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Governance of special economic zones and their performance: Evidence from Poland

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ABSTRACT

Objective: The objective of the article is to assess why some zone managing companies (ZMCs) are more successful in developing their special economic zones (SEZs) than others. In almost every part of Poland, there are winners and losers among SEZs. It suggests that the advantage of having a better zone location is relative, and other factors may play a role. The specific research question addressed in this article is whether the individual zone administrations matter.

Research Design & Methods: We used cluster and correlation analysis and estimated regression models at the level of ZMCs to explain the relative performance of SEZs in Poland over the period 2004-2018. The set of explanatory variables, treated as a proxy for ZMC's efforts, were regressed on investment outlays and jobs created.

Findings: (1) location is the principal determinant of SEZs performance; (2) zone governance also makes a difference; (3) among ZMCs' efforts promotional activities and infrastructural outlays impact SEZs performance to the greatest extent.

Implications & Recommendations: Zone performance depends predominantly on its location but effective governance exercised by the operator matters, too. Both conclusions advocate opting for a zone policy that limits the centralising of decision-making powers. First, regional/local authorities must be more engaged. Second, and more importantly, additional powers and resources should be delegated to zone operators.

Contribution & Value Added: The use of a regression model to explain the role played by zone operators in zones' performance is very scarce in economic literature. There is no such a study for Poland. Our research tries to fill this gap. We check (1) whether good administration is important for the success of a SEZ and (2) why it is important: due to the resources ZMC has or rather due to the services it provides for investors.

Article type: research article

Keywords: special economic zones; zone managing companies; investment policy; Poland

JEL codes: C19, F23, H25, H71, O25, P48, R58

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INTRODUCTION

Special economic zones (SEZs) have become a popular investment policy tool especially in emerging economies. According to UNCTAD (WIR, 2019), back in 1975 there were 79 zones operating in 29 countries, while in 2018 as many as 5 400 zones could be found in 147 countries. Recently, special economic zones have been spreading rapidly – over five years their population grew by one thousand and further five hundred are expected to be established in near future. Growing popularity of zones among the governments seems to confirm the effectiveness and efficiency of the instrument. More sceptical assessments can be heard from researchers aware that we are dealing with the *second best* solution (Rodrik, 2008), i.e., the one which may, but does not have to, be beneficial to the economy and may also generate loses (Baissac, 2011; AfDB, 2015; ADB, 2015). For instance, according to Ag-

garwal (2019), in only three countries (Korea, Taiwan, and China), representing only 2% of all economies in which special economic zones operate, the policy has been fully successful, and in further 25 countries (17%), including Poland, the policy has been moderately successful.

The main objective of comparative empirical studies is to identify circumstances and factors decisive for the performance of zones in individual countries. Such determinants stem from programme-based solutions (incentives and requirements addressed to investors), zone characteristics (location, infrastructure), and the environment in which they operate (institutional quality, economic development level). These factors are highlighted by neoclassical economics and political economics (World Bank, 2017; Farole & Moberg, 2014). Their wide range includes, among others, the role of zone operators, that is entities which administer SEZs. Yet, in most instances, their assessment usually boils down to labelling them as 'private' or 'public' in character and does not even provide clear-cut answers as to which solution is better (World Bank, 2017).

In addition to cross-country comparisons, more detailed case studies are carried out for zones based in one country (see e.g., Kuznetsow & Kuznetsowa, 2019; Aggarwal, 2005), where the regulatory, institutional, and macroeconomic context is the same for all operators. The case of Poland shows that also in such circumstances zones differ when it comes to their performance (e.g. Ambroziak, 2016; Ambroziak & Hartwell, 2018; Ciżkowicz *et al.,* 2017).

Hence, a question can be asked to what extent these differences can be attributed to the professionalism of zone operators. The issue is far from obvious if we consider the fact that the latter operate within the framework of competences entrusted to them by the central government and under its strict surveillance. On the one hand, we could say that they simply administer SEZs like in a fully centralised 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) suggests there is a correlation between the performance of zones and actions undertaken by their operators (officially referred to as managing companies). To put some light on this relationship we have applied a more advanced quantitative method, i.e., the cluster analysis and regression analysis that covers all the zone managing companies (ZMCs) in Poland over the period 2004-2018.

The objective of the article is to find out whether and why some ZMCs are more successful in developing their SEZs than others. Specifically, we would like to address the following research questions: Do individual zone administrations matter? And, if so, how exactly do they make a difference? Do they matter because of the resources they have, or is it due to the services they provide and institution-building efforts? In the literature on special economic zones, only a handful of studies have tackled the issue (e.g. Aggarwal, 2005), partly due to the limitations of data concerning variables relevant for comparing zone administrations with each other.

Our study was motivated by the fact that in every part of Poland we can find the best and the worst performing ZMCs in terms of investment outlays and the number of jobs created. The results of our empirical study suggest that the location advantage (in terms of physical location, infrastructure, available resources, and cultural and historical contexts) is very important, but other factors may play a role, too. The quality of governance (administration) could be one of them, and our analysis demonstrates that this presumption may be correct.

We have divided our article into six main parts. In the next section, there is a short literature review. Section 3 explains how the Polish SEZs are managed. In section 4 we present sources of data and briefly discuss statistical methods used in the empirical part of the study. In section 5 we analyse the data with a view to answering the research questions and discuss the results. The final section concludes and delineates directions for further studies. A detailed description of variables can be found in the Appendix.

LITERATURE REVIEW

Economists who investigate SEZs often highlight the absence of credible indicators that might give us a full picture of the effects of their operations (Frick & Rodriguez-Pose, 2019). Absolute and relative

measures (e.g. number of jobs created, value of investments, volume of exports), 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) relate to various goals of zone policies. Hence, assessments based on them are often incomparable. Researchers also face problems with identifying credible counterfactuals and with 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; Zeng, 2015; Frick *et al.*, 2018), which, according to UNCTAD, host 93% of all zones.[1]

However, independently of how we measure the performance of SEZs, what matters much more to politicians are factors that are decisive for the zones' success or failure. Surveys in this field usually take the form of case studies (Madani, 1999; Engman *et al*., 2007; FIAS, 2008; ADB, 2015; Zeng, 2015; Kuznetsow & Kuznetsowa, 2019; WIR, 2019), which are not necessarily substantiated with advanced statistical methodologies. For instance, Farole (2011) used correlation coefficients for a sample of 70 countries. Fewer studies use econometric models with panel data, e.g., Aggarwal (2005), World Bank (2017), Frick *et al.* (2018), Frick and Rodriguez-Pose (2019).

There are probably as many reasons why some zones perform better than others as there are SEZs (Moberg, 2015). For analytical purposes, we can rank them by dividing them into three groups (World Bank, 2017; Frick *et al.*, 2018): (1) SEZ operating principles (SEZ scheme); (2) uniqueness of the SEZ; (3) the business environment (national and regional). If we narrow our comparisons to SEZs in one country, which all follow the same operating principles, differences can be sought in the uniqueness of the zone (the investment climate) and its immediate environment, i.e., in the business attractiveness of the host region. Researchers stress that suitable location, a factor independent of the operator (ZMC), is the key to a zone's success. Inevitable mistakes concerning location are made by governments due to inadequate knowledge and destructive rent-seeking behaviour (Moberg, 2015). Establishing a SEZ in relatively remote rural areas (Frick & Rodriguez-Pose, 2019), poorly connected to the rest of the world and with labour shortages (WIR, 2019), with little developed industry (Kuznetsow & Kuznetsowa, 2019), and far from important urban centres (World Bank, 2017) does not bode well for the success of the venture. Aside from location, which is a very wide-ranging concept, the researchers consider more concrete factors like the size and maturity of the zone. In such cases their opinions are less unequivocal. Bigger zones are more attractive to investors but not always develop much better (World Bank, 2017). The growth of the zone is not linear and varies over time (Frick *et al.*, 2018).

The choice of location is made by policymakers. An operator (ZMC) is expected to manage the SEZ effectively, i.e., to ensure smooth administrative services to investors, promote the zone, provide the necessary infrastructure, etc. The role played by ZMC is rarely accounted for by researchers in their analyses and is assessed differently. By using a questionnaire-based interview and a panel model, Aggarwal (2005) demonstrated that governance has a meaningful impact on the performance of zones in India, Sri Lanka, and Bangladesh. Based on panel data and a sample taken from many countries, the World Bank (2017) suggests that private zone operators are no more effective than public ones. Frick *et al.* (2018) draw a similar conclusion. On the other hand, Farole and Moberg (2014) provided evidence that private operators perform better because they have more knowledge about market reality, better managerial skills, and the horizon for their work is not dictated by political agendas. Generalising the experience of many countries, WIR (2019) underlines that effective zone governance, together with good cooperation amongst operators and administration at different levels, are pre-conditions for winning and maintaining investors' trust.

Zones located in Poland are guided by the same rules, which is why discrepancies in their performance can be attributed to the qualities of the zones (investment climate) and the advantages

[1] Numerical data should be approached with a great deal of caution. For instance, according to UNCTAD, there are 21 SEZs in Poland ranking second after the United States amongst developed economies (WIR 2019). The number comes from including 7 duty-free areas. The latter do not offer incentives laid down in the Act on SEZs so researchers usually ignore them. Interestingly, in accordance with the EU law, only duty-free areas are considered to be zones *de jure*. The legal boundaries for SEZs *de facto* can be found in the EU's provisions on regional State aid (Commission Regulation (EU) No 651/2014 of 17 June 2014).

of the host region. The relevance of both factors was confirmed by Dorożyński *et al.* (2018). Hajduga *et al.* (2018) in research based on a questionnaire survey indicated that zone governance is important for investors. These observations justify checking whether differences in zone performance may depend on zone administration. According to Jensen (2018), this is an important and under-researched topic.

Managing the Polish zones experiment

Special economic zones have been active in Poland since 1995. Between 1995 and 1997, the government established 17 zones that were designed to operate until no later than 2017. In 2001, some zones were phased out, other merged, reducing the zone population to 14. The maximum area eligible for public support under the scheme also increased several times, from the first ceiling of 6.3k ha to 25k ha in 2015.

The decision-making process related to SEZs involves many actors motivated not necessarily by the same goals and interests. At the national level, regulations and surveillance over the zones rest in the hands of the Ministry of Economy. However, the Ministry of Economy must consult its decisions with the ministry responsible for regional development, Ministry of Finance, and the Office of Competition and Consumer Protection. These bodies, taking care of different aspects of state operations (territorial cohesion, public finance, and competitive order), are subject to, inter alia, strong pressure exerted by local stakeholders. The latter include public administration, local authorities, Members of Parliament, as well as other stakeholders (e.g., trade unions, universities) who have vested interests in solutions that would attract investors, stimulate the economy, and ensure the creation of new jobs. Thus, the establishment of a zone and its further development are worth formal and informal lobbying at the highest levels of power in the country. In fact, it is believed that most zones were established not out of the initiative of the government but as a result of bottom-up efforts (Siudak & Wątorek, 2011) mostly dictated by political interest of the ruling party (Cieślik, 1995).

Zone operators, i.e., companies with majority holdings of the State Treasury or provincial self-government (one case), execute the policy delineated by the central government. The Ministry of Economy provides them with a zone development plan identifying the goals, resources, duties, rules of procedure, deadlines, and preferred industries. For this reason, the financial result of the company[2] cannot be viewed as a credible indicator of its performance. Much more important are economic effects generated by the zone, such as the number of permits issued to enterprises, their investment outlays, newly created jobs, or the development of the zone area (NIK, 2011). The government may support zone operators by exempting them from CIT and by waiving some zone development related charges but also may entrust them with the issuance of permits and day-to-day monitoring of investors' operations. Thus, a zone managing company is an agent whose performance is monitored by the government represented in the Supervisory Board and encouraged by tax allowances (CIT). On the other hand, a ZMC remains in direct contact with the local self-government which may offer additional support to investors who decide to invest in the zone (e.g., property tax allowances, facilitated formalities involved in applying for different permits, organising training courses for newly recruited workers, improved infrastructure). Co-operation with local authorities often conditions a zone development and thus the assessment of operator's performance by the central government. Support received from local communities and information barrier faced by the central government put ZMCs in an advantageous position. As a result, ZMCs may impact its decisions to take care of the interest of an investor or/and of the local government, e.g., when it comes to changes in zone boundaries, inclusion of a private plot into the zone, or introduction of a new industry, etc.

For the above stated reasons, the national level takes care primarily for having trustworthy people in ZMCs in top management positions. However, unlike in private companies, where professionalism

[2] Financial result is a difference between costs (administration, infrastructure, marketing, services to investors, cost of real estate purchase) and earnings (fees and charges paid to the zone, sales of property, revenue from contracts).

is the key criterion for hiring managers, in ZMCs political affiliation, loyalty and allegiance are fundamental for receiving these well-paid jobs. Thus, people hired by ZMCs are usually recruited from among local activists of the ruling party. Changes in management occur mainly, although not exclusively, after parliamentary elections. The CEOs change rather often which may impact the quality of zone governance and its performance (the subject is discussed further below).

However, zones' functional specificity stems from two other features. Firstly, they are distinguished in a legal rather than purely physical sense. Hence, plots are often dispersed, located in various administrative regions, sometimes several hundred kilometres away from each other, e.g. a sub-zone in north-west belongs to a zone in the south-east of the country. As the zone location is not predetermined, ZMCs can compete for investment plots almost anywhere in the country.

The second distinctive feature of Polish SEZs concerns the conditions of starting up a business. Zone managers do not enjoy any legislative autonomy that would enable them to offer special concessions and better compete for investors with other operators. Each SEZ in Poland has the same package of incentives with similar requirements. As a result, the differences in the maximum value of financial incentives between them are known in advance. They result from EU regulations on State aid ceilings which are regionally diversified. Therefore, differences in the administrative capacity of the zones depend generally on two factors. Firstly, on the availability of larger-sized investment plots (which is an inheritance of the territorial concentration of industry in the command economy) and zone managers' ability to bargain for these with the local authorities. Secondly, on the professionalism and attitude that both the ZMCs and the local authorities show towards investors.

While investments in SEZs come with incentives, such as tax exemptions, fully developed investment plots, advanced technical infrastructure, and the eventual exemption from property tax, there are many requirements attached to these favourable investment conditions. The requirements include extra bureaucracy involved in preparing a permit to operate in the SEZ and minimum requirements regarding employment, investment, and capital stake. Large investors have to operate for at least five years in the SEZ, while for smaller investors, the minimum operation period is three years. Additionally, all investors must pay an annual fee to the ZMC. Investors are liable to pay back the public support with interest if they fail to meet the terms and conditions. Finally, there is a requirement that the investment does not represent a relocation, e.g. investors must prove that their investment is a new activity rather than simply the relocation of an existing business (within the European Economic Area).

The comparative information collected from interviews[3] in the Lodz Province (Table 1) indicates that investing in a zone may be more complicated than outside of SEZs. The extra services are costly in monetary terms as well as in extra red tape, lengthy procedures, less freedom for doing business, and fewer plots to choose from. Figure 1 shows how bureaucratic and complicated zone entry procedures are.

Summing up, the conditions of investing in SEZs constitute an effective selection mechanism for firms: only the strong can afford to get into the club and start working according to its rules (Trzciński *et al*., 2016). Strong firms are usually big and foreign market players. In 2015, in the whole non-financial sector, big companies accounted for only 4.5% of all investors while in the SEZs they represented as much as 53.5%. More than one-third of all firms of that size in Poland were present in the SEZs; 71% of them were firms with foreign capital.[4]

The selection mechanism is reflected in statistics on investment permits. By the end of 2018 less than 60% of granted permits translated into actual economic operations. In the opinion of 44% of the respondents, the costs entailed by investing in SEZs would exceed the benefits (KPMG, 2012).

[3] Own compilation based on 6 partly structured individual interviews with representatives of the local and regional government in the Lodz Province and with the staff of the Lodz special Economic Zone. Interviews were conducted by the authors of the article in 2017 and 2018.

[4] Based on Statistics Poland (2016) and data from the Ministry of Economy.

Table 1. Advantages and disadvantages of investing within and outside of SEZs

Component	SEZ	outside of SEZs
	(+) advantage / (-) disadvantage	
Administrative costs	-	+
Time-consuming and complex procedures	-	+
Requirements to be met by the investment project	-	+
Real estate acquisition costs	-	+
Degree of land/property development	+	-
Real estate legal status	+	-
Variety of potential locations	-	+
Limitations regarding the business profile	-	+
Assistance in recruiting labour	+	-
Advisory services (project manager)	+	-
Average amount of State aid	+	-
Total	**5+**	**6+**

Source: own compilation based on in-depth interviews with representatives of local and regional government units from the Lodz Province and the Lodz Special Economic Zone.

RESEARCH METHODOLOGY

We employed statistical and econometric methods at the level of the ZMCs to explain the relative performance of SEZs in Poland over the period 2004-2018. The set of explanatory variables (x_1-x_6), treated as a proxy for ZMC's efforts (tax allowances for ZMCs, equity of ZMCs, promotional and infrastructural outlays, number and changes in governors), were regressed on investment outlays (Y_1) and jobs created (Y_2).

We created our own database. Numerical data is available in the reports published yearly by the ministry responsible for the economy (Information about…, 2005-2019). We deflated nominal values with the price index for the sector closest to the researched phenomenon (Investment Outlays Price Index, Consumer Price Index). The year 2004 was used as the base one (for detailed description of variables and sources of statistical data see Table A1). The data on the number and changes in governors comes from NIK (2011) and from other sources (SEZs' websites and press articles).

In the first stage of the study we used cluster analysis (k-means algorithm and Ward's linkage method) to distinguish clusters of zones differing with the invested amount and the number of newly created jobs. By using the k-means method we could identify clusters that differ the most between each other. At the same time, standardized variables used in this method helped us to identify cluster centroids and estimate deviation from the mean. The disadvantage of the k-means method is the fact that it may generate strongly non-equipotent clusters. This is what happened in our case. This prompted us to apply hierarchical cluster analysis (James *et al.*, 2014; Lasek, 2002).

In the second stage we used correlation analysis (Pearson's linear correlation coefficients and Spearman's rank correlation coefficients). They let us evaluate the relationship between the performance of SEZs measured with investment outlays and jobs created and the set of explanatory variables. These variables (x_1 - x_4, Table A1) come from the reports of the Minister who supervised the SEZs. In addition, we considered the frequency of changes in the composition of boards as this factor may impact management continuity (and quality). Over the period covered by the study, one and the same person held the position of the CEO of the ZMC in KTW for 13 years and in SLP for 14 years (SEZs symbols see Table 2). On the other hand, in 8 zones CEOs changed at least five times (KRW, LGA, LDZ, MLC, PMR, SWK, TBS, and WMZ). Therefore, we decided to add our original variable (x_5) that reflects changes in the position of the CEO of ZMCs to our analyses.

Because our main goal was to identify the direction and strength of relationships, we built linear regression models (Welfe, 2009; Greene, 2003) in the last stage. Being aware that geography does matter, although it does not prejudge SEZ performance, we added to variables describing governance

quality a location variable which informs to which of the six macro-regions a zone belongs (Table 4). Central macro-region, in which there is only LDZ, was our reference point.

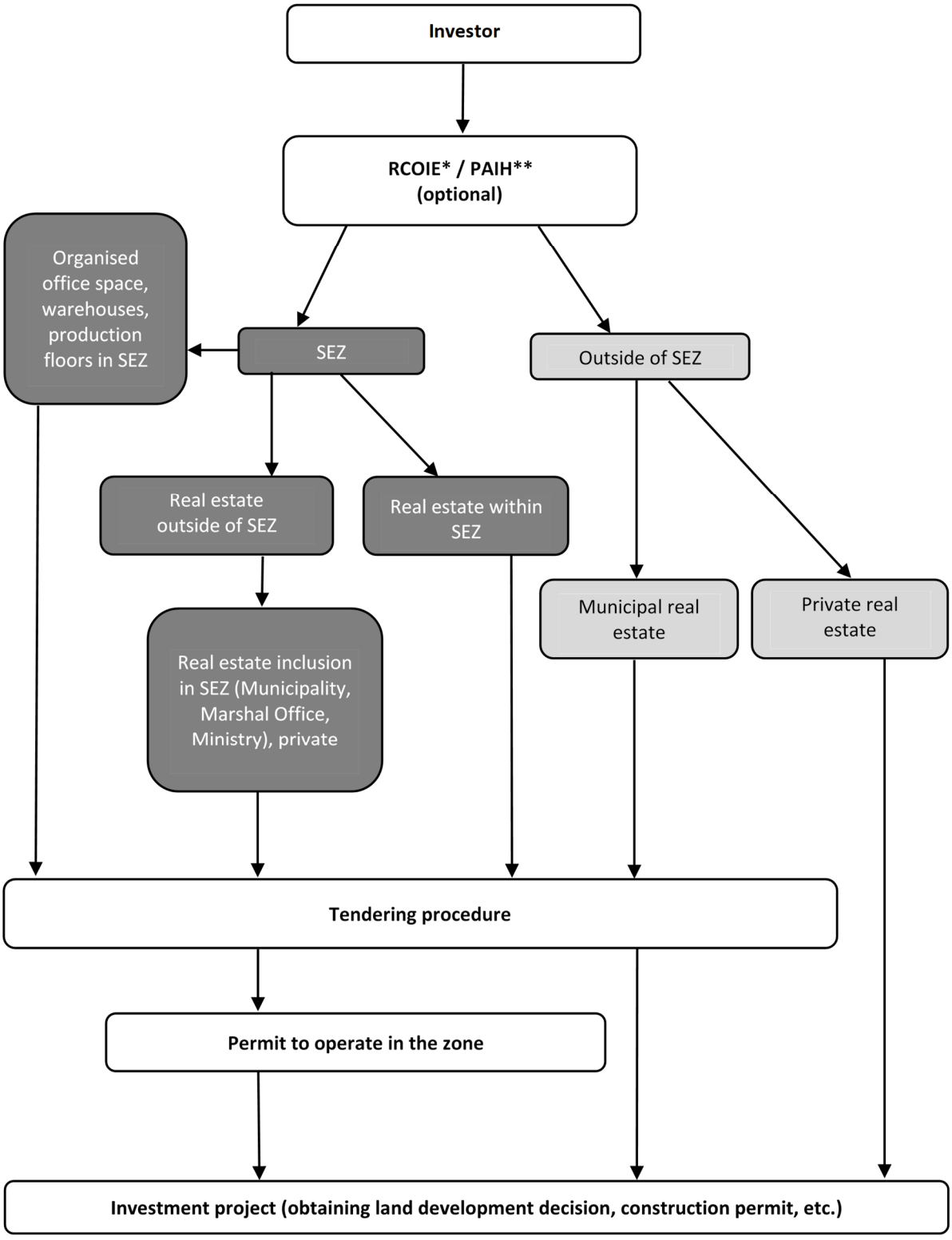

Figure 1. Investor's path to get a project started

* RCOIE – Regional Service Centre for Investors and Exporters

** PAIH – Polish Investment and Trade Agency

Source: own elaboration.

RESULTS AND DISUSSION

Location and SEZ performance: cluster analysis

Our starting point aimed at investigating how geographic location correlates with a zone's performance. To this end, each zone was assigned to one of six macro-regions in accordance with NUTS 1 classification[5] (Table 4). Based on that and using the k-means algorithm[6] we identified three clusters (Table 2). Each cluster brings together zones in which the value of real investment (Y_1) and the number of newly created jobs (Y_2) per hectare are the closest.

Table 2. Membership in clusters based on the k-means algorithm for 14 SEZs in 2004-2018

No. of observations	Special Economic Zone	Symbol	Cluster	Distance from cluster centre
1	Kamiennogórska	KMG	2	0.255
2	Katowicka	KTW	3	2.076
3	Kostrzyńsko-Słubicka	KTS	2	1.842
4	Krakowski Park Technologiczny	KRW	3	5.306
5	Legnicka	LGA	2	2.216
6	Łódzka	LDZ	2	6.383
7	Euro Park Mielec	MLC	3	3.603
8	Pomorska	PMR	2	1.665
9	Słupska	SLP	1	0.000
10	Starachowicka	STW	2	3.257
11	Suwalska	SWK	2	0.936
12	Euro-Park Wisłosan	TBS	2	1.443
13	Wałbrzyska	WBS	2	1.730
14	Warmińsko-Mazurska	WMZ	2	2.481

Source: own elaboration (calculations were performed in PS IMAGO).

Table 3. Standardised average invested amount and the number of jobs created in clusters

Item	Cluster		
	1	2	3
No. of observations in a cluster	1	10	3
Y_1	2.16	4.74	5.65
Y_2	4.33	14.01	26.62

Note: For detailed description of variables, see Table A1.
Source: as in Table 2

In the first cluster, there is only the SLP zone, for which standardised results are the lowest (Table 3). The third cluster brings together three best performing zones in which an average invested amount (Y_1) was more than twice as high as in the first cluster, while the number of newly created jobs (Y_2) was more than six times higher. The second cluster consists of as many as 10 zones. This uneven distribution did not allow to unambiguously assess the importance of the location for zones' performance.

By using Ward's method (James *et al.*, 2014; Lasek, 2002) we obtained a dendrogram, which reveals a hierarchical structure in the order of decreasing similarity in a set (Figure 2). This, in turn, allowed us to distinguish three clusters of zones differing with the invested amount and the number of newly created jobs (Figure 3):

a) group 1: KTS, WMZ, STW, and SLP,
b) group 2: LGA, TBS, SWK, KMG, and PMR,
c) group 3: KTW, MLC, LDZ, WBS, and KRW.

[5] The division was binding between 2004 and the end of 2017 (Regulation (EC) No. 1888/2005 of the European Parliament and of the Council of 26 October 2005). Having more than 50% of the total invested amount in the subzones of a specific macro-region was the criterion for assigning zones to macro-regions. We used unpublished data of the Ministry of Development.
[6] https://www.naftaliharris.com/blog/visualing-k-means-clustering.

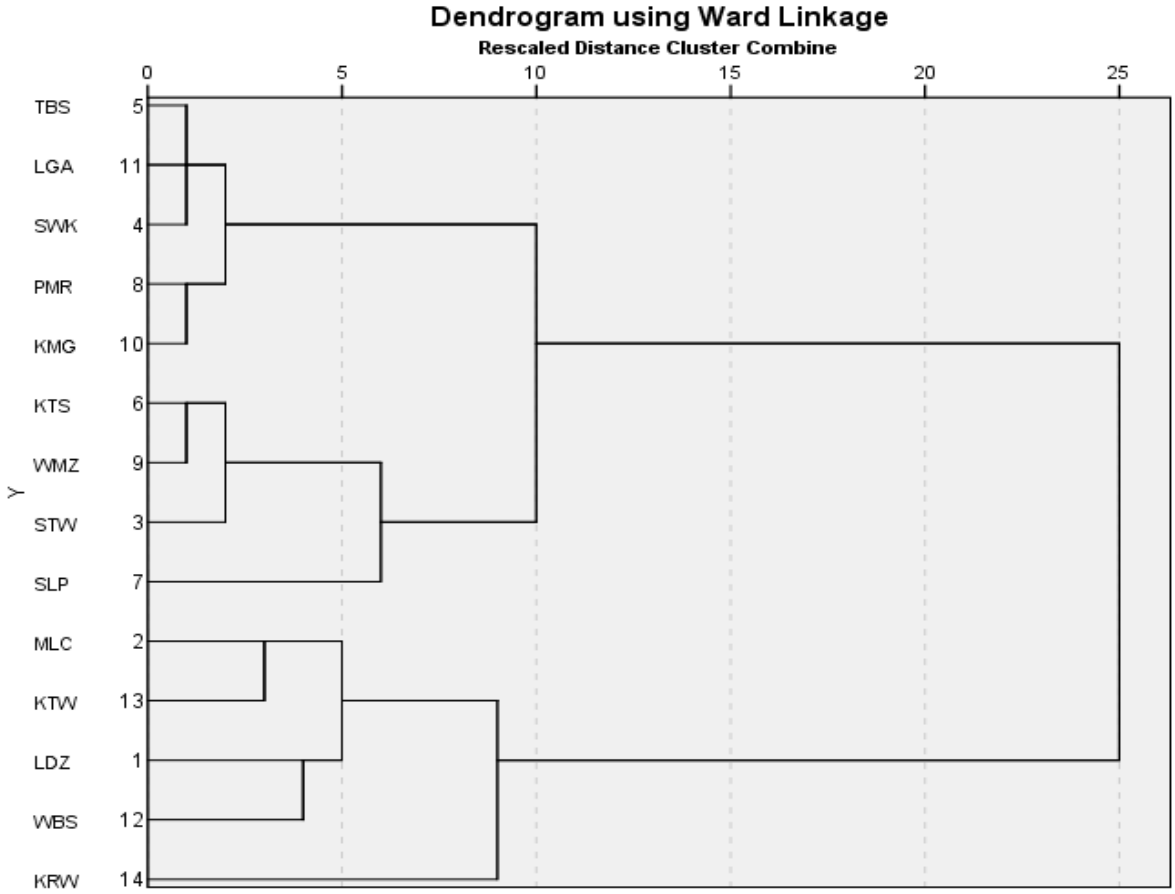

Figure 2. Dendrogram obtained using Ward's linkage method for 14 SEZs
Source: own elaboration.

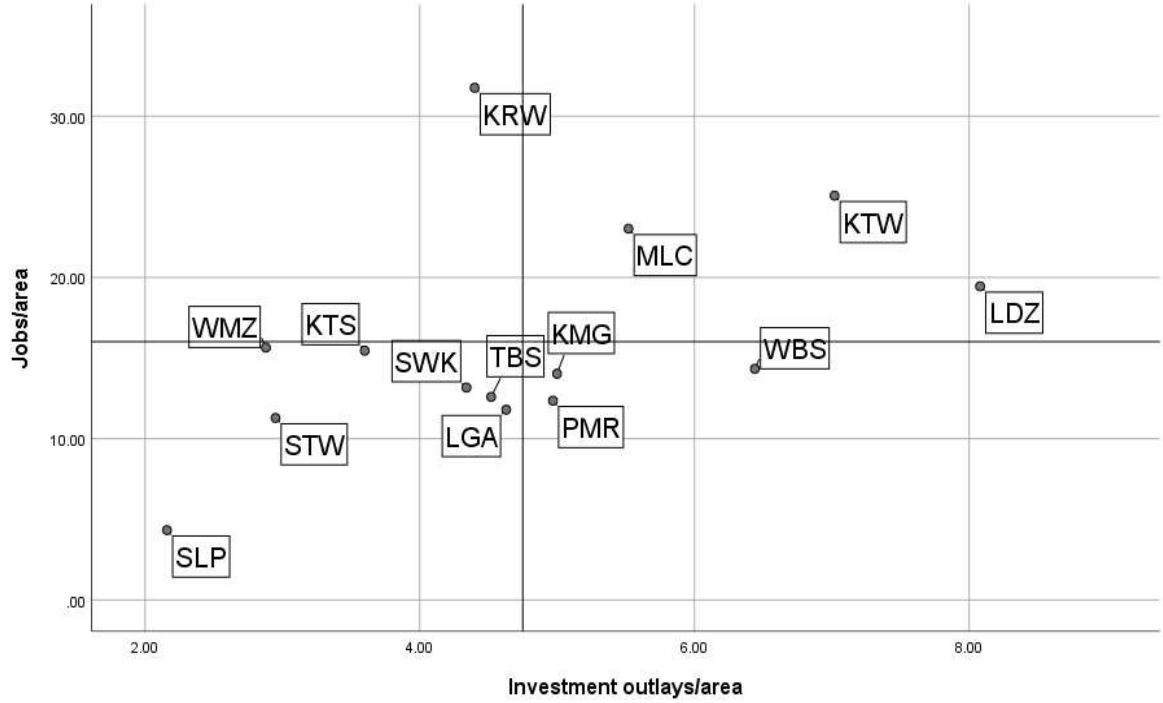

Figure 3. Investment outlays per ha (Y1) and the number of jobs created per ha (Y2) in SEZs
Source: own elaboration.

Based on the above, we can conclude that there is no unambiguous relationship between the membership in a particular cluster and zone location. Zones from groups 1 (worst performing) and 2 (mid) are distributed across three, and from group 3 (the best) across as many as four, macro-regions. Importantly, zones in the eastern macro-region represent all clusters while the northern and south-western macro-regions host zones from two clusters (Table 4). This can be used as evidence substantiating the assertion that the location does not prejudge the attractiveness of a SEZ, as other factors, such as, e.g., the efforts of ZMCs may be important to investors[7].

Table 4. Membership in clusters and zones in macro-regions

Cluster	Zone	Macro-region
GROUP 1	KTS	Northwestern
	WMZ	Northern
	STW	Eastern
	SLP	Northwestern
GROUP 2	LGA	Southwestern
	TBS	Eastern
	SWK	Eastern
	KMG	Southwestern
	PMR	Northern
GROUP 3	KTW	Southern
	MLC	Eastern
	LDZ	Central
	WBS	Southwestern
	KRW	Southern

Source: own study.

Zone governance and its performance: correlation analysis

With data we had, zone operator's efforts to attract and retain new investors could be assessed only indirectly. We used a group of variables which can be controlled by operators and are used as instruments when competing with other zones. Table 5 shows correlation between the inflow of investment (Y_1) and the number of jobs (Y_2) in the zones and our variables reflecting the quality of performance of their operators. Our calculations were made for macro-regions, in accordance with geographic designation of zones.

Table 5. Correlation coefficients for 14 SEZs grouped in 6 macro-regions

Macro-region	Y_1					Y_2				
	x_{1t}	x_{2t}	x_{3it-1}	x_{4it-1}	x_{5it}	x_{1t}	x_{2t}	x_{3it-1}	x_{4it-1}	x_{5it}
Northern		0.645	0.782	0.741				0.476	0.473	
Southern	0.588				-0.642		0.561		0.696	
Eastern				0.626	0.721		0.516		0.466	0.326
Northwestern			0.822	0.817	0.803		0.459	0.882	0.891	0.730
Central	-0.587*	-0.646	0.638	0.797	0.706		-0.709		0.728	0.783
Southwestern	0.465	0.494	0.530	0.344						-0.423

Note: For detailed description of variables, see Table A1. The Table shows statistically significant ($p<0.05$) Pearson's linear correlation coefficients. * Statistically significant ($p<0.05$) Spearman's rank correlation coefficient.
Source: own study.

The values of Pearson's linear correlation coefficients and Spearman's rank correlation coefficient reveal a statistically significant, positive, and at least moderate relationship between the performance

[7] The size and age of a zone may impact its performance. The first one was indirectly accounted for by calculating the amount invested and jobs created per 1 hectare. The second factor seems little relevant to Poland. Zones were established between 1995 (MLC) and 2001 (PMR) and initially they grew very slowly. Investors' interest (especially from other countries) skyrocketed when Poland joined the EU in 2004. Our study begins in 2004, meaning the zones were more or less at the same level of maturity.

of zones grouped in macro-regions, measured with Y_1 and Y_2, and promotion outlays in the preceding period (x_{3it-1}), as well as the equity of ZMCs (x_{2t}). Central macro-region was the only exception where we observed a negative relationship between variable x_{2t} and values Y_1 and Y_2.

We can also observe a statistically significant, positive, and strong correlation relationship between SEZ performance and infrastructural outlays in the preceding period (x_{4it-1}). In southern, southwestern, and central macro-regions invested amounts (Y_1) moderately correlate with tax allowances for ZMCs (x_{1t}). Remarkably, no statistically significant relationships have been found between Y_2 and tax allowances for ZMCs (x_{1t}).

Correlation analysis shows that in most macro-regions the relationship between the frequency of changes in the position of CEO in ZMCs (x_{5it}) and zone performance is statistically significant. Changes in the CEO position positively correlated with invested amounts in northwestern, eastern, and central macro-regions and negatively correlated in the southern macro-region. For Y_2 (newly created jobs) a negative relationship was obtained only for the southwestern macro-region, while northwestern, central, and eastern macro-regions reported positive correlation. It means that analysis conducted at the level of regions does not allow to unambiguously assess the importance of the stability of the composition of the Management Board of a ZMC for the inflow of investment or the number of newly created jobs, although such a relationship is usually statistically significant. This ambiguity of results encouraged us to examine the correlation for individual zones (Table 6).

Table 6. Correlation coefficients for variables Y1 and Y2 and explanatory variables for zones

Zone	Y_1					Y_2				
	x_{1t}	x_{2t}	x_{3it-1}	x_{4it-1}	x_{5it}	x_{1t}	x_{2t}	x_{3it-1}	x_{4it-1}	x_{5it}
KMG		-0.757	0.707	0.750	0.727		-0.583		0.635*	0.567
KRW	0.703	0.587		0.790	0.670	-0.819*	0.678		0.719*	0.824
KTS	-0.924	-0.924		0.943	0.890		-0.801		0.879	0.797
KTW		0.673								
LDZ	-0.587	-0.646	0.638	0.797	0.706		-0.709		0.728	0.783
LGA				0.669	-0.595			0.682*	0.542	
MLC				0.585	0.603				0.575	
PMR		0.539		0.638			-0.869		0.832	-0.557
SLP					0.512	-0.578*	-0.713*	0.738*	0.875	0.512
STW		-0.789		0.785	0.787				0.605	
SWK		-0.693	0.661	0.690*	0.726	-0.756		0.655*	0.572	
TBS	0.848			0.850	0.831					
WBS							-0.613		0.631	-0.742
WMZ				0.572						0.638

The Table shows statistically significant ($p<0.05$) Pearson's linear correlation coefficients. * Statistically significant ($p<0.05$) Spearman's rank correlation coefficients.
Source: own study.

For most SEZs coefficients suggest a statistically significant, positive, and at least moderate correlation between the performance measured with Y_1 and Y_2 and infrastructural outlays from the previous period (x_{4it-1}). In most zones Y_1 and Y_2 significantly correlate with the equity of ZMCs (x_{2t}), while in some with promotional outlays from the previous period (x_{3it-1}) and with tax allowances available to ZMCs (x_{1t}). Besides, there is a clear, usually positive, relationship between the changes in the top management of ZMCs and zone performance. In this case, positive signs are connected with the fact that variable x_5 is a cumulated value.[8] We need to mention three zones, i.e., LGA, PMR, and WBS where changes in the composition of the Board negatively correlated with SEZ performance.

[8] Replacing x_5 with a zero-one variable x_6 in the analysis did not produce any statistically significant relationships (Table A1).

Zone governance and its performance: regression analysis

So far we have learned that the governance quality of ZMCs may contribute to the success or failure of a SEZ. 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[9] and taking account of potential explanatory variables:[10]

$$\mathrm{Y}_{1it} = \beta_0 + \cdots + \beta_1 \cdot \mathrm{X}_{1it} + \beta_2 \cdot \mathrm{X}_{2it} + \beta_3 \cdot \mathrm{X}_{3it} + \beta_4 \cdot \mathrm{X}_{4it} + \beta_5 \cdot \mathrm{X}_{5it} + \beta_6 \cdot D_{1it} + \\ + \beta_7 \cdot D_{2it} + \beta_8 \cdot D_{3it} + \beta_9 \cdot D_{4it} + \beta_{10} \cdot D_{5it} + \varepsilon_{it} \quad (1)$$

$$\mathrm{Y}_{2it} = \beta_0 + \cdots + \beta_1 \cdot \mathrm{X}_{1it} + \beta_2 \cdot \mathrm{X}_{2it} + \beta_3 \cdot \mathrm{X}_{3it-1} + \beta_4 \cdot \mathrm{X}_{4it-1} + \beta_5 \cdot \mathrm{X}_{5it} + \beta_6 \cdot D_{1it} + \\ + \beta_7 \cdot D_{2it} + \beta_8 \cdot D_{3it} + \beta_9 \cdot D_{4it} + \beta_{10} \cdot D_{5it} + \varepsilon_{it} \quad (2)$$

where:

Y_{1it} - is *investment outlays/area* in PLN million/ha for the *i*-th SEZ in the period *t*;
Y_{2it} - is j*obs/area* number of/ha for the *i*-th SEZ in the period *t*;
X_{1it} - is *tax allowances for ZMCs t* in PLN million for the *i*-th SEZ in the period;
X_{2it} - is *equity of ZMCs* in PLN for the *i*-th SEZ in the period *t*;
X_{3it-1} - is *promotion outlays* in PLN million for the *i*-th SEZ in the period *t*-1;
X_{4it-1} - is *infrastructure outlays* in PLN million for the *i*-th SEZ in the period *t*-1;
X_{5it} - is *number of governors* cumulated for the *i*-th SEZ in the period *t*;
D_{1it} - northern macro-region in the period *t*;
D_{2it} - southern macro-region in the period *t*;
D_{3it} - eastern macro-region in the period *t*;
D_{4it} - northwestern macro-region in the period *t*;
D_{5it} - southwestern macro-region in the period *t*.

Table 7 presents the optimum form of model 1 (for Y_1) obtained in a step-wise method. The value of a revised determination coefficient is statistically significant and is close to 0.6, meaning the model fits the sample well.

Table 7. Estimated parameters of an optimum regression model of variable Y_1

Variable	*Unstandardised coefficients*		*Standardised coefficients*	*p*-value
	Parameter estimate B	Standard error B	β	
x_{1it}	0.150	0.071	0.128	0.036
x_{3it-1}	1.791	0.320	0,358	0.000
x_{5it}	-0.178	0.085	-0,131	0.039
D_{1it}	-1.275	0.344	-0.231	0.000
D_{3it}	-1.610	0.369	-0.292	0.000
D_{4it}	-3.851	0.342	-0.698	0.000
Constant	5.191	0.367	X	0.000
R^2	0.597	F(6;125)=30.8411		
Within R-squared	0.577	(*p*<0.0001)		

Note: For detailed description of variables, see Table A1.
Source: own study.

Estimates have demonstrated that increases in tax allowances for ZMCs (x_{1it}) and in promotional outlays from the previous year (x_{3it-1}) exerted positive impact upon amounts invested in SEZs (Y_1) while frequent changes in the position of CEO had detrimental effect (x_{5it}). Other variables turned out to be

[9] Collinearity of explanatory variables was tested using the VIF coefficient; linearity of the relationship was tested using the non-linearity test; Shapiro-Wilk test was used to test the normality of the distribution of the random factor; for heteroskedasticity of the random factor we used the Breusch-Pagan test; autocorrelation of the random factor of the 1st order -AR(1) was tested with Durbin-Watson test, time series stationarity was tested with the ADF test, and the stability of parameters over time with the Chow test (Welfe, 2009, pp. 60-61).
[10] For detailed description of variables, see Table A1.

statistically insignificant. β coefficients show that investment inflow depended mostly on promotional outlays, changes in the composition of ZMCs boards, and tax allowances.

Surprisingly, in light of earlier correlation analyses, variable x_{5it} came with a 'minus'. When testing simple correlation relationships for zones and macro-regions, dependencies between Y_1 and x_{5it} which were statistically significant had opposite signs (plus and minus).

Nevertheless, we need to bear in mind that in the regression model, unlike in the case of correlation, the dependence is not a simple relationship between two variables but an indicator of the direction and strength of the relationship measured under the assumption that other factors remain constant.

Statistically significant parameters were obtained for three qualitative variables ($D1_{it}$, D_{3it}, and D_{4it}) that identify geographic designation of SEZs. It confirms that the location matters for investor decision. Negative signs at these parameters suggest that its impact on amounts invested in northwestern, eastern, and northern macro-regions is smaller than in central and southwestern macro-regions.

Table 8 presents the optimum format of model 2 (for Y_2). The value of revised determination coefficient from the sample (0.7) is statistically significant. β coefficients show that promotional outlays (x_{3it-1}) were crucial for creating new jobs in the zones, ZMCs' equity (x_{2t}) also played a relatively important role. More frequent changes in the composition of Boards of ZMCs turned out to be a positive factor as they contributed to increased employment in the SEZs. Other explanatory variables, including tax allowances for ZMCs, are statistically insignificant. Parameters for qualitative variables D_{3it} and D_{4it} were negative, while the one for D_{2it} was positive. Being part of the southern macro-region exerted a relatively more positive impact upon the number of newly created jobs. On the other hand, like in model 1, zones from the eastern and northwestern macro-regions underperformed in this area.

Table 8. Estimates of parameters of an optimum regression model for variable Y_2

Variable	*Unstandardised coefficients*		*Standardised coefficients*	*p*- value
	Parameter estimate B	Standard error B	β	
x_{2t}	1.287E-8	0.000	0.177	0.002
x_{3it-1}	5.566	0.804	0.377	0.000
x_{5it}	0.548	0.220	0.138	0.014
D_{2it}	8.323	0.953	0.512	0.000
D_{3it}	-1.894	0.899	-0.116	0.037
D_{4it}	-6.653	0.960	-0.409	0.000
Constant	11.664	1.006	X	0.000
R^2	0.707	F(6;125)=50.346		
Within R-squared	0.693	(p<0.0001)		

Source: own study.

It is difficult to confront our findings with those of other authors as we did not come across similar studies. As far as Poland is concerned, Jensen (2018, p. 887) observed that "*the exact role of the zones' administrations in creating the policy outcome is an important topic to be addressed in future research*". The only econometric study known to us that assesses the impact of governance on the zone performance (measured by investments and exports) is the one carried out by Aggarwal (2005). But unlike in our study, *governance* was an aggregated variable whose numerical value was obtained in a primary survey conducted among investors in zones in India, Bangladesh, and Sri Lanka. They agreed that it is an important determinant of the attractiveness of zones. However, after estimating models' parameters governance turned out to be relevant for investment but not for export performance.

CONCLUSIONS

The objective of the article was to assess why some ZMCs are more successful at attracting more investment and jobs. Our starting point was to check whether we can find the best and worst-performing ZMCs in every region of Poland. In the south and south-west, we can find both the best performing SEZs, such as WBS, KWT or KRW, and one of the worst – KMG and LGA. In the north, the

successful PMR coexists with the poorly performing WMZ and SLP (north-west). In the east, we have one of the least successful STW, while MLC is doing quite well. These examples suggest that the advantage of having a better zone location (in terms of geography, infrastructure, resources, and cultural or even historical contexts) is relative, and other factors may be at play too. The quality of governance (administration) could be one of them.

Our analysis has demonstrated that this presumption may be correct. We have shown that although location is decisive (making zones in the south & central more successful relative to the rest, see Figure A1 in Appendix) the zone management style also impacts SEZs' performance.

ZMC promotional activity is the most important factor. Tax allowances granted to a ZMC are crucial for total amounts invested in SEZ, while ZMC's equity is important for the number of newly created jobs. Apparently, financial and operational autonomy of the ZMC translates into better performance of a zone in these two fields and not very attractive location does not preclude growth opportunities of a SEZ as long as it is managed in a professional way. Changes in the SEZ's top management have a dubious impact – positive in the case of extra jobs and negative in the case of investment inflows.

Summing up, our findings on the relative importance of individual ZMCs in the overall design suggest that: (1) zone administration does matter; (2) competition between ZMCs may be an important aspect, especially as they can open subzones in different macro-regions; (3) zone location determines the ZMC performance in the first place.

Following these conclusions, we recommend limiting the centralisation of decision-making powers in zone policy. On the one hand, it would mean strengthening the role of regional authorities, who have much better knowledge about available plots, their location, and what industries they would like to host in their territories. There is also the more important issue of delegating more powers and resources to the managing companies; being in direct contact with investors surely impacts zone performance. Equipped with additional prerogatives, they could, e.g., more effectively assist in removing infrastructural barriers, help with organising vocational trainings, and facilitate contacts with local businesses.[11]

The results of our study should be approached with caution. First, the explanatory variables only indirectly indicate governance quality, but no better data were available. Second, zones are usually dispersed across more than one region, meaning they are subject to different State aid ceilings.

Third, another simplification stems from our criterion for assigning a zone to a specific macro-region. We used a threshold of more than 50% of the total invested amount in the subzones located there.[12]

Further research could examine the quality of zone governance from investors' perspective through questionnaire-based analysis. Another point worth considering is geography.

Macro-regions cover big areas which are not homogenous as far as economic situation is concerned. Zones in different parts of e.g., the southern macro-region do not offer the same location advantages to investors, as assumed for our study. Therefore, by disaggregating macro-regions into smaller territorial units we could shed more light on the role of zones' governance in Poland.

[11] The results of a study carried out by KPMG suggest that in all zones (except one) investors assessed "the quality of cooperation with SEZ managing authority" clearly better than infrastructure and human resources. Sometimes the rating was higher by even 1 point (on a 5-point scale) and for ten zones it exceeded 4 (with 5 being the maximum score). The sample included 234 enterprises, with at least 10% of investors from each zone. The study was conducted as a computer assisted telephone interview (CATI) with top managers (KPMG, 2014).

[12] The problem has been reduced since 2018. The territorial competencies of ZMCs were specified in the Act of 10 May 2018 on support for new investments (Dz.U. [Journal of Laws] of 2018, item 1162) entered into force on 30 June 2018).

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Appendix:

Table 1. Explained and explanatory variables

No	Variable	Measurement unit (as at 31.12)	Symbol	Explanatory notes
Explained variables				
1.	Investment outlays/area*	million, PLN/ha	Y_1	Cumulated, by companies with valid permits/area**
2.	Jobs/area	number of/ha	Y_2	Cumulated, existing and new/area.
Explanatory variables				
3.	Tax allow-ances for ZMCs	million, PLN	X_1	Yearly, calculated as percentage of the revenue earmarked for the development of the zone, e.g. infrastructure and promotion outlays**
4.	Equity of ZMCs	PLN	X_2	Including State Treasury and other shareholders** Data for 2 SEZs have been skipped. MLC and TBS equity be-long to the same ZMC – Industry Development Agency. There is no information about the shares of the two in total.
5.	Promotional outlays	million, PLN	X_3	Cumulated, by ZMCs***
6.	Infrastructural outlays	million, PLN	X_4	Cumulated, by ZMCs, excluding infrastructure outlays spent in SEZs by gminas, poviats, suppliers of gas, water, electric-ity, sewage and General Directorate for National Roads and Motorways. Those "external" (to ZMCs) outlays were usu-ally much higher****
7.	Number of gover-nors/CEOs	number of	X_5	Cumulated
8.	Change in gov-ernors/CEO position	dummy var.	X_6	Governor = President of ZMC

* The areas of the zones are affected by both land inclusion (more often) and exclusion (less often). There are four main reasons for land exclusion:
1) the loss/termination of a permit by an investor operating in the area;
2) zone area has been earmarked for public infrastructure projects (e.g. motorway);
3) a plot sale for non-zone investment projects;
4) no investment projects in the area.
The last one was the most frequently observed. ZMCs are obliged to make a review of undeveloped areas. If there are no investors for approx. ten years (there is no strong regulation about it) they can remove them from the zone. No statistics are available but the phenomenon is not very common as it covers probably less than 5% of the zone area.
** Variable deflated with the Investment Outlays Price Index (Statistics Poland). The first year of the analysis was taken as a base for comparisons.
*** Variable deflated with the Consumer Price Index (CPI) (Statistics Poland). The first year of the analysis was taken as a base for comparisons.
**** Variable deflated with the Investment Outlays Price Index (sub-category: Buildings and Structures) (Statistics Poland). The first year of the analysis was taken as a base for comparisons.
Variables 1-6: all data come from the Information about the Implementation of the Act on Special Economic Zones, Ministry of Economy and Labour, Ministry of the Economy, Ministry of Economic Development, Ministry of Entrepreneurship and Technology, (2005-2019).
Variables 7&8: authors' own elaboration based on NIK (2011) and other sources (SEZs' websites and press articles).
Source: own study.

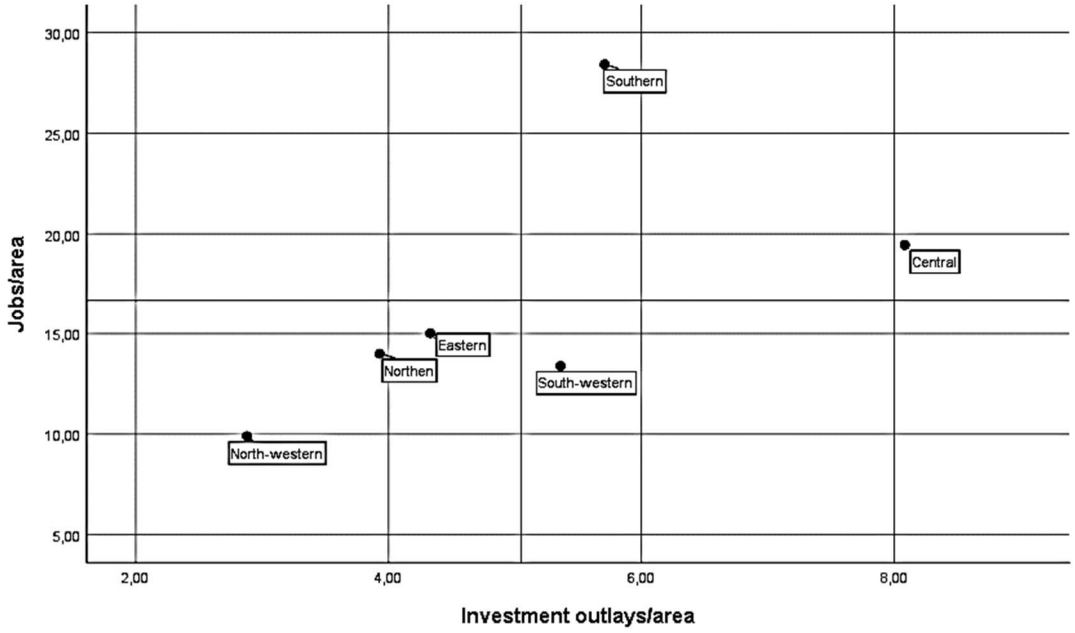

Figure A1. Investment outlays per ha (Y1) and the number of jobs created per ha (Y2) in 14 SEZs grouped in 6 macro-regions

Source: own elaboration.

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The contribution share of authors is equal and amounted to ⅓ each of them.

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Conflict of Interest

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