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Investment Decisions and Their Impact on Job Creation at Energy Sector Enterprises in Poland

Decyzje inwestycyjne i ich wpływ na tworzenie miejsc pracy w przedsiębiorstwach sektora energetycznego w Polsce

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ABSTRACT

Objective: The main objective of the research was to confirm the existence of a relationship between the investment outlays energy companies make and the number of workers they employ. The existence of this relationship would indicate the presence of a correlation between investment outlays and jobs created.

Research Design & Methods: The objects of the research were energy companies operating in Poland divided into size classes (small, medium, large). To confirm the assumed research hypothesis, the rate of change of two quantities – capital expenditures and number of employees – was analysed in equivalent periods and taking into account the delay effect ($t + 1$). The study

of the relationship between quantities was done with correlation analysis. Linear regression analysis was used to simultaneously determine the level of interdependence of variables R^2 and the Pearson coefficient.

Findings: The results confirmed significant variation in the development over time of the two quantities, as well as their mutual relations divided into size classes of enterprises. The correlation analysis showed a low degree of interdependence in small and medium-sized enterprises and a high level in large ones. However, the negative direction of this interdependence in large enterprises was a surprise.

Implications/Recommendations: The research results indicate that the high investment intensity in the energy sector results in an increase in the automation of manufacturing activities but does not necessarily involve changes in human resources. However, these relations may be differentiated by enterprise size classes.

Contribution: The article contributes to the knowledge base on measures of enterprise development and the relationships between them. It could provide a methodological basis for conducting similar research in other industrial sectors.

Article type: original article.

Keywords: investments, employment, job creation, energy sector enterprises, measures of development.

JEL Classification: O14, L16, Q48.

STRESZCZENIE

Cel: Celem badań było potwierdzenie istnienia relacji pomiędzy nakładami inwestycyjnymi ponoszonymi przez przedsiębiorstwa energetyczne a liczbą osób w nich pracujących. Występowanie tej relacji wskazywałoby na istnienie korelacji pomiędzy nakładami inwestycyjnymi a tworzonymi następnie miejscami pracy.

Metodyka badań: Przedmiotem badań były przedsiębiorstwa energetyczne funkcjonujące na terenie Polski w podziale na klasy wielkości (małe, średnie, duże). W celu potwierdzenia hipotezy badawczej dokonano analizy zmian dwóch wielkości (nakłady inwestycyjne, liczba pracujących), a także tempa ich zmian zarówno w okresach równoważnych, jak i z uwzględnieniem efektu opóźnienia ($t + 1$). Badanie relacji pomiędzy wielkościami polegało na analizie korelacji. Wykorzystano analizę regresji liniowej, wyznaczając jednocześnie poziom współzależności zmiennych R^2 oraz współczynnik Pearsona.

Wyniki badań: Uzyskane wyniki potwierdziły znaczne zróżnicowanie kształtowania się w czasie badanych wielkości oraz ich wzajemnych relacji w podziale na klasy wielkości przedsiębiorstw. Przeprowadzona analiza korelacji wykazała niski stopień współzależności w przedsiębiorstwach małych i średnich, a także wysoki poziom w dużych. Zaskoczeniem był natomiast ujemny kierunek tej współzależności w przedsiębiorstwach dużych.

Wnioski: Wyniki badań wskazują, że duża intensywność inwestycyjna w sektorze energetycznym skutkuje raczej wzrostem automatyzacji działań wytwórczych i nie musi wiązać się ze zmianami w potencjale osobowym, jednak relacje te mogą być zróżnicowane w podziale na klasy wielkości przedsiębiorstw.

Wkład w rozwój dyscypliny: Artykuł wzbogaca nurt badań w zakresie mierników rozwoju przedsiębiorstwa oraz występujących pomiędzy nimi zależności. Może stanowić podstawę metodologiczną do prowadzenia podobnych badań w innych sektorach przemysłu.

Typ artykułu: oryginalny artykuł naukowy.

Słowa kluczowe: inwestycje, zatrudnienie, tworzenie miejsc pracy, przedsiębiorstwa sektora energetycznego, mierniki rozwoju.

1. Introduction

The energy sector is defined as a part of fuel and energy sector involved in the production, transmission and distribution, and trade of electricity. According to the description in the Polish Classification of Activities (PKD), electric power engineering is included in group 35.1, section D, PKD symbol 35, namely "Production, transmission, distribution and trade of electricity". The electric power industry is a "base sector", meaning it has a significant impact on the development and competitiveness of other areas of the economy, particularly industry (Daniluk 1999, Ecke *et al*. 2017). The strategic nature of the power industry, apart from its importance for the economy, is also demonstrated by its role as an independent industrial sector employer (68,000 in 2020). The industry also commanded a 16% share of overall industrial sector investment outlays in that year.

This significant role of the energy sector in the economy meant that, from the beginning of the political changes in Poland, the transformation of the sector and individual energy companies have been treated very seriously. However, over the last three decades, both the needs and directions of transformation have changed numerous times. In the first decade of change (the 1990s), the main focus was on creating a new operating model for the sector, both in terms of legal and institutional conditions as well as its ownership structure. The second decade saw changes in the corporate structure of the sector, horizontal and vertical integration of enterprises, gradual liberalisation of the energy market through the introduction of competition, the principle of third-party access to the network (TPA) and the legal separation of activities (unbundling) (Kwiatkowski 2008, Makaruk 2008, Gugler, Rammerstorfer & Schmitt 2013, Szymla 2014). The second decade was also a time of rising anxiety related to the growing awareness of the need to restore aging power generation and network assets. However, at the end of this decade, a challenge was mounted to the EU's energy and climate package, which were announced in 2007 and 2008 (Szymla 2013, Kowalke & Prochownik 2014, Peña & Rodríguez 2019). The stigma of the EU's climate policy is undoubtedly a hallmark of the past decade and a harbinger of difficult transformations to come in the next decades. Currently, in

the era of still tightening emission reduction targets and other requirements set forth under the EU's climate policy (Rosenow *et al*. 2017, Tagliapietra *et al*. 2019), the need to transition to new sources of power generation and to adapt the transmission and distribution network to the needs of distributed generation based on Renewable Energy Sources (RES) has come to the fore (Zamasz 2015, Oliva *et al*. 2022). This transition, planned for the coming decades, will require huge investments. It is estimated that by 2040, capital expenditures will amount to approximately PLN 320–342 billion for energy generation sources alone (*Energy…* 2021). According to various forecasts, investment outlays are to be accompanied by a significant increase in employment, especially in industries related to RES. According to a forecast prepared by the Jagiellonian Institute think tank, employment as a result of the transition may increase by 616,000 people by 2040 (Moskwik, Krupa & Roszkowski 2021). According to another forecast, in 50 countries of the world, including Poland, in the RES sector alone, employment would increase fivefold by 2050, of which 85% of new employees would find a job in the wind energy and photovoltaic sectors (Siedlaczek 2021).

Such far-reaching conclusions regarding the connection of investment outlays and employment prompted us to examine their legitimacy. This discussion will be both a continuation and development of research we have already conducted, both in terms of the dynamics and directions of development of enterprises in the power sector (Szymla 2015, 2016, 2020), as well as the relationship between investment outlays and the size of employment (Kolegowicz 2017, 2019). The main thesis of the article is that increasing investment outlays will be accompanied by rising employment in the sector. If this thesis bears out, another question will arise: to what extent the investment outlays made by energy companies contribute to the creation of jobs in the sector.

The article is a part of a wider series that study the basic measures of enterprise development and the relationships between them in individual economic activities and industry sectors, with special regard to division by size classes of enterprises.

2. Literature Review

Investment decisions taken in enterprises cover all kinds of economic expenditures for the reproduction of all types of tangible and intangible economic resources including human, material and monetary ones. Investment decisions are of crucial importance to an enterprise's long-term survival. Such decisions form the foundation of an enterprise's development and its long-term effectiveness (*Finanse przedsiębiorstwa…* 1999, p. 361). They also enable the company, through reconstruction decisions, to maintain its current position and to increase its potential. The importance of investment decisions in shaping the directions and scale of further business operations makes these decisions crucial to the company's operations (Levy &

Post 2005, Zygmunt 2013). They condition the further development of all economic entities and their business activities that make up the whole of the management processes in individual countries. Investment decisions determine the spending of funds on economic objects, securities or intangible assets, the latter including rights enabling the execution of economic processes, the recovery of capital and an increase in an enterprise's potential (Towarnicka 1996, Walica 1998). Methods for measuring the economic effects of investments including fixed assets growth, employment growth and fixed assets per employee have been reported on in the subject literature (Kolegowicz 2019). The interdependence of investments and technical progress is reflected in these methods.

Investments can be further defined as investment activities that are based on certain management decisions intended to increase an enterprise's potential. They determine the enterprise's future development and its current operations. They can be treated as the foundation for implementing the overarching objective of the company's operations – to maximise its value (Jaki 2012). It can be stated, therefore, that investment decisions significantly influence the future direction of a company's development. H. Towarnicka (2003) defines investment decisions as "strategic economic decisions".

Taking into account these definitions of investments and the many similar ways of understanding them, presented in the subject literature (see also: Koc & Waślicki 2001, Felis 2005, Henzel 2005, Rudkowski 2006, Michalak 2007, Smoleń & Urban 2010, Kasprzak-Czelej 2013, Jensen & Jones 2020), investing is the act of an enterprise spending money to obtain economic effects in a current period or deferred in time.

The significance of time and its impact on investment effects comes from the thus understood essence of investments. Investment decisions as a subject of the development activity of enterprises, national economy and its particular areas are characterised by higher risk and uncertainty occurring at every stage of the investment process, including expenditures, expected outcomes, payback period, the need to accumulate significant cash and more. The purpose of the investment, and the expenditure incurred for its implementation, is to obtain desired effects, including substantive effects, structural, micro- and macroeconomic quantitative, qualitative and social effects. Of particular importance are the effects that create the material and non-material and legal conditions for further development by increasing both the production potential and the degree of utilisation and efficiency of managing available resources.

It is worth mentioning that the economic effects of investments significant for the future development of enterprises are obtained with the size and structure of investment expenditures appropriate from the point of view of development goals. What is important is not only their size and dynamics, but also the directions of

investing. When they are subordinated to rationally defined development goals, investments ensure that those goals are achieved. They therefore largely depend on the reliability, comprehensiveness and accuracy of analyses and assessments of the purposefulness and feasibility of investments made in the preliminary stage of their implementation, taking into account their type, scale, location, and the investor (Kolegowicz 2017).

The main goal of the article is to analyse the relation of investment decisions and their impact on employment in energy sector enterprises in Poland, according to the size classes of those enterprises. Of course, the situation on the labour market depends on the great number and variety of phenomena and processes taking place in the economy. As the subject literature and empirical research make clear (Gawrycka 2002, Wiśniewski & Salejko-Szymczak 2004, Tokarski, Roszkowska & Gajewski 2005, Beard, Ford & Kim 2014, Gawrycka & Szymczak 2015, Szymczak 2017, Kolegowicz 2019), the investment process is closely correlated with the number of jobs generated. Investments carried out by enterprises allow for the creation of new jobs, while constant investment enables existing jobs to be maintained. At the same time, not all investments generate new jobs or contribute to the maintenance of existing jobs, as they can only increase the level of labour productivity. The impact of investment on labour productivity can be complex, especially in a low-growth economy. Maintaining existing jobs can be difficult due to the need to adjust the quality and level of employees' qualifications to the positions enterprises offer (Bremond, Couet & Salort 2005).

On the other hand, increasing labour productivity improves the efficiency of operations, which makes enterprises more competitive. And investments that increase competitiveness may be conducive to increasing employment levels. Critical analysis of the subject literature allows us to observe that, despite the discrepancies in defining the scope of factual investment decisions, there is no doubt that fixed assets are consistently the area that is most frequently invested in (Zygmunt 2013).

3. Data and Methodology

The subject of the research was the analysis of changes in investment outlays and the number of employees as well as the relationship between the analysed variables. The analysis was carried out on the group of non-financial enterprises classified as the economic activity class PKD 35.1, referred to as the energy sector, employing more than 9 people. The results were presented in a breakdown into four groups: total enterprises (more than 9 people), small (employing 10–49 people), medium (50–249) and large (more than 249 people). Micro enterprises (0–9 employees) were not included in the research due to the high share of self-employment entities, i.e. those that do not conduct investment activities aimed at improving their competitiveness, increasing their productivity, and, as a result, increasing employment.

Furthermore, as these entities are not required to conduct statistical reporting, the data describing them are presented in public statistics only as estimates. Only entities covered by the obligatory reporting by the Central Statistical Office (F-01 and F-02) were subjects of the research. Data on their activities for the years 2007–2020 were obtained from the databases of the Central Statistical Office and the PONT Info collections, and their time scope also covered the COVID-19 pandemic.

Comparative analysis based on statistical linear regression was used to map the relationships between the variables in the form of an appropriate function. This was done to search for the specific class of functions that would best characterise the relationship between variables and determine whether the relationship is statistically significant and the strength of the interactivity. For this purpose, a measure of the strength of the rectilinear relationship between two measurable features – the Pearson linear correlation – was used.

To analyse the interdependence of time series, a critical significance level of $\alpha = 0.05$ was adopted, compared with a *p*-value test probability. A value lower than the critical level of significance means that one can proceed *ad hoc*, as if the null hypothesis that no correlation exists has been rejected (the degree of correlation as a numerical value is given in the results of the analyses only when the condition of *p*-value $< \alpha$ is met). The correlation was measured using the Pearson R coefficient (degrees of correlation: < 0.1 slight, 0.1–0.3 weak, 0.3–0.5 average, 0.5–0.7 strong, 0.7–0.9 very strong, > 0.9 an almost full correlation). The measure of variability applied was the standard deviation and the coefficient of variation (the ratio of the standard deviation to the mean).

A linear regression model was adopted to analytically illustrate the relationship between an explained (dependent) variable and an explanatory (independent) variable and to determine the nature of this relationship (Piłatowska 2006). The fit for the regression equation was established using the determination coefficient R^2 (fit levels: 0.0–0.5 unsatisfactory, 0.5–0.6 weak, 0.6–0.8 satisfactory, 0.8–0.9 good, 0.9–1.0 very good).

Due to the nature of investment outlays, the effects of which are usually spread over time, the research also took into account the effect of delay. Therefore, the data on capital expenditures were compared to employment data from the same period and from the $t + 1$ period.

4. Findings from the Empirical Research

Energy sector enterprises in Poland were broken down into three classes: small, medium and large (according to the number of employees) (see Fig. 1). Analysis of this structure indicates their significant diversification and a strong dominance of large entities, which prompts analysis of the dependencies in question in individual size classes. The share of large enterprises was 89% in 2007 but had risen to 95%

in 2020. At the same time, the share of middle-sized enterprises decreased by 7 pp while the share of the small enterprises increased by 1 pp.

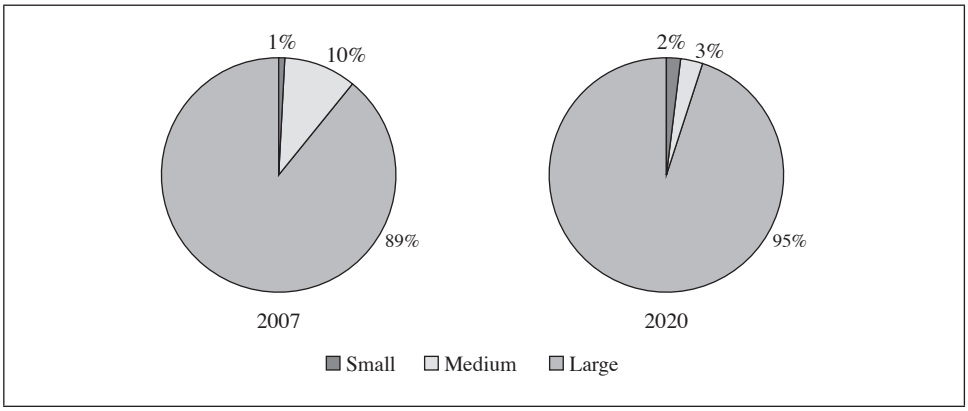

Fig. 1. The Structure of Number of Employees of Small, Medium and Large Energy Enterprises in Poland (2007 and 2020)

Source: the authors, based on data from: Internetowa baza danych PONT Info – Gospodarka – Sektor Średnich i Dużych Przedsiębiorstw, http://www.pontinfo.sm.pl (accessed: 31.01.2022), *Wyniki finansowe…* (2021), *Zmiany strukturalne…* (2021).

The structure of investment outlays (Fig. 2) of energy sector enterprises is similar to the structure of the number of employees. The share of large enterprises dominates (90% in 2007) throughout the entire period, with a slight downward trend to 89% in 2020. Meanwhile, there was a simultaneous decrease (by 1 pp) in the share of investment outlays in the medium-sized enterprise class and an increase in the share of the small enterprise class (by 2 pp).

Energy sector investment expenditures (Fig. 3) were characterised by a clearly outlined upward trend with a break point in 2015, when the trend reversed. 2015 was also the year with the highest capital expenditure in the energy sector. Analysis of the number of employed persons indicates a sustained increase until 2010. At that point, the downward trend emerged and continued until the end of 2020. In the class of small enterprises, an increase in the number of employees was observed throughout the entire period, with its maximum values being recorded in 2020. Investment outlays by small entities were characterised by a high degree of volatility and a strong increase from 2018 through 2020. In contrast to the small enterprises, the number of employed in medium-sized enterprises followed a clear downward trend (the lowest number of employed in 2020). Investments made by medium-size entities, like their smaller counterparts, were characterised by a high degree of volatility without an outlined long-term trend, but with a strong increase from

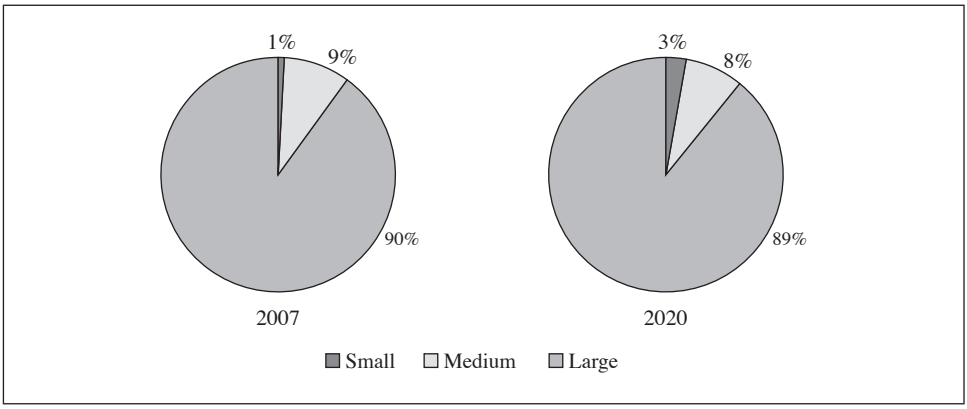

Fig. 2. The Structure of Investment Outlays of Small, Medium and Large Energy Enterprises in Poland (2007 and 2020)

Source: the same as for Figure 1.

2019. In the class of large energy enterprises, a regular reduction in the number of employees was observed from 2010. The size of investment outlays by large enterprises was characterised by an increase until 2015, when the trend was reversed. It then continued until 2020.

The next step in the analysis was to compare the ratio of investment expenditures per employee (Fig. 4). This made it possible to observe the relationship of the two variables analysed in the form of one measure, thus relativising the assessment and allowing the direction of their changes to be indicated. It is interesting that the largest investment expenditures per employee were incurred by small enterprises foremost, but by 2018 also by large entities. Investment expenditures per employee in small energy enterprises did not show a clearly defined change trend, and the highest expenditures were observed in 2010. In large entities, an upward trend could be observed until 2015, and then a slight decrease, despite the fact that the number of employees stabilised. It is noteworthy that there were comparably strong increases in investment outlays per employee in the small and medium-sized enterprise class in 2019 and 2020. The increases were caused in the small enterprises by a strong increase in investment outlays, while there was also a simultaneous reduction in the number of employees. In large energy sector enterprises, the opposite tendency was observed. This was influenced by a strong successive reduction in the number of employees. Finally, in 2020 the amount of investment per employee in small enterprises was 1.5 times higher, and in medium-sized enterprises 2.8 times higher, than in large enterprises.

To assess the possible impact of investments on changes in employment in energy sector enterprises in total in Poland in the years 2007–2020, a linear regres-

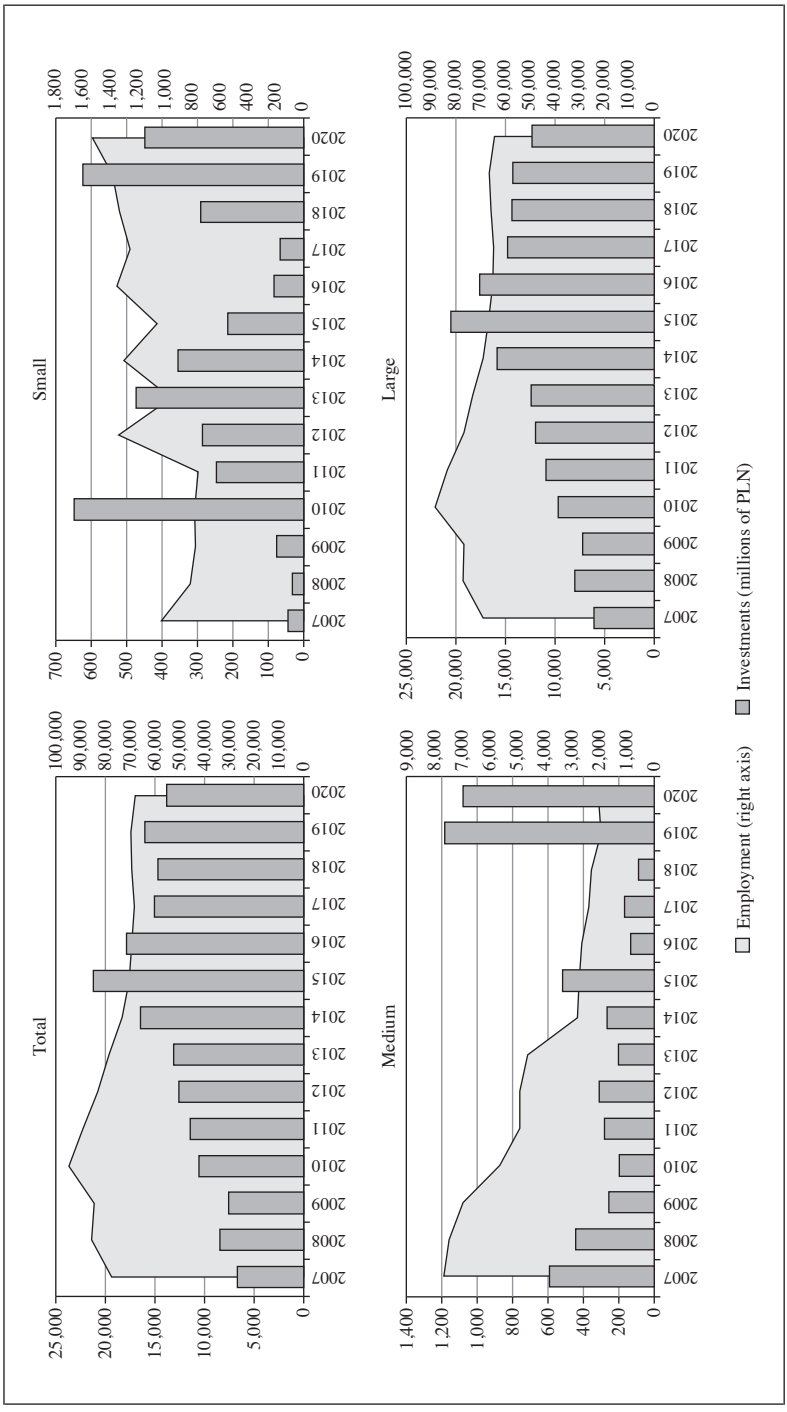

Fig. 3. Investment Outlays (Millions of PLN) and Employment of Small, Medium and Large Energy Enterprises in Poland (2007–2020)
Source: the same as for Figure 1.

sion analysis was done for a comparable period[1] and taking into account the annual delay ($t - 1$)[2] of the investment effect (Fig. 5). Analysis of the interdependencies of variables for the energy sector in total, and the coefficient of determination ($R^2 = 0.44$), indicates a relatively low (unsatisfactory) fit of the regression equation. A strong relationship between investments and the number of employees was not confirmed. 44% of the variability in the employment level of enterprises in Poland is explained by changes in investment outlays, while 39% is attributable to other factors (complete results of the univariate regression analysis (significant effects) are presented in Table 1). The value of the Pearson correlation coefficient ($rxy = -0.667$) indicates a strong correlation between the variables. Considering the delay of the investment effect by 1 year (Fig. 5), the coefficient of determination increased to the level of $R^2 = 0.76$, indicating a fairly satisfactory fit of the regression equation. At the same time, the value of the Pearson correlation coefficient ($rxy = -0.871$) proves a very strong correlation between investments and the number of employees at energy sector enterprises.

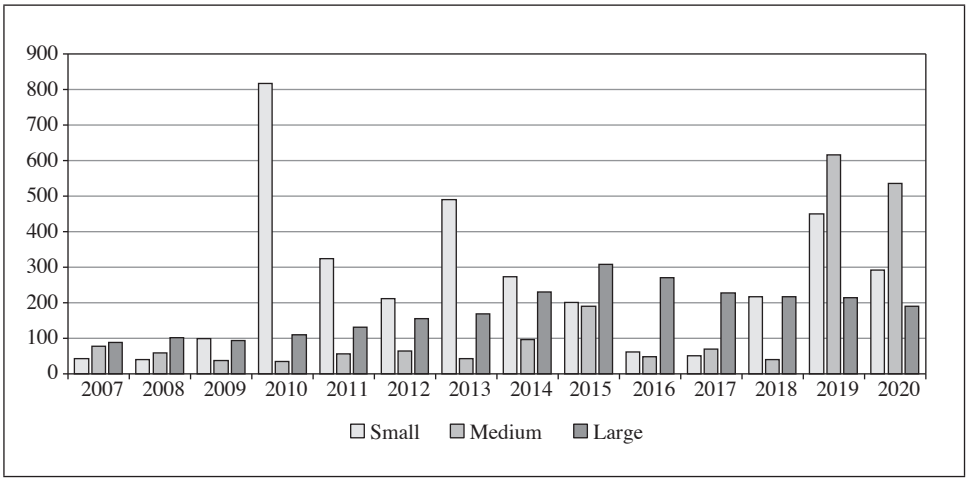

Fig. 4. The Investment Outlays per Employee in the Energy Sector Enterprises in Poland by Size Classes (2007–2020) (Thousands of PLN/Person)

Source: the same as for Figure 1.

In small enterprises, there was no adjustment ($R^2 = 0.017$) and, at the level of $rxy = 0.132$, a very low correlation. Considering the effect of delaying the investment by 1 year, the level of adjustment increased slightly to $R^2 = 0.043$, but still maintained

[1] Data comparison for the same years.

[2] Investment outlays for period t and the number of employees in period $t - 1$.

a very low correlation ($rxy = 0.207$). The result of the linear regression analysis both for comparable periods as well as taking into account the delay does not allow the conclusion that there is a relationship between the change in investment outlays and the change in employment in small enterprises.

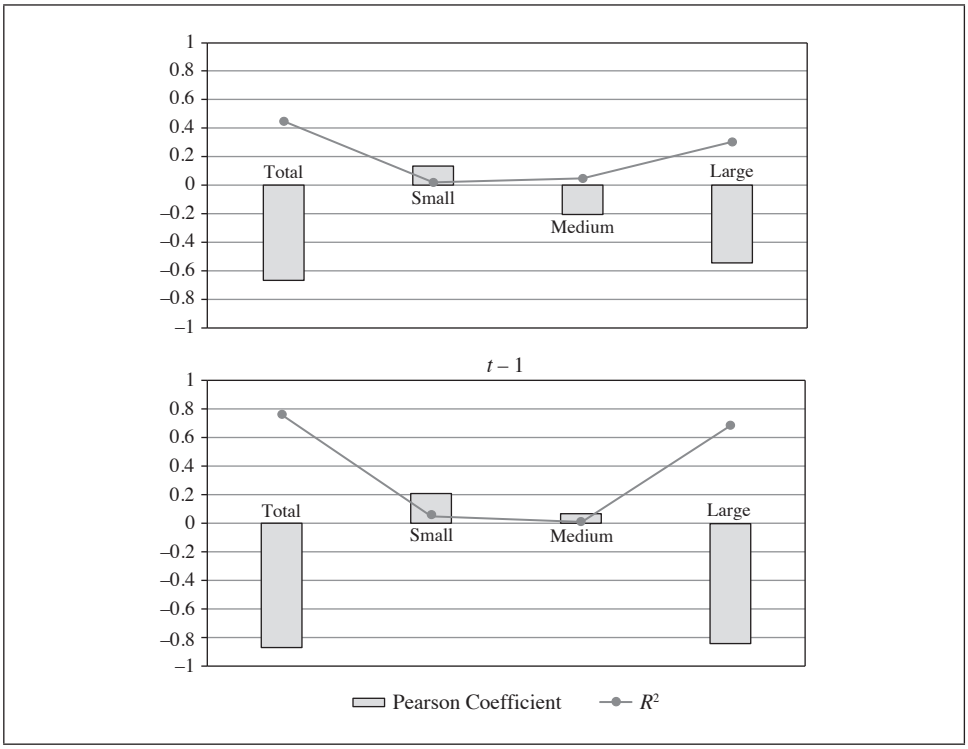

Fig. 5. The Coefficient of Determination R^2 and the Value of the Pearson Correlation Coefficient for the Relationship between Investments and the Number of Employees in Energy Sector Enterprises in Poland by Size Classes (2007–2020)

Source: the same as for Figure 1.

Linear regression analysis in medium-sized enterprises shows ($R^2 = 0.043$) the lack of fit of the regression equation and a very weak correlation ($rxy = 0.208$). Considering the delay of the investment effect, a decrease in the coefficient of determination was observed ($R^2 = 0.003$). This confirms that the variables did not match, and a simultaneous reduction in the Pearson correlation coefficient ($rxy = 0.054$), confirming the weak correlation. On the basis of these results, it is not possible to demonstrate the existence of a statistically significant relationship between employment and investments in medium-sized enterprises in the energy sector.

Table 1. Results of the Univariate Regression Analysis (Significant Results Only)

Dependent Variables	Independent Variables (Explanatory Variables)							
	Constant	Coefficient	Pearson	Standard Error of Regression	*R*-squared	*p*-value	*F* statistics (*F*-value)	Observations
	Investment Outlays							
EMPN Total	96,332.465	–1.436	0.667	6,866.102	0.443	0.009	9.571	14
EMPN Total (*t* – 1)	102,052.300	–1.876	0.869	4,750.005	0.756	0.000	34.067	13
EMPN Small	1,100.332	0.177	0.133	279.154	0.018	0.000	0.233	14
EMPN Small (*t* – 1)	1,083.566	0.282	0.207	284.765	0.043	0.000	0.538	13
EMPN Medium	4,712.803	–1.277	0.208	2,122.729	0.043	0.000	0.542	14
EMPN Medium (*t* – 1)	3,800.900	0.356	0.054	1,992.805	0.003	0.001	0.032	13
EMPN Large	84,838.925	–1.023	0.547	6,615.462	0.299	0.043	5.121	14
EMPN Large (*t* – 1)	91,565.362	–1.537	0.827	4,603.137	0.685	0.000	23.888	13

Source: the authors.

In large enterprises, the coefficient of determination ($R^2 = 0.30$) indicates a poor fit of the regression equation, while the value of the Pearson correlation coefficient ($rxy = 0.55$) indicates a moderate correlation between the variables. The analysis considering the delay of the investment effect shows a significant increase in the coefficient of determination ($R^2 = 0.685$), indicating an average correlation between the variables. The Pearson's correlation coefficient ($rxy = 0.827$) also increased, confirming a fairly strong relationship between the variables.

It can therefore be concluded that only taking into account the delay of 1 year, the results of the regression analysis indicate the existence of a statistically significant relationship between employment and investments in large enterprises in the energy sector.

The calculated values of Pearson's linear correlation coefficients of enterprises do not indicate a clearly significant correlation between the explained and the explanatory variable, but they do confirm that the relations between the dependencies are statistically significant only in the energy sector in general and in large enterprises. It is particularly significant, however, when the one-year delay of the investment effects is taken into account. Such a correlation was not found in small and medium-sized enterprises.

The linear regression curve for total enterprises (Fig. 6) indicates that an increase in investment outlays by 1 billion PLN will result in a reduction in employment by only 1.4 employees. This confirms the negative correlation between the variables under analysis and the impact of variability of investment outlays on the size of employment in the group of enterprises surveyed. The dependence of the impact of variability in investment outlays in large enterprises is the strongest among all size classes. The results of the analysis confirm the coexistence between the variables, i.e. the impact of changes in the size of investment outlays on the size of employment in the surveyed group of enterprises. However, the direction of the correlation (negative) for medium and large enterprises is surprising.

The analysis of the linear regression curve that takes into account the effect of investment delay for enterprises in general (Fig. 7) indicates that an increase in investment outlays by 1 billion PLN will result in a reduction of employment by as much as 1.87 employees. This confirms the negative correlation between the variables under analysis and the impact of variability of investment outlays on the size of employment in the enterprises. A similar direction of interdependence is observed in large enterprises, where an increase of 1 billion PLN in investment outlays will reduce employment by 1.537 of employees. In small and medium-sized enterprises, the dependencies were statistically insignificant. It therefore cannot be concluded that there is a coexistence between investments and employment in these size classes of energy sector enterprise.

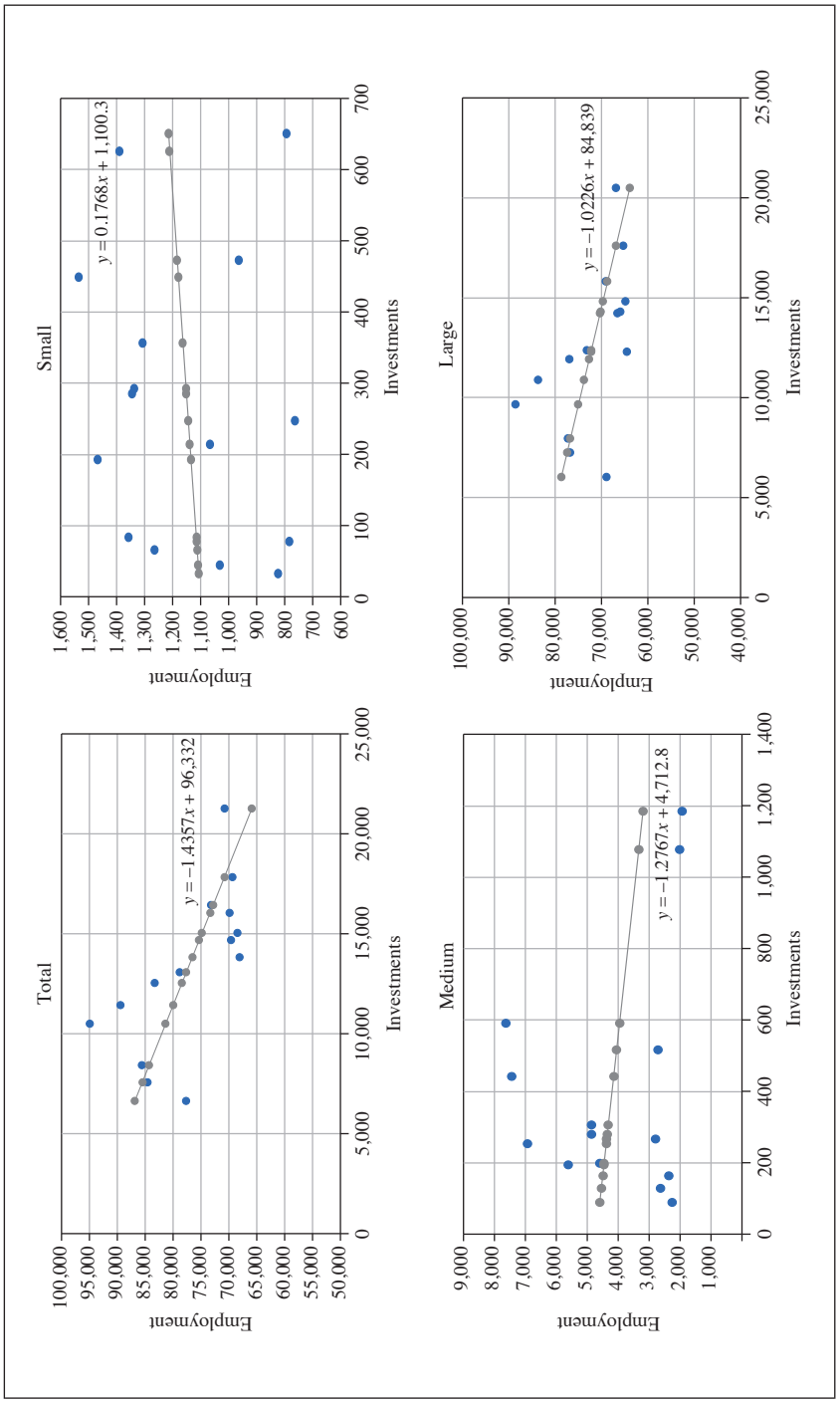

Fig. 6. The Relationship between Investments Outlays and the Number of Employees in Energy Sector Enterprises in Poland by Size Classes (2007–2020)

Source: the same as for Figure 1.

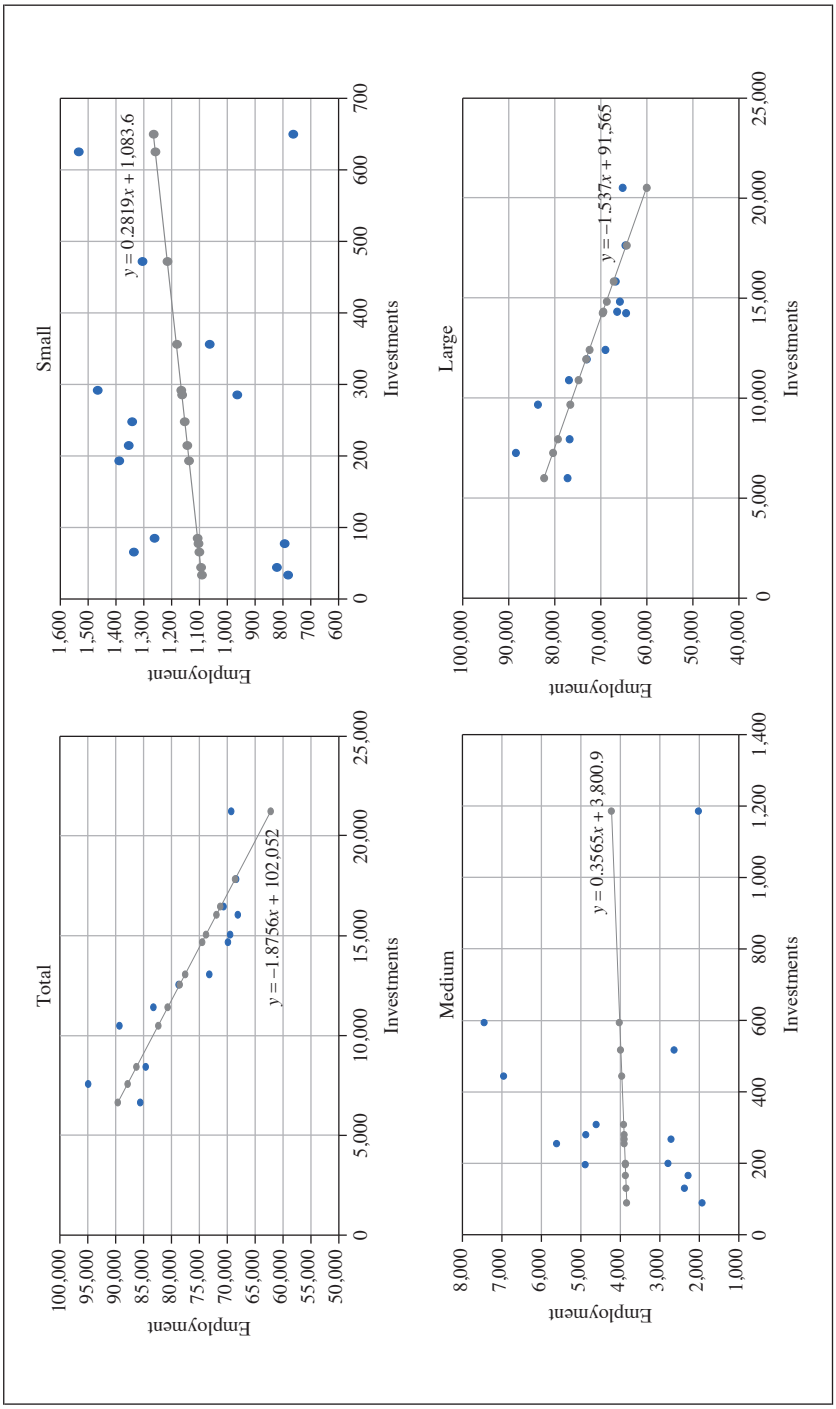

Fig. 7. The Relationship between Investments Outlays and the Number of Employees in Energy Sector Enterprises in Poland by Size Class in 2007–2020 (Effect of Delay in Investment Activities $t - 1$)

Source: the same as for Figure 1.

5. Conclusions

The research carried out for the Polish energy sector has confirmed the thesis – there is a dependence between the variables analysed, mainly when taking into account the delay of the investment effect. Surprisingly, however, the direction of this dependence was different than expected and different than that observed in similar research in the manufacturing sector enterprises (Kolegowicz 2019). During the period under review, there was a negative correlation between the investment outlays incurred and the number of employees in the entire energy sector. The negative direction of interdependence in the sector indicates an increasing level of automation and a reduction in the dependence of production on human potential. An important development is the high level of differentiation both in terms of the formation of the economic quantities over time and their interdependence divided into enterprise size classes. In large enterprises, a negative correlation was observed between the variables tested, with an even higher degree of intensity than for the entire sector. In small and medium-sized enterprises, the variables matched at a low level, preventing a clear determination of the interdependencies between them. It is interesting that, given the one-year delay in investment effects in medium-sized enterprises, a change in the direction of interdependence was observed. Only in small units of the energy sector was there a positive correlation between investment outlays and the number of employees, both with and without the delay of the investment effect taken into account.

In the light of the research and the conclusions drawn from it, it seems that the negative nature of the dependence or co-association of investment outlays and the number of employees in a group of large enterprises is influenced by the specific nature of the entities forming this community. Particularly state-owned enterprises enjoy a significant advantage in terms of economic potential. The vast majority of these companies have not undergone thorough restructuring and have been struggling with the problem of overemployment for several years. In such conditions, increasing the scale of activity of these enterprises, even by increasing investment outlays, would only allow for better management of existing human capital. At the same time, there are enterprises in Western Europe operating in completely different conditions. It is often based on their example that forecasts are made. Increased investments made by the leading companies can cause employment in these entities to rise.

Other conclusions can be drawn from the observation of small enterprises, whose share in the structure of the economic measures examined here is still small. However, it is these very companies that best exemplify a positive dependence of investment outlays on job creation. This situation may result from another phase of development of small energy companies in Poland, which are just entering the sector and for which the prospect of energy transition and possible funds for invest-

ments may become a springboard for further intensive development. If the forecasts for employment growth were to be confirmed, the studies carried out indicate that small enterprises be responsible for the increases. The main question is whether the projected employment increases are the direct and intended result of investment activities or just a side effect. If they are to be an objective, then appropriate regulations supporting the investment decisions of small entities in the electricity sector should be considered.

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