	100	x <sub>2</sub>
	75	x <sub>3</sub>
	50	–
3. Distance to the border with EU countries	Up to 200 km	x <sub>4</sub>
	More than 200 km	–
4. Labor cost in region	Low	x <sub>5</sub>
	Average	–
5. The level of development of infrastructure of the industrial park	High	x <sub>6</sub>
	Average	–

implementation such projects, which leads to a significant delay in their implementation.

These circumstances also harm the investment climate, as there is no ability to provide potential participants of industrial parks with a quality proposal for locating their production facilities in such parks.

For the successful functioning of industrial parks in Ukraine, legislative support of the state is also necessary, which will reveal the potential of industrial parks and improve the conditions of investment activities in Ukraine, which will contribute to the increase of investment inflows into the economy of Ukraine. There are already some changes in this regard, and market participants believed that government support is weak; many site owners postponed their further development in anticipation of large state benefits.

In order to ensure a public discussion, in February 2022, the Ministry of Economy of Ukraine published a draft order of the Cabinet of Ministers of Ukraine “On approval of the Strategy for the Development of Industrial Parks for the period until 2030” ([On approval of the Strategy for the Development of Industrial Parks for the period until 2030](#)). The strategy was developed to determine the directions and ways of ensuring the development of industrial parks in Ukraine, thereby contributing to the formation of an attractive investment environment, sustainable development of the national economy, and decarbonization.

Today in Ukraine, the initiators of creating Industrial Parks are state authorities, local governments, legal entities, or individuals. Among the parks included in the Register, 58% are communally owned, and 38% are privately owned. Such an ownership structure, in most cases, does not determine the commercial nature of the creation of Industrial Parks.

In total, land plots with a total area of 2,236 ha are planned for development by industrial parks. The largest area belongs to the Kyiv and Dnipropetrovsk regions – 22.5% and 14.6%, respectively. The Lviv region holds the third position in terms of area – 10.7%. According to Colliers Ukraine ([Colliers Ukraine](#)); Lviv is the second region after Kyiv where the warehouse and industrial real estate market is actively developing.

### Results of environment analysis

An analysis of the external environment is important for studying the competitiveness of industrial parks since the state and direction of macroeconomic development directly impact the project's implementation and further development. The analysis was carried out using the PESTEL analysis, and the factors of the macroeconomic environment that will have a positive or negative impact on the development and functioning of the park are presented in the matrix.

As we can see, from all of the components of the macro-environment of the industrial park, legal factors from the side of the state are the most positive, which also make the project attractive for investments and business interest in it. The development of technologies and the high scientific potential of the region will have a favorable effect on the project. The legislative framework and a number of laws that have been adopted will also contribute to increasing the number of future

Participants in the park, some of which will be represented by foreign companies. Simultaneously, environmental and social factors increase the level of competitiveness of industrial parks.

### Results

Analysis of the industrial park's competitive environment involves studying factors that affect the strength of competition.

In order to establish the priority directions for the development of competitiveness and determine the importance of influencing factors on decision-making ([Tarhan & Aydın, 2019](#)) by potential participants of the industrial park, it is suggested to use the combined analysis method. This method allows quantitative calculations to be combined with qualitative (expert) assessments of combinations of factors of a certain level.

It should be noted that the use of this method makes it possible not only to establish the relative importance of each factor influencing the competitiveness of the industrial park but also to assess the level of development of the enterprise at the given values of each factor, which will allow concentrating efforts and resources on increasing the level of the most important of them.

The competitiveness of the industrial park is influenced by factors, each of which can acquire values of a certain level (see [Table 2](#)). According to the authors, the main factors that affect the competitiveness of the industrial park are the price of renting production, warehouse, and office premises, the image and reputation of the developer (management company), the distance to the border with the countries of the European Union, the cost and availability of labor in the region where the industrial park is located, as well as the level of infrastructure of the industrial park.

The combination of factors of different levels forms a combination, which is expertly evaluated as the overall level of influence of factors on the competitiveness of the industrial park.

In the table above, the levels of factors “Rental price,” “Distance to the border with EU countries,” “Cost of labor in the region,” and “Level of infrastructure development” take qualitative values, and the factor “Image of the developer” - quantitative values out of 100 - point scale. In contrast, the levels of the factors are significantly differentiated to ensure unequivocal perception and evaluation by experts.

To carry out the analysis, a group of experts was interviewed, which consisted of 6 experienced owners of production enterprises - potential participants of the industrial park. The experts for the assessment included the owner of the industrial park in Lviv region, the director of the technology park, owners of manufacturing enterprises in Lviv region, and the project manager of an international manufacturing company. Experts were asked to evaluate the characteristics of not individual signs but their given combinations, ranking them in the direction of decreasing priority.

The ratings of experts are given in the [Table 3](#).

Let us build a linear regression equation, the coefficients of which characterize the degree of influence of each factor on the overall assessment of the competitiveness of the industrial park. Note that one of

**Table 3**

Evaluation of combinations of the full set of factors of different levels.

Combinations	Factors					Average evaluations of combinations by experts	Average transformed ranks
	1. Rental price	2. Image of the developer	3. Distance to the border with EU countries	4. Labor cost	5. Level of infrastructure development		
1	Low	75	more than 200 km	Average	High	8,00	11,00
2	Average	100	up to 200 km	Low	High	7,50	11,50
3	Average	75	more than 200 km	Low	Average	15,83	3,17
4	Low	75	up to 200 km	Low	High	2,50	16,50
5	Low	75	more than 200 km	Low	High	3,50	15,50
6	Low	50	more than 200 km	Low	High	5,33	13,67
7	Average	50	up to 200 km	Average	High	14,33	4,67
8	Low	100	up to 200 km	Low	Average	12,33	6,67
9	Low	100	more than 200 km	Low	High	3,83	15,17
10	Low	75	up to 200 km	Low	Average	13,83	5,17
11	Low	100	up to 200 km	Average	High	7,67	11,33
12	Average	75	up to 200 km	Low	High	10,00	9,00
13	Low	50	up to 200 km	Average	Average	15,83	3,17
14	Low	75	up to 200 km	Average	High	9,33	9,67
15	Average	100	more than 200 km	Average	Average	16,83	2,17
16	Low	100	up to 200 km	Low	High	1,33	17,67
17	Low	50	up to 200 km	Low	Average	13,33	5,67
18	Average	50	up to 200 km	Low	High	9,67	9,33

**Table 4**

Calculation of partial significance of factors' levels.

Factor	Factor's level	Partial significance
1. Rental price	Low	2,146
	Average	-2,146
2. Image of the developer	100	1,250
	75	-0,417
	50	-0,833
3. Distance to the border with EU countries	Up to 200 km	-0,458
	More than 200 km	0,458
4. Labor cost in region	Low	1,875
	Average	-1,875
5. The level of the industrial park infrastructure development	High	3,875
	Average	-3,875

the values of each factor is excluded from consideration so that the multifactor regression model will take the following form:

$$y = a_0 + a_1x_1 + a_2x_2 + a_3x_3 + a_4x_4 + a_5x_5 + a_6x_6 + e, \quad (1)$$

where  $a$  - is model parameters,  $e$  - is a random variable,  $x_1 \div x_6$  is influencing factors taking into account the level of assessment.

The variable  $x_i$  can take on one of three possible values  $\{-1; 0; +1\}$  depending on whether the characteristic of a certain level is represented in the combination. If the level of the characteristic is not taken into account in the combination and does not appear in the model, then  $x_i = -1$ . When the feature level is not taken into account in the combination but is taken into account in the model, then  $x_i = 0$ , and if the feature level is taken into account in the features of the combination, then  $x_i = 1$ .

Based on the expert ratings, we shall calculate the transformed ranks ( $R_m$ ) according to formula (2):

$$R_m = (n + 1) - r_m, \quad m \in 1, \bar{n}, \quad (2)$$

where  $m$  is the combination index,  $n$  is the number of combinations;  $r_m$  is the rank of the 3d combination of features assessed by the respondent.

To simplify the calculations, we calculate the average values of the transformed ranks ( $\bar{R}_m$ ), thereby averaging the ranks increases the reliability of the rating estimates. Let us limit the number of possible combinations of the levels of the five competitiveness factors to 18.

Based on the average values of the transformed ranks, it is possible to conclude the priority of the sixteenth, fourth, and fifth combination of features. Nevertheless, our goal is to establish estimates of the individual

contribution of each characteristic of a certain level to the overall ranking.

Considering the assessment of the competitiveness of the industrial park  $y$  as the value of the dependent variable and taking into account the values of the independent variables  $x_i$ , we find the parameters of the linear regression model (1) and determine the coefficient of multiple correlations ( $R$ ).

In this case, the regression model will look like this:

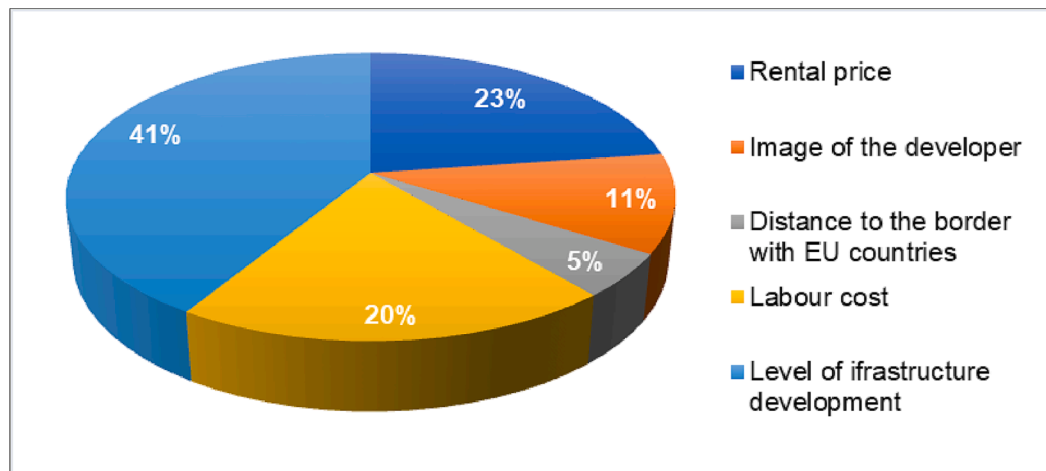
$$y = 7,021 + 2,146x_1 + 1,250x_2 - 0,417x_3 - 0,458x_4 + 1,875x_5 + 3,875x_6 + e; \\ R = 0,973, \quad (3)$$

According to Fisher's F-criterion, the built model is adequate since the coefficient  $R$ -value is close to 1, and the relationship between the factors is tight and direct. The most influential factor in the regression model is a factor ( $x_6$ ) - Infrastructure level. Coefficients  $a_1$ - $a_6$  (parameters of the model) characterize the individual contributions of each characteristic of a certain level to the overall assessment of factors affecting the competitiveness of the industrial park. They are called the partial weight of features of a certain level. However, the effect of only 6 out of 11 levels of factors are reflected in the regression model. The partial weights of those features that were not included in the regression model can be found in tabular form (see Table 4), taking into account condition (3):

The transition from the absolute values of the partial features' significance to the relative values can be carried out according to the formulas given in (Feshchur et al., 2003; Lebid, Samulyak, & Feshchur, 2010).

**Table 5**  
Calculation of relative factors' relative significance.

Factor	$\max_i \{ r_{ij} \}$	$\min_i \{ r_{ij} \}$	Scope of partial significance, $R_i$	Relative significance, $\rho_i$	Relative Normalized significance, $u_i$	Evaluation of factor's significance
1. Rental price	2,146	−2,146	4,292	0,228	0,494	Interim value significance
2. Image of the developer	1,250	−0,833	2,083	0,111	0,171	Interim value significance
3. Distance to the border with EU countries	0,458	−0,458	0,917	0,049	0	The list of significant sign
4. Labor cost	1,875	−1,875	3,750	0,200	0,415	Interim value significance
5. Level of infrastructure development	3,875	−3,875	7,750	0,412	1	The most significant sign
$\Sigma$	–	–	18,792	1	–	–



**Fig. 3.** Results of conjoint analysis of industrial park attractiveness.

The calculation of the factors' relative significance is given in the Table 5.

Fig. 3 presents the results of the conjoint analysis regarding the importance of factors that affect the competitiveness of the industrial park.

The above-made calculations of the factors' relative significance affecting the competitiveness of the industrial park indicate that according to experts, such factors as the level of infrastructure development [35] and the price of renting industrial and office premises contribute most to the formation of competitiveness.

## Conclusions

According to the research results, the authors suggested considering IP not only as objects that can be used to improve the economic condition of Ukraine and attract investments but also as objects that can compete with each other for participants in industrial parks.

A special group of experts who carried out the research evaluated combinations of factors affecting the competitiveness of the industrial park, namely the rental price, the image and reputation of the developer, the distance to the border with the countries of the European Union, the cost and availability of labor in the region, as well as the level of infrastructure of the industrial park. Based on experts' ratings, ranks were calculated, the average values of which made it possible to identify the most priority characteristics and estimate the individual contribution of each characteristic to the overall ranking of factors influencing competitiveness. According to a survey of experts, the most influential factors were the level of infrastructure development and the price of renting industrial and office premises, which allowed the concentration of efforts and resources in this direction.

The relevance of the research lies in the fact that already existing parks should form a favorable competitive environment, taking into account factors influencing the choice of future participants of the parks.

The direction of further research. The authors plan to apply the developed regression model of the competitiveness of industrial parks for the comparison of IPs between each other. Such comparison will allow investors and the state to understand which parks are worth investing in as a priority and which are less promising and need improvement or resuscitation.

## CRediT authorship contribution statement

**Iryna Kohut:** Conceptualization, Data curation, Formal analysis, Methodology, Software, Validation, Writing – original draft, Writing – review & editing. **Tetyana Lebid:** Conceptualization, Data curation, Formal analysis, Methodology, Software, Validation, Writing – original draft, Writing – review & editing. **Solomiia Fedushko:** Conceptualization, Data curation, Formal analysis, Methodology, Software, Project administration, Validation, Writing – original draft, Writing – review & editing. **Iryna Klymchuk:** Conceptualization, Data curation, Formal analysis, Methodology, Software, Validation, Writing – original draft, Writing – review & editing.

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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## References

- Aliyev, A. (2019). Development of models of manufacturing processes of innovative products at different levels of management. *International Journal of Information Technology and Computer Science (IJITCS)*, 11(5), 23–29. <https://doi.org/10.5815/ijitcs.2019.05.03>
- Aliyev, A., & Shahverdiyeva, R. (2017). Structural analysis of the transformation processes of scientific and technical ideas and knowledge into innovations in technoparks. *International Journal of Engineering and Manufacturing (IJEM)*, 7(2), 1–10. <https://doi.org/10.5815/ijem.2017.02.01>
- Aliyev, A., & Shahverdiyeva, R. (2018). Application of mathematical methods and models in product - service manufacturing processes in scientific innovative technoparks. *International Journal of Mathematical Sciences and Computing (IJMSC)*, 4(3), 1–12. <https://doi.org/10.5815/ijmsc.2018.03.01>
- Boiko, O., Vasiutkina, N., Kondratiuk, O. (2020) Ukrainian-Chinese Cooperation of Industrial Enterprises on Innovative Principles. Available online: <http://ekmair.ukma.edu.ua/handle/123456789/21116>.
- Boyko, O. (2019). Experience of Ukraine and China in creating organizational forms of innovation activity. *European Scientific Journal of Economic and Financial Innovation*, 1(3), 5–26. <https://doi.org/10.32750/2019-0101>.
- Chirychenko, Y.u., & Kotko, O. (2014). Problems of creation and functioning of industrial parks: Analysis and implementation of world experience. *Bulletin of the Academy of Customs Service of Ukraine. Series Economics*, (1), 74–82.
- Colliers Ukraine. <https://www.colliers.com/uk-ua>.
- Industrial parks: what international experience can be applied by Ukraine. *Ekonomichna Pravda*. 2021. Available online: <https://www.epravda.com.ua/columns/2021/07/1/675532/> (accessed July 1, 2021).
- Enterprise Relocation Program 2022. Available online: <https://me.gov.ua/Documents/Detail?lang=uk-UA&id=3e766cf9-f3ca-4121-8679-e4853640a99a&title=ProgramaRelokatsiiPidprimstv>.
- Fedushko, S., Ustyianovych, T., Syerov, Y.u., & Peracek, T. (2020). User-engagement score and SLIs/SLOs/SLAs measurements Correlation of E-Business projects through big data analysis. *Applied Sciences*, 10(24), 9112. <https://doi.org/10.3390/app10249112>
- Feshchur R.V., Barvinsky A.F., Kichor V.P. et al. (2003) Statistics: theoretical foundations and applied aspects. Study guide. Lviv, Intellect-West, 576 c.
- Green, P., & Vithala, R. (1971). Conjoint measurement- for quantifying judgmental data. *Journal of Marketing Research*, 8(3), 355–363. <https://doi.org/10.1177/002224377100800312>
- Halasiuk, V. (2018) Industrial Parks: World Experience and Perspectives of Creation in Ukraine. Economic analysis. Ternopil: Economic Thought, 28(1), 40-50. ISSN 1993-0259.
- Kadyrus, I. G. (2014) Competitiveness of enterprises and factors making effects on this. Effective economy. 5. Available online: <https://dspace.dsau.dp.ua/bitstream/123456789/3077/1/2.pdf>.
- Kalat, Y. (2020). Incentives for the development of industrial parks (on the example of the border regions of Poland). *So-cio-Economic Problems of the Modern Period of Ukraine*, 2(142), 78–87. <https://doi.org/10.36818/2071-4653-2020-2-11>.
- Kirillo V. A new round of development of industrial parks in Ukraine. Property Times. 2022. Available online: [https://propertytimes.com.ua/blogs/valeriy\\_kirillo/noviy\\_vitok\\_rozvitku\\_industrialnih\\_parkiv\\_ukrayini](https://propertytimes.com.ua/blogs/valeriy_kirillo/noviy_vitok_rozvitku_industrialnih_parkiv_ukrayini).
- Kushnir, S., & Karmazina, V. (2022). Innovative development of technoparks as a key to the recovery and sustainable development of Ukraine. *Economy and Region*, 2(85), 53–59.
- Law of Ukraine. On Industrial Parks, Vidomosti Verkhovnoi Rady (VVR), No. 22, Art. 212. 2013. Available online: <https://zakon.rada.gov.ua/laws/show/5018-17#Text>.
- Lebid, T., Samulyak, V., & Feshchur, R. (2010). Research of marketing factors of influence on the development of machine-building enterprises. *Theoretical and Applied Aspects of Economics*, 2, 116–123.
- Lekar, S. (2017). International and national realities of industrial parks functioning. *Economy of Industry*, 77(1), 80–94. <https://doi.org/10.15407/econindustry2017.01.080>.
- Luce, R., & Tukey, J. (1964). Simultaneous conjoint measurement: A new type of fundamental measurement. *Journal of Mathematical Psychology*, 1(1), 1–27. [https://doi.org/10.1016/0022-2496\(64\)90015-X](https://doi.org/10.1016/0022-2496(64)90015-X)
- Marhraoui, M., & Manouar, A. (2018). IT innovation and firm's sustainable performance: The intermediary role of organizational agility – An empirical study. *International Journal of Information Engineering and Electronic Business (IJIEEB)*, 10(3), 1–7. <https://doi.org/10.5815/ijieeb.2018.03.01>
- Melnychenko, A., Shevchuk, N., Babiy, I., Blyznyuk, T., & Akimova, O. (2022). Transformation of industrial parks towards ensuring the achievement of sustainable development goals. *International Journal of Computer Science and Network Security*, 22(1), 7–14.
- Obeng, A., & Mkhize, P. (2017). Impact of IS strategy and technological innovation strategic alignment on firm performance. *International Journal of Information Technology and Computer Science (IJITCS)*, 9(8), 68–84. <https://doi.org/10.5815/ijitcs.2017.08.08>
- On approval of the Strategy for the Development of Industrial Parks for the period until 2030. <https://zakon.rada.gov.ua/laws/show/176-2023-p#Text>.
- Ricardo, D. (2005) From the principles of political economy and taxation. Readings in the economics of the division of labor: The classical tradition. pp. 127-130.
- Shevchuk, N. (2021). World experience in the development of industrial parks and their benefits for the development of the Ukrainian economy. *Problems and Prospects of Economy and Management*, 4(28), 68–74.
- Shevchuk, N., et al. (2021). Conceptual principles of the transformation of industrial parks into eco-industrial ones in the conditions of sustainable development. *International Journal of Computer Science & Network Security*. T., 21(12), 349–355.
- Soshnykov, A., Yershova, Yu. (2021) Industrial Parks: Collaboration of Business, State and National Science. Scientific Notes of Taurida National V.I. Vernadsky University. Series: Juridical Sciences, 4, pp. 19-24. <https://doi.org/10.32838/TNU-2707-0581/2021.4/04>.
- Stimulating the development of industrial parks: European experience and opportunities for Ukraine, 2020. Available online: <https://ird.gov.ua/irdp/e20200401.pdf>.
- Svatyuk, O., & Khabko, M. (2014). Competitiveness of the enterprise: Concept, relationship, competitive advantages. *Innovative Economy*, 5, 82–86.
- Tarhan, C., & Aydin, C. (2019). Why should municipalities use management information systems in their decision-making processes? *International Journal of Information Technology and Computer Science (IJITCS)*, 11(4), 1–8. <https://doi.org/10.5815/ijitcs.2019.04.01>
- Verkhovod, I. S. (2019). Clustering processes and creation of industrial parks as a tool for regional development. *Economic Studies*, (2), 55–60.
- Vinichenko, I., Polehenka M. (2019) Theoretical aspects of formation of economic efficiency of agricultural production. *Effective Economics*, no. 12. <https://doi.org/10.32702/2307-2105-2019.12.14> (accessed December 27, 2019).
- Waligóra, K. (2015). In *Science and Technology and Industrial Parks as a Tool to Support the Innovation Potential of the Polish Economy. Modern challenges of economic development: Policy and capacity building. Creation, innovation, foreign trade* (pp. 171–186). Białystok University Press.