Zone managing companies' governance and performance
Evidence from the Polish Investment Zone

Tomasz Dorożyński[1], Janusz Świerkocki[1] and Bogusława Dobrowolska[2]

[1]Department of International Economics, University of Lodz
Lodz, Poland

[2]Department of Economic and Social Statistics, University of Lodz
Lodz, Poland

***Abstract*. We assess why some zone managing companies (ZMCs) are more successful in developing their special economic zones (SEZs) than others. In almost every region of Poland, there are winners and losers among SEZs. The advantage of having a better zone location is relative, and other factors may play a role in their development path. The specific research question addressed in this study is whether the quality of zone administration matters. We used cluster, correlation analysis, and estimated regression models for 14 ZMCs to explain their relative performance in Poland from 2018 to 2022. We used the case of the Polish Investment Zone (PIZ) initiative, which entered into force of the Act of 10 May 2018 on supporting new investments. The preliminary findings suggest that zone performance depends on effective governance. The efforts made by ZMCs may be decisive for attracting foreign and domestic investors. The governance quality is one of the main determinants of the number of investment projects, the value of investment outlays, and the jobs created in special economic zones. The results of the study empower us to make recommendations to policymakers. High-quality institutions can contribute to the attractiveness of investment in countries and regions.**

This work-in-progress paper presents the next stage of the research project on the governance quality of ZMCs (e.g. Dorożyński et al. 2021; Dorożyński, Świerkocki, 2022). Previous ones were based on data for special economic zones. In this study for the first time we used the original database on Polish Investment Zone prepared at our request by the Department of Investment Development, Ministry of Development and Technology, Warsaw, Poland.

***Keywords*: Special economic zone, Zone managing company, Polish Investment Zone**

I. Introduction

Special economic zones are increasingly used for investment (industrial) policy in various economic areas. According to the classification of this instrument adopted by UNCTAD, in 1975, there were only 79 SEZs in 29 countries, in 1995 - 500 zones in 73 countries, and in 2006 - 3500 zones in 130 countries. In 2018, the numbers were around 5,400 and 147, respectively, with another 500 units in the planning phase (World Investment Report, 2019). From the figures above, it is clear that the zones have undoubtedly gained global reach, with their popularity starting to grow rapidly from the mid-1990s onwards. However, it has been distributed strongly unevenly, and, as a result, the international distribution of SEZs is characterized by high asymmetry.

According to the geographical criterion, Asia was the dominant region (75%). There, the zones were mainly concentrated in the east of the continent. China alone launched 63% of the Asian zones and almost half the world's total. They were much less prevalent in South Asia, mainly in India, and even less in West Asian countries. South America (9%), North America (5%), Africa (4%), and Europe (2%) made relatively little use of this instrument. Using UNCTAD's classification of countries into developed, developing, and transition economies, most zones fall into the second group (88%). Transition economies accounted for 5% of all zones, and developed economies accounted for 7%. In the latter, as many as 70% of the units were in the USA and only 30% in Europe (World Investment Report, 2019).

The growing popularity of zones among governments may indicate the effectiveness and efficiency of such an investment incentive scheme. More skeptical assessments can be heard from researchers aware that we are dealing with the second best solution (Rodrik, 2008; Birdawod, 2022), i.e., the one which may, but does not have to, be beneficial to the economy and may also generate losses (Baissac, 2011; AfDB, 2015; ADB, 2015).

Most governments actively compete for investors by offering them, e.g., fiscal, financial, regulatory, technical, and information incentives (Tavares-Lehmann et al., eds., 2016; World Investment Report, 2019). However, using incentives to attract (and retain) investors cannot be a priori considered economically justified, as it is connected with incurring costs, which, in some circumstances, may exceed expected returns (James, 2009; Tuomi, 2012).

Using instruments that encourage market participants to take a specific course of action (or refrain from it) is one of the prerogatives of the state. The scale and scope of these measures largely depend on the governance model pursued by a particular country. The administration's interference is minimal in a state model called the night-watchman state. That is the effect of the conviction about the perfection of market mechanism and absolute freedom of a man reflected in the right to take unlimited risk. On the other hand, the idea of a regulatory state acknowledges the existence of market failures and external effects (costs) that justify public authorities' application of various instruments. These instruments are addressed mainly to owners of capital, including foreign operators (Surdej, 2011; Massoudi & Birdawod, 2023).

DOI: http://doi.org/10.24086/icafs2025/paper.1769

2. Literature review

Economists who investigate SEZs often highlight the absence of credible indicators that might give us a complete picture of the effects of their operations (Frick & Rodriguez-Pose, 2019). Absolute and relative measures (e.g., number of jobs created, value of investments, number of entities) estimated spillover effects, expert opinions about how SEZs have contributed to the growth of the economy, or night-time lights data as a proxy measure for investors' economic activity (World Bank, 2017; Zaidan et al, 2024) relate to various goals of zone policies. Hence, assessments based on them are often incomparable. Researchers also face problems identifying credible counterfactuals and accessing reliable data (Gibbon et al., 2008). Studies on the effects of SEZs have been conducted for developed economies (for an overview, see Mayneris & Py, 2013), but predominantly for developing and transition economies (e.g., Farole, 2011; Aggarwal, 2012; ADB, 2015; Frick et al., 2018), which, according to UNCTAD, host 93% of all zones.

The economic rationale for creating zones is not universal. The argumentation looks different for developing and developed countries (FIAS, 2008). For the first group, two key rationales are relevant: institutional and infrastructural. Zones provide producers with an operating environment akin to free trade and a well-developed 'hard' infrastructure unparalleled in the rest of the country through access to real estate, roads, utilities, etc. Overall, they serve the macroeconomy - they are meant to ensure the growth and structural transformation of the national economy. The arguments for opening zones in developed countries are more varied. They can involve promoting foreign investment, creating growth poles, or revitalizing declining rural and urban areas. Therefore, the rationale behind using this instrument is not an overall economic reform but the improvement of production and trade efficiency of specific companies operating in the market daily in international competition. Zones are, therefore, more microeconomically oriented here (Dorożyński, Świerkocki, 2022).

Among other things, the developers of endogenous growth theory have pointed out that economic growth starts at the microeconomic level. One of its factors is positive externalities (benefits), which "occur wherever an increase in the output of the branch as a whole induces an increase in the size of the supply that each firm is willing to supply at particular prices" (Blaug, 1994, p. 388). These benefits are thus both internal to the branch. Their sources include specialization, lower transport costs, better use of labor resources, and faster diffusion of knowledge and innovation. They arise under spatial concentration (agglomeration) of economic activity, and the presence of other branches in a given area may further enhance these effects, as it will increase the diversity of ideas in circulation, which may facilitate the improvement of business operations. Processes of industrial concentration can lead to the development of urban centers that will attract more businesses and job seekers (Duranton, Puga, 2003; Krugman, 1992).

Poland is one country that uses special economic zones in investment policies subordinated to pursuing various economic policy objectives. However, after 25 years of experience, their formula was abandoned and replaced in 2018 by a new instrument known popularly as the Polish Investment Zone. The management structure of the new program based on the companies administering the zones also remained. There is a transition period until 2026, when the SEZs will be finally extinguished, during which both regimes will co-exist.

SEZs were intended to counteract the regional economic, social, and territorial disparities revealed by the market transformation of the Polish economy. However, these intentions failed to be reflected in the Act (Act of 1994), and, as a result, subzones were created in all voivodeships, both in the better and less developed ones. The areas of some zones have been designed to a small extent, while others have steadily expanded. Reasons for these differences include the location of the zones. For obvious reasons, those located in more prosperous and better-developed parts of Poland, and therefore more attractive for business, performed better.

In addition to location factors, the investment attractiveness of SEZs was influenced by endogenous considerations related to the characteristics of the specific zone, such as its area, the availability of infrastructure, and the development of the investment areas. Efforts made by the zone management companies to provide efficient services to investors also played an important role (Dorożyński, Świerkocki, Dobrowolska, 2021).

Hence, a question can be asked to what extent these differences can be attributed to the professionalism of zone operators. On the one hand, they administer SEZs like a fully centralized decision-making system. On the other hand, however, there are strong reasons to believe that they enjoy a wide margin of discretion and manage the zones as if they operated in a system of indirect government intervention. For instance, Dorożyński et al. (2016) suggest a correlation between the performance of zones and actions undertaken by their operators.

The article aims to find out whether and why some ZMCs are more successful in developing their SEZs than others. Specifically, we want to address the following research questions: Do the quality of zone administrations matter? Do they matter because of their resources, or is it due to the services they provide and institution-building efforts? In the literature on special economic zones, only a few studies have tackled the issue (e.g., Aggarwal, 2005), partly due to the data limitations concerning variables relevant for comparing zone administrations. We used the case of the Polish Investment Zone to investigate the zones' performance and their determinants.

3. Hierarchical cluster analysis

We employed hierarchical cluster analysis methodology in the first step to preselect zone managing companies representing similar levels of governance quality (GQ). This type of analysis is typically used to identify homogenous groups of elements based on selected characteristics in a given set of data (Lasek, 2002; James et al., 2014). For the study's goal, 17 diagnostic variables were selected that, in our opinion, allow for the most comprehensive assessment of the quality of operation of ZMCs within the Polish Investment Zone (See Annex, Table A1). Using Ward's method, one of the agglomerative methods of hierarchical cluster analysis, we obtained a dendrogram showing a hierarchical structure arranged in order of decreasing similarity of the components in our set (see Fig. 1).

DOI: http://doi.org/10.24086/icafs2025/paper.1769

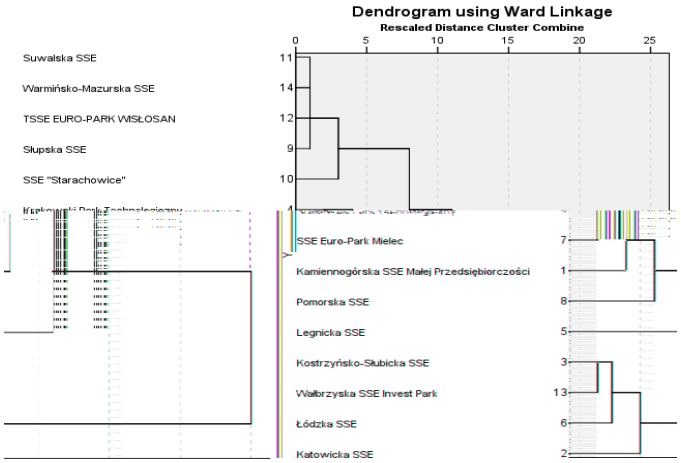

Figure 1. Dendrogram for the 14 ZMCs obtained using Ward's linkage method
Source: own compilation using PS IMAGO.

The analysis allowed us to divide all of the 14 ZMCs of the Polish Investment Zone into three groups that represent similar levels of governance quality:

Group 1gq: Suwalska SSE, Warmińsko-Mazurska SSE, TSSE EURO-PARK WISŁOSAN, Słupska SSE, SSE "Starachowice";

Group 2gq: Krakowski Park Technologiczny, SSE Euro-Park Mielec, Kamiennogórska SSE Małej Przedsiębiorczości, Pomorska SSE, Legnicka SSE;

Group 3gq: Kostrzyńsko-Słubicka SSE, Wałbrzyska SSE Invest Park, Łódzka SSE, Katowicka SSE.

Hierarchical cluster analysis was successfully deployed to distinguish groups of ZMCs with similar GQ, yet it failed to tell us which group performs better. Therefore, in the second step, we compared the ZMCs' governance quality among the Polish Investment Zone.

4. Quality of governance

The main objective of the second stage of the study was to create an original ranking of the GQ of SEZs within the Polish Investment Zone. We used the same set of 17 diagnostic variables as in the first phase (x1-x17, see Annex, Table A1). The indicators numbered 1 to 16 were treated as stimulants, while variable x17 (unemployment rate) was treated as a destimulant.

In the beginning, the variability of the variables was assessed using the coefficient of variation. This coefficient was calculated based on standard deviations. For most variables, the value of the coefficient of variation exceeded the threshold value (20%), which means that these variables were characterized by a sufficiently high variability (see Annex, Table A2). Four variables (x9, x12, x13, x15) were removed from further analysis due to their relatively low variation.

In the next step, the correlation of potential diagnostic variables was assessed to reduce and select the final set of diagnostic indicators. A parametric method was employed to assess correlation (see Śmiłowska, 1997). As a result of its application, a cluster was determined in which the central feature is x1, and the satellite feature is x3. The remaining ones (x2, x4, x5, x6, x7, x8, x10, x11, x14, x16 and x17) were classifies as isolated features. Thus, the central and isolated features were qualified for further analysis, and the satellite variable was eliminated. Finally, 12 diagnostic indicators were adopted to synthetically assess PIZ's quality, thus building an original authorship ranking . This is a set of variables characterised by high informative value.

The study aimed to rank the ZMCs linearly in terms of GQ. The Hellwig development pattern method was used to achieve this, and the objects were grouped using the standard deviation method. This method assumes the existence of a benchmark object in which the input variables take on optimal values. The determination of the development pattern was preceded by making the diagnostic indicators comparable and then excluding negative values from the set. Variables were normalized using classical standardization. Destimulants were transformed into stimulants. The Hellwig method hierarchizes objects through comparisons to a designated development pattern (Panek, 2009). The coordinates of the benchmark object are the maximum values of the standardized variables, which are summarised in Annex (see Table A3).

Objects are prioritized based on their distances from the benchmark. The Euclidean metric was used to calculate the distance of each ZMC from the benchmark object. In the Hellwig method, objects are ranked based on the value of a synthetic measure (indicator) of development si.

The measure si usually takes values in the range [0; 1]. These values are higher the less distant an object is from the benchmark. It is, therefore, applicable to order these values from largest to smallest. The final stage of the calculation involves dividing the objects, in this case ZMCs, into classes. The objects were grouped according to the standard deviation method. The ranges of variation of the values of the synthetic variable for each class were as follows (see Tab. 1).

Table 1. Class boundaries of the synthetic Hellwig s_i of the ZMCs governance quality (2018-2022)

Cla I		$s_i \geq$	0,3835
Cla II	0,3835	$> s_i \geq$	0,2557
Cla III	0,2557	$> s_i \geq$	0,1278
Cla IV	$s_i <$	0,1278	

Source: own study.

The results of the calculations align with the stages described above, and thus, the ranking of governance quality of ZMCs in 2018-2022 is shown in Table 2.

Table 2. Governance quality ranking of ZMCs (2018-2022)

ZMCs	Indicator s_i	Class (Category)	Ranking
Wałbrzyska SSE Invest Park	0,417467	1	1
Łódzka SSE	0,386512	1	2
Katowicka SSE	0,293945	2	3
Kostrzyńsko-Słubicka SSE	0,265981	2	4
SSE Euro-Park Mielec	0,208669	3	5
Pomorska SSE	0,198272	3	6
Krakowski Park Technologiczny	0,183807	3	7
Legnicka SSE	0,100218	3	8
TSSE EURO-PARK WISŁOSAN	0,095546	3	9
Słupska SSE	0,093115	3	10
Kamiennogórska SSE Małej Przedsiębiorczości	0,05962	3	11
SSE "Starachowice"	0,041195	4	12
Warmińsko-Mazurska SSE	0,029971	4	13
Suwalska SSE	0,00001	4	14

Source: own study.

The ZMCs were ranked from 'best' to 'worst' according to the value of the synthetic measure. Based on the value of the si measure, it can be concluded that between 2018 and 2022, the best-performing SEZ was Wałbrzyska SSE Invest Park, for which the Hellwig measure was 0.417. Łódzka SSE occupies the second place

DOI: http://doi.org/10.24086/icafs2025/paper.1769

in the ranking with a value of 0.386. Both of these zones make up Class I, which means that these zones had the best governance quality. They are followed by Katowicka SSE and Kostrzyńsko-Słubicka SSE (Class II). Class III is the most numerous, with as many as 7 SEZs classified in it. The results of the ranking indicate that three of fourteen ZMCs performed worst during the analyzed period (Class IV).

To better illustrate the differences in GQ of ZMCs (see Figure 2), the values of the synthetic measure have been normalized so that the ZMC with the highest level of GQ achieves a score of 100 and all others proportionally lower. The values of the normalized synthetic measure indicate a high diversity of governance quality of SEZs in Poland. As many as nine out of 14 ZMCs are characterised by a value below 50 points.

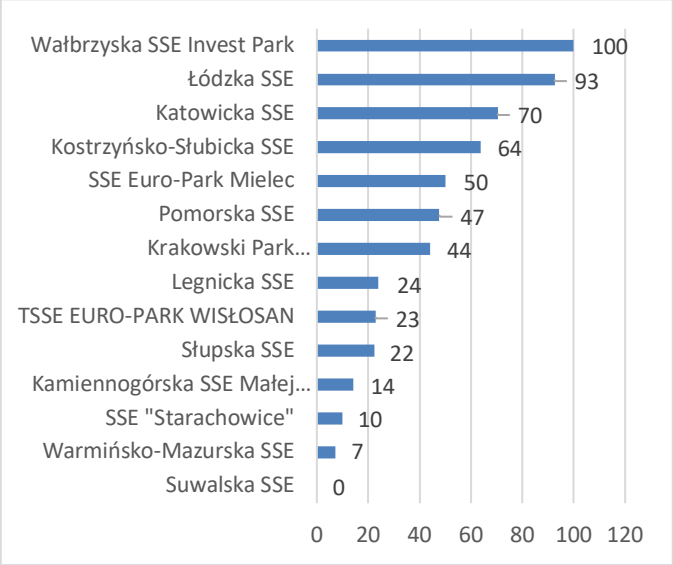

Figure 2. Ranking of the governance quality of ZMCs 2018-2022 according to standardized indicator values

Source: own compilation.

5. Comparison of zone performance

Among the analyzed variables describing the governance quality of PIZ, three of them seem to be of critical importance, i.e., the number of jobs declared (x1), the number of active decisions (x2), which can be partly equated with the number of economic entities (investors), and the declared value of investment outlays (x3) (see Annex A1).

In terms of the number of jobs and the number of active decisions, the undisputed leaders of the rankings were Katowicka SSE, Łódzka SSE, and Pomorska SSE, located in the southern, central, and northern parts of the country, respectively. In terms of declared investment value, Wałbrzyska SSE Invest Park, located in south-western Poland, led the way. The positions in the rankings, which illustrate the performance of individual zones, are correlated with the governance quality of the ZMCs. The leading zones in all three rankings were simultaneously among the most internationalized. This means that foreign investors significantly influenced their performance. Wałbrzyska SSE was the only one exception. (See Annex, Tables A4-A6).

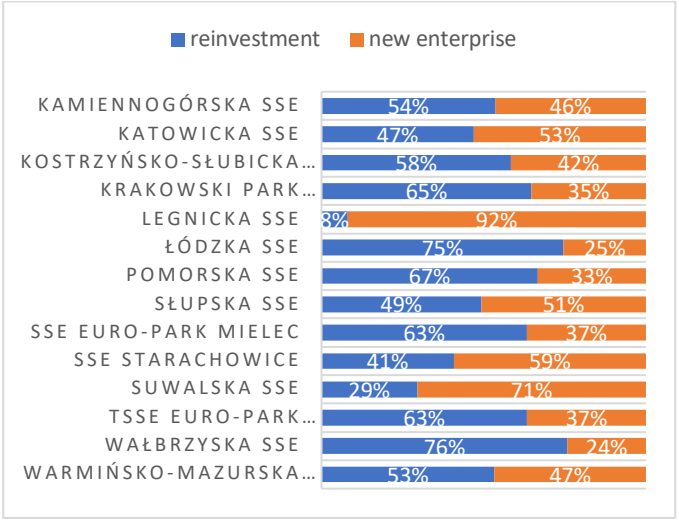

Figure 3. The share of reinvestment and new projects in PIZ

Source: own compilation.

At the same time, the zones most attractive to investors were dominated by reinvestments (See Figure 3). This means that entrepreneurs previously operating in the zones decided to develop their investments by investing in tangible or intangible assets related to increasing the production capacity of an existing plant and diversifying the plant's production by introducing products previously not produced in the plant. The sectoral structure of the investments was very diverse. Of the 1,766 support decisions issued, most were in the quality food sector (188), means of transport (178), machinery and equipment manufacturing (140), and eco-construction (101). The fewest number of projects were implemented in the aerospace sector (8). More than half of the projects were categorised as 'other' This may indicate a relatively high sectoral dispersion (See Figure 4).

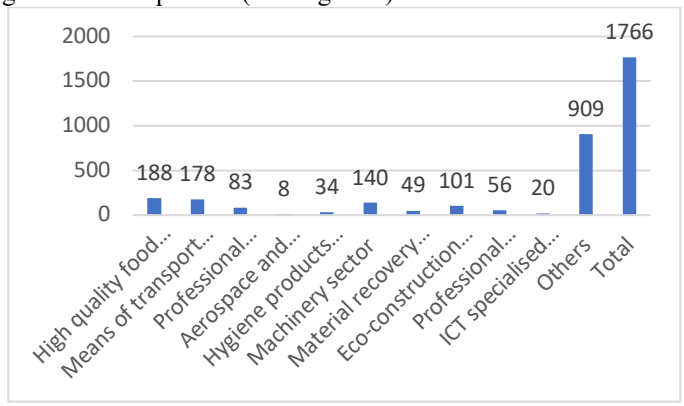

Figure 4. Ranking of leading industries in 14 SEZs (2018-2022)

Source: own compilation.

6. Zone governance and its performance: correlation and regression analysis

We used two groups of variables to assess the zone operator's efforts to attract and retain investors. The first group includes variables that characterize the activity of ZMCs (x4 - x8, see Annex, Table A1), taken from the Ministry of Development and Technology reports (2018-2022). The second group consists of variables characterizing the socio-economic conditions in which PIZ operates, which may indirectly contribute to or impede the development of the zones (x9 - x17, see Annex, Table A1) .

DOI: http://doi.org/10.24086/icafs2025/paper.1769

Table 3 shows the correlation coefficients between the number of jobs created (x1), the number of active decisions (x2), and the declared value of investments (x3) in 14 zones and the variables reflecting the governance quality.

Table 3. Correlation coefficients for x1, x2, x3, and the set of explanatory variables (2018-2022)

Variables	x1	x2	x3
Net financial result of ZMCs (in million PLN)	.532	.269	**.63**
ZMCs' promotion expenditure (in million PLN)	**.752****	.398	**.77**
Tax exemptions on income of ZMCs for SEZs development (in million PLN)	.373	.122	.4
ZMCs outlays on infrastructure (in million PLN)	.110	-.060	.56
Outlays by other entities on infrastructure, e.g., municipalities, utility operators, General Directorate for National Roads and Motorways (in million PLN)	**.860****	**.721****	**.84**
Average revenue per capita of municipalities including cities with district rights	.003	.180	.1
Average industrial and construction output sold (2018-2021)	**.546***	.219	.5
Average gross value of fixed assets in enterprises per capita, Poland = 100 (2018-2021)	.278	-.047	.2
Average number of businesses per 10,000 population	**.593***	.413	**.62**
Average gross monthly salaries	.389 A	.279 A	.53
Average revenue of district budgets (in million PLN)	**.602***	**.723****	**.70**
Average number of hard-surfaced district roads (in km)	-.330	-.293	-.3
Average number of university graduates per 10,000 population	.476 A	.576* A	.41
Average registered unemployment rate	**-.613***	-0384	**-.63**

* Correlation is significant at the 0.05 level (2-tailed).

**Correlation is significant at the 0.01 level (2-tailed).

The Table shows Pearson's linear correlation coefficients.

A - shows Spearman's rank correlation coefficients.

Source: own calculations.

We examined correlations between variables using Pearson's linear correlation coefficient and Spearman's rank correlation coefficient (see Table 3). Pearson's linear correlation coefficient values indicate a statistically significant and meaningful relationship between the PIZ performance, measured by x1 and x3, and promotional expenditure, unemployment rate, and number of businesses per 10,000 population. The performance of the zones (measured by x1, x2, and x3) is strongly and positively correlated with outlays by other entities on infrastructure and the revenue of district budgets located in a given PIZ. Furthermore, the number of jobs in the zone (x1) shows a moderate positive correlation with the value of industrial and construction output sold. In turn, the value of investments (x3) is significantly and positively correlated with the net financial result of the ZMCs.

So far, we have learned that the zone governance quality may contribute to the success or failure of a PIZ. To assess this impact, we built regression models. Searching for the best analytical form, we tested non-linear and linear models. Ultimately, we selected two linear models complying with Markov assumptions and taking account of potential explanatory variables . Table 4 presents the optimum form of model 1 obtained in a step-wise method. An adjusted R-squared value is statistically significant and close to 0.815, meaning the model fits the sample well.

The estimates showed that an increase in investment by outlays of other entities on infrastructure (x8) and an increase in average revenue for district budgets (x14) had a positive effect on the number of jobs created in special economic zones (x1). The estimated structural parameters have positive signs, and the model is cointegrated, i.e., the signs of the parameters are the same as for the correlation coefficients of the explanatory variables with the explanatory variable.

Table 4. Estimated parameters of an optimum regression model 1 for the number of jobs created

Variable	*Unstandardized coefficients*		*Standardized coefficients*	*p-value*
	Parameter estimate B	Standard error B	*β*	
x8*	6.338	1.092	0.740	0.0001
x14**	4,165E-6	0.000	0.343	0.0210
Constant	-1654.322	927.620	X	0.1020
R^2	0.843	F(14;70)=29.584 (p<0.0001)		
Adjusted R-squared	0.815			

For a detailed description of variables, see Annex, Table A1.

* Outlays by other entities on infrastructure, e.g., municipalities, utility operators, General Directorate for National Roads and Motorways (in million PLN)

** Average revenue of district budgets (in million PLN)

Source: own calculations.

Table 5 presents the optimum format of model 2. The adjusted R-squared value from the sample (0.805) is statistically significant. The β coefficients show that the outlays by other entities on infrastructure and the average revenue for district budgets were crucial for the number of active decisions. ZMCs' promotion expenditure also plays a relatively important role.

Table 5. Estimated parameters of an optimum regression model 2 for the number of active decisions

Variable	*Unstandardized coefficients*		*Standardized coefficients*	*p-value*
	Parameter estimate B	Standard error B	*β*	
x8*	0.173	0.037	0.738	0.0001
x14**	2,173E-6	0.000	0.653	0.0001
x5***	28.671	12.573	0,388	0,0460
Constant	-26.000	26.339	X	0.347
R^2	0.850	F(14;70)=18.886 (p<0.0001)		
Adjusted R-squared	0.805			

For a detailed description of variables, see Annex, Table A1.

* Outlays by other entities on infrastructure, e.g., municipalities, utility operators, General Directorate for National Roads and Motorways (in million PLN)

** Average revenue of district budgets (in million PLN)

*** ZMCs' promotion expenditure (in million PLN)

Source: own calculations.

Table 6 presents the optimum form of model 3 (for x3 - declared investment value) obtained in a step-wise method. An adjusted R-squared value is statistically significant and close to 0.888, meaning the model fits the sample well. As in the previous two models, the β coefficients show that outlays by other entities on infrastructure and the average revenue of district budgets were crucial for the increase in the investment value in PIZ.

Table 6. Estimated parameters of an optimum regression model 3 for the declared investment value

DOI: http://doi.org/10.24086/icafs2025/paper.1769

Variable	*Unstandardized coefficients*		*Standardized coefficients*	*p-value*
	Parameter estimate B	Standard error B	*β*	
x8*	11129622.186	1616557.419	0.682	0.0001
x14**	10.800	2.292	0.467	0.0001
Constant	3228580970.974	1373755480.496	X	0.0380
R^2	0.905	F(14;70)=52.633 (p<0.0001)		
Adjusted R-squared	0.888			

For a detailed description of variables, see Annex, Table A1.

* Outlays by other entities on infrastructure, e.g., municipalities, utility operators, General Directorate for National Roads and Motorways (in million PLN)

** Average revenue of district budgets (in million PLN)

Source: own calculations.

7. Preliminary conclusions

Special economic zones were intended to counteract the regional economic, social, and territorial disparities revealed by the market transformation of the Polish economy. However, these intentions failed to be reflected in the Act (Act of 1994), and, as a result, subzones were created in all voivodeships, both in the better and less developed ones. The areas of some zones have been developed to a small extent, while others have steadily expanded. Reasons for these differences include the location of the zones. For obvious reasons, those located in more prosperous and better-developed parts of Poland, and therefore more attractive for business, performed better.

In addition to location factors, the investment attractiveness of SEZs was influenced by endogenous considerations related to the characteristics of the specific zone, such as its area, the availability of infrastructure, and the development of the investment areas. Efforts made by the zone management companies (ZMC) to provide efficient services to investors also played an important role. Currently, the SEZ management companies (ZMCs) operate within their respective territorial competence set out in the implementing regulation to the Act. Each zone management company has areas assigned to it, i.e., groups of counties (and cities with county status), in which they may carry out their operations and offer business support services to entrepreneurs.

The survey results indicate that the financial situation and activity of the local government units within which the zone is located are essential for the zone's performance. Expenditures on infrastructure construction and average revenue for district budgets are the most critical factors determining the economic performance of the Polish Investment Zone. Managers' expenditures on SEZ promotion were also crucial for the number of active decisions.

Summing up, our findings on the relative importance of individual ZMCs in the overall SEZ performance suggest that:

1) even though the zones operate in the same legal environment, their results differ significantly;

2) the zones' performance in terms of job creation, number and value of investments is influenced by the economic situation and the activity of local and regional authorities;

3) the quality of the SEZ management companies can have a significant impact on their performance in attracting investors; in other words, the governance quality does matter;

4) zones with a significant share of foreign investors that transfer capital, technology, and managerial skills record better results.

Annex

Table A1. Potential diagnostic variables of PIZ quality of operations 2018-2022

Symbol	Description of the variable
x1	Number of jobs declared (total)
x2	Number of active decisions (total)
x3	Declared value of investment outlays (in million PLN)
x4	Net financial result of ZMCs (in million PLN)
x5	ZMCs' promotion expenditure (in million PLN)
x6	Tax exemptions on the income of ZMCs for SEZ development (in million PLN)
x7	ZMCs outlays on infrastructure (in million PLN)
x8	Outlays by other entities on infrastructure, e.g., municipalities, utility operators, General Directorate for National Roads and Motorways (in million PLN)
x9	Average revenue per capita of municipalities, including cities with district rights
x10	Average industrial and construction output sold (2018-2021)
x11	Average gross value of fixed assets in enterprises per capita, Poland = 100 (2018-2021)
x12	Average number of businesses per 10,000 population
x13	Average gross monthly salaries
x14	Average revenue of district budgets (in million PLN)
x15	Average number of hard-surfaced district roads (in km)
x16	Average number of university graduates per 10,000 population
x17	Average registered unemployment rate

Table A2. Characteristics of potential diagnostic variables

Variable	Mean	Standard deviation	Coefficient of variation
X1	2670,43	2498,44	94%
X2	126,14	68,45	54%
X3	6477877522,02	4762809906,97	74%
X4	17239,22	17360,71	101%
X5	1,00	0,93	93%
X6	2,75	5,15	187%
X7	140,73	147,72	105%
X8	284,23	291,74	103%
X9	6067,94	207,74	3%
X10	29643,65	9373,43	32%
X11	73,28	25,94	35%
X12	5,89	0,72	12%
X13	4884,31	271,82	6%
X14	605816632,08	205759061,11	34%
X15	305,16	57,05	19%
X16	27,00	10,96	41%
x17	7,92	2,02	26%

DOI: http://doi.org/10.24086/icafs2025/paper.1769

Table A3. Values of variables for the benchmark object

Variable	Reference object
X1	4,552877
X2	4,341547
X4	4,236726
X5	4,283216
X6	5,082808
X7	5,065924
X8	4,802117
X10	4,009237
X11	5,170476
X14	4,661291
X16	5,002625
x17	4,76346

Source: own study.

Table A4. Ranking of 14 ZMCs based on the number of jobs declared

ZMCs	number of jobs from domestic investment	% of jobs from domestic investment	number of jobs from foreign investment	% of jobs from foreign investment	Total (number of jobs)	Total (%)	Ran
Katowicka SSE	3 629,00	30%	4 528,00	18%	8 157,00	15%	
Pomorska SSE	1 213,00	10%	738,00	3%	1 951,00	14%	
Łódzka SSE	1 434,00	12%	3 812,00	15%	5 246,00	11%	
Krakowski Park Technologiczny	828,00	7%	2 602,00	10%	3 430,00	11%	
SSE Euro-Park Mielec	1 066,00	9%	1 633,00	6%	2 699,00	7%	
Wałbrzyska SSE	524,00	4%	7 022,00	28%	7 546,00	7%	
Kostrzyńsko-Słubicka SSE	554,00	5%	2 236,00	9%	2 790,00	7%	
Warmińsko-Mazurska SSE	663,00	5%	63,00	0%	726,00	6%	
TSSE Euro-Park Wisłosan	613,00	5%	1 135,00	4%	1 748,00	6%	
Suwalska SSE	476,00	4%	95,00	0%	571,00	4%	1
SSE Starachowice	504,00	4%	52,00	0%	556,00	4%	1
Słupska SSE	456,00	4%	237,00	1%	693,00	4%	1
Kamiennogórska SSE	129,00	1%	707,00	3%	836,00	2%	1
Legnicka SSE	35,00	0%	402,00	2%	437,00	1%	1
Total	12 124,00	100%	25 262,00	100%	37 386,00	100%	

Source: Own calculations based on Ministry of Development and Innovation data.

5. Ranking of 14 SEZs based on number of active decisions

ZMCs	number of decisions from domestic investment	% of decisions from domestic investment	number of decisions from foreign investment	% of decisions from foreign investment	Total (number of decisions)	Total (%)
cka SSE	161	12,7%	101	20,4%	262	14,8%
ka SSE	200	15,7%	40	8,1%	240	13,6%
SSE	138	10,9%	63	12,7%	201	11,4%
ski Park logiczny	151	11,9%	36	7,3%	187	10,6%
ro-Park Mielec	99	7,8%	29	5,9%	128	7,2%
yska SSE	54	4,2%	70	14,1%	124	7,0%
ńsko-Słubicka	52	4,1%	66	13,3%	118	6,7%
sko-Mazurska	95	7,5%	10	2,0%	105	5,9%
uro-Park an	85	6,7%	16	3,2%	101	5,7%
ka SSE	72	5,7%	6	1,2%	78	4,4%
rachowice	72	5,7%	4	0,8%	76	4,3%
SSE	47	3,7%	18	3,6%	65	3,7%
nogórska SSE	35	2,8%	21	4,2%	56	3,2%
ca SSE	10	0,8%	15	3,0%	25	1,4%
	1 271,00	100,0%	495	100,0%	1 766,00	100,0%

Source: Own calculations based on Ministry of Development and Innovation data.

A6. Ranking of 14 SEZs based on the value of investment outlays (declared)

MCs	Declared value of domestic investment in PLN	Declared value of domestic investment in %	Declared value of foreign investment in PLN	Declared value of foreign investme nt in %	Declared value of total investment in PLN	Decl valu tot inves nt ir
yska SSE	1 718 494 016,68	5%	13 099 909 860,20	23%	14 818 403 876,88	
cka SSE	5 611 695 237,19	17%	8 703 026 968,84	15%	14 314 722 206,03	
SSE	5 069 160 314,04	15%	8 169 287 169,04	14%	13 238 447 483,08	
ńsko-a SSE	2 145 452 481,63	6%	7 534 761 203,59	13%	9 680 213 685,22	
ka SSE	5 112 858 613,82	15%	3 134 046 778,74	6%	8 246 905 392,56	
ski Park logiczny	4 078 868 647,40	12%	3 480 007 840,13	6%	7 558 876 487,53	
uro-Park an	1 323 985 194,83	4%	4 711 274 680,71	8%	6 035 259 875,54	
ro-Park	3 071 308 419,05	9%	2 190 904 057,50	4%	5 262 212 476,55	

References

Act of 20 October 1994 on Special Economic Zones, Journal of Laws of 2019, item 482, with further amendments.

Act of 10 May 2018 on supporting new investments, Journal of Laws of 2018, item 1162, with further amendments.

AfDB, (2015). Special Economic Zones in Fragile Situations: A Useful Policy Tool?. African Development Bank Group. Retrieved from https://www.afdb.org/fileadmin/uploads/afdb/Documents/Generic-Documents/SEZ_anglais_SEZ_anglais.pdf (20.08.2024)

ADB, (2015). Asian economic integration report 2015: How can special economic zones catalyze economic development?. Mandaluyong City, Philippines: Asian Development Bank. Retrieved from https://www.adb.org/sites/default/files/publication/177205/asian-economic-integration-report-2015.pdf (15.08.2024)

Aggarwal, A., (2005). Performance of Export Processing Zones: A Comparative Analysis of India, Sri Lanka and Bangladesh, ICRIER Working Paper, 155. Retrieved from https://icrier.org/pdf/wp155.pdf (10.08.2024)

Aggarwal, A., (2012). Social and Economic Impact of SEZs in India. Oxford: Oxford University Press.

Baissac, C., (2011). Brief History of SEZs and Overview of Policy Debates. In T. Farole (Eds.), Special Economic Zones in Africa: Comparing Performance and Learning from Global Experience, World Bank. https://doi.org/10.1596/9780821386385_CH02

Birdawod, H. Q. (2022). Using factor analysis to determine the most important factors affecting student absenteeism at Cihan University-Erbil. *Cihan University-Erbil Scientific Journal*, *6*(2), 1-8.

Blaug, M., (1994). Teoria ekonomii. Ujęcie retrospektywne, Państwowe Wydawnictwo Naukowe, Warszawa.

Dorożyński, T., Świerkocki, J., & Urbaniak, W. (2016). Specjalne strefy ekonomiczne w Polsce a aktywność spółek zarządzających. International Business and Global Economy, 35(2), 43-55.

https://doi.org/10.4467/23539496IB.16.045.5626

Dorożyński, T., Świerkocki, J., & Dobrowolska, B. (2021). Governance of special economic zones and their performance: Evidence from Poland. Entrepreneurial Business and Economics Review, 9(3), 149-167. https://doi.org/10.15678/EBER.2021.090310

Dorożyński T., & Świerkocki J., (2022). Specjalne strefy ekonomiczne w Polsce. Doświadczenia i perspektywy, Wydawnictwo Uniwersytetu Łódzkiego, Łódź, https://wydawnictwo.uni.lodz.pl/produkt/specjalne-strefy-ekonomiczne-w-polsce/

Duranton, G., Puga, D. (2003). Micro-foundations of Urban Agglomeration Economies, NBER Working Paper, no. 9931 https://www.nber.org/system/files/working_papers/w9931/w9931.pdf

Farole, T. (2011). Special Economic Zones in Africa Comparing Performance and Learning from Global Experiences. Washington: The World Bank. Retrieved from https://documents1.worldbank.org/curated/en/996871468008466349/pdf/600590PUB0ID181onomic09780821386385.pdf (10.08.2024)

FIAS. (2008). Special Economic Zones Performance, Lessons Learned, and Implications for Zone Development. Washington: The World Bank. https://documents1.worldbank.org/curated/en/343901468330977533/pdf/458690WP0Box331s0April200801PUBLIC1.pdf (20.07.2024)

Frick, S., Rodríguez-Pose, A., & Wong, M. (2018). Towards economically dynamic Special Economic Zones in emerging countries, Papers in Evolutionary Economic Geography. Utrecht University.

https://doi.org/10.1080/00130095.2018.1467732

Frick, S., & Rodríguez-Pose, A. (2019). Are special economic zones in emerging countries a catalyst for the growth of surrounding areas? Transnational Corporations, 26(2), 75-94. https://doi.org/10.18356/0554caef-en

Gibbon, P., Jones, S., & Thomsen, L. (2008). An Assessment of the Impact of Export Processing Zones and an Identification of Appropriate Measures to Support Their Development. For Royal Danish Ministry of Foreign Affairs, Danish

Institute For International Studies. Retrieved from https://www.diis.dk/files/media/publications/import/assessment_of_the_impact_of_export_processing_zones.pdf (15.07.2024)

Information about the implementation of the Act on Special Economic Zones. (2018-2022). Ministry of Economy/ Ministry of Economic Development / Ministry for Development and Technology, Warsaw. Retrieved from https://isap.sejm.gov.pl/ (10.02.2024)

James, S. (2009). Incentives and Investments: Evidence and Policy Implications, ICAS of the World Bank Group.

James, G., Witten, D., Hastie, T., & Tibshirani, R. (2014). An introduction to statistical learning with applications in R. Springer. https://doi.org/10.1007/978-1-4614-7138-7_2

Krugman, P. (1992). Geography and Trade, MIT Press, Cambridge.

Lasek, M. (2002). Data mining. Zastosowania w analizach i ocenach klientów bankowych. Warsaw: Biblioteka Menedżera i Bankowca.

Massoudi, A. H., & Birdawod, H. Q. (2023). Applying knowledge management processes to improve institutional performance. *Cihan University-Erbil Journal of Humanities and Social Sciences*, *7*(1), 1-10.

Mayneris, F., & Py, L. (2013). The efficiency of enterprise zone programs Some conflicting results?. Université Catholique de Louvain, IRES, CORE, Discussion Paper 20, 13-25. Retrieved from https://sites.uclouvain.be/econ/DP/IRES/2013025.pdf (15.05.2024)

Ostasiewicz, W. (ed.). (1999). Statystyczne metody analizy danych, Wydawnictwo Akademii Ekonomicznej we Wrocławiu, Wrocław.

Panek, T. (2009). Statystyczne metody wielowymiarowej analizy porównawczej, Szkoła Główna Handlowa w Warszawie - Oficyna Wydawnicza, Warszawa.

Rodrik, D. (2008). Second-best institutions. American Economic Review, 98(2), 100-104.

https://doi.org/10.1257/aer.98.2.100

Surdej, A. (2011). Nowoczesne państwo a gospodarka rynkowa, Instytut Obywatelski, Warszawa.

Śmiłowska T. (1997). Statystyczna analiza poziomu życia ludności Polski w ujęciu przestrzennym, Główny Urząd Statystyczny. Zakład Badań Statystyczno-Ekonomicznych, Warszawa.

Tavares-Lehmann, T.A., Toledano, P., Johnson, L., Sachs, L. (red.), (2016). Rethinking Investment Incentives. Trends and Policy Options, Columbia University Press, New York.

Tuomi, K. (2012). Review of Investment Incentives. Best Practice in Attracting Investment, Working Paper No F-41003-ZMB-1, International Growth Centre, London School of Economics and Political Science, London, pp. 1–24.

Welfe, A. (2009). Ekonometria. Metody i ich zastosowanie. Warsaw: PWE.

World Bank. (2017). Special economic zones: an operational review of their impacts, Washington. Retrieved from

http://documents.worldbank.org/curated/en/316931512640011812/Special-economic-zones-an-operational-review-of-their-impacts (10.03.2024)

World Investment Report (2019). Special Economic Zones, United Nations Conference on Trade and Development (UNCTAD), New York, Geneva.

Zaidan, M. N., Hamdi, S. S., Birdawod, H. Q., & Agha, A. M. (2024). Factors Influencing Innovation Management in Iraq's Small-and Medium-sized Enterprises. *Cihan University-Erbil Journal of Humanities and Social Sciences*, *8*(1), 126-132

DOI: http://doi.org/10.24086/icafs2025/paper.1769