

## Impact of the Regional Operational Programme on selected production factors of development. A case study for the Opolskie voivodeship

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The article presents research aimed at analysing the impact of the Regional Operational Programme for the Opolskie voivodeship on selected macroeconomic factors of regional growth. The undertaken research analysed the impact of macroeconomic variables related to the labour market, average wages, and the housing market. Each of the specified areas was scrutinised, taking into consideration the analysis of temporal fluctuations in the examined factors in relation to the financial disbursements made under the Regional Operational Programme (ROP) for the Opolskie voivodeship. A correlation analysis was conducted between the examined variables and the financial contributions under the ROP for the Opolskie voivodeship, and a functional correlation analysis was carried out for the examined dimensions. The conducted analyses showed the positive impact of the disbursed funds under the ROP for the Opolskie voivodeship on the examined macroeconomic indicators. The obtained results may have a utilitarian aspect in decision making at both regional and national levels. It should also be noted that a literature analysis of the issue was conducted prior to the research process to ensure systematic research conclusions. This study demonstrates the importance of the cascading strategic planning process and comprehensively describes the evolution of the EU's approach to interpreting the growth of particular regions, emphasising development, sustainability, and smart specialisation. Evaluating the impact of public policy and public funds is not easy and often poses challenges, however it should be noted that the creation of models allows for showcasing various, often simplified, aspects of reality.

**Keywords:** region, development, sustainable development, smart specialisation, macroeconomic determinants, Regional Development Programme (ROP), Opolskie voivodeship (OV)

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## 1. Introduction

The European Union's weak position as a leading global economy, worsening socio-economic context (Radulescu et al., 2018), and demographic situation (Okólski, 2010) in Europe are forcing the adoption of alternative methods to programming activities with the primary objective of strengthening its competitiveness. Ensuring the proper targeting of interventions to accurately address identified areas of development is significant, as it will yield macroeconomic progress for the European Union as a whole, along with its respective member states and regions (Bedrunka and Malik, 2012). Iuga and Mihaliciuc (2020) clearly emphasise the influence of certain macroeconomic indicators on economic development. Consequently, the growth of the European Union, a nation, or a region, embodies a complex undertaking influenced by multiple internal and external factors (Klasik, 2006). Shaping development policies requires in-depth analysis, as well as the readiness and courage to actively and effectively minimise the negative impact of adverse trends (Strategia Rozwoju Kraju 2020 – Aktywne społeczeństwo, konkurencyjna gospodarka, sprawne państwo, 2012).

At national level, the Polish economy is an indispensable component of the global economic system. Therefore, it is important to bear in mind that global economic prosperity constitutes one of the primary drivers impacting on Poland's economic growth (Kuczmarka and Pietryka, 2010; Mobarak and Niaz, 2018). The fluctuations of the Polish economy and its reliance on the developmental cycles and trends of the global system are influenced by both direct economic links and conditions on the world markets, as well as the effects of participation in the European Union's common market and multilateral free trade agreements (Strategia Rozwoju Kraju 2020 – Aktywne społeczeństwo, konkurencyjna gospodarka, sprawne państwo, 2012).

It is important to acknowledge that the development of the entire country is closely linked to the development of its individual regions. The growth potential of these regions has been and continues to be stimulated by the support of regional EU funds (Cohesion in Europe towards 2050. Eighth report on economic, social and territorial cohesion, 2022). In Poland, this support has been provided since the 20th century, and significantly increased after the country's accession in 2004. Following the first two rounds of funding in 2004-2006 and 2007-2013, the third EU funding period (2014-2020) is now coming to an end. Poland is the largest beneficiary of EU support among all the member states, with a total of over €77 billion disbursed between 2014 and 2020 (ESIF 2014-2020 EU Payments, Krajowe Obserwatorium Terytorialne – Ministerstwo Funduszy i Polityki Regionalnej, 2022; Szlachta, 2017).

The Opolskie voivodeship (OV) is one of the leading regions in terms of the disbursement of EU funds at regional level. Throughout the current financial period, OV has consistently ranked first in Poland in terms of fund absorption since 2015, and the selection of measures and priorities aimed at improving economic and social conditions, including the demographic situation, is given equal importance as the rate of EU fund disbursement (Szlachta et al., 2022).

Taking into account the above, the goal of the conducted research was to analyse the influence of support under the Regional Operational Programme of the Opolskie Voivodeship (ROP OV) on the key production factors for the growth of the region, namely:

- focusing on the rate of unemployment and levels of employment;
- the average monthly remuneration;
- the housing market, with particular emphasis on the number of permits issued for the construction of apartments and the number of apartments under construction.

The first criterion for the selection of variables was based on the assumptions of economic theory indicating that the economy functions on the basis of three main factors of production: capital, land and labour (Smith, 2007). The proposed variable 'labour market' directly relates to the labour factor and the variable 'housing' to the land factor. Both variables, in turn, affect the monetary resources and the means of production, therefore, capital. The financial crisis of 2007-2011 and the global crises caused by the Covid-19 pandemic clearly show that the labour market and housing construction are two variables that react very quickly to fluctuations in economies. The second criterion is the availability of data for individual variables on an annual and monthly basis at the level of voivodeships (regions).

The carried-out research and the analysis based on it demonstrate the relations between the production factors and the spending of EU funds in the Opolskie voivodeship. The research covered the period 2015-2020, using the most up-to-date data available by year and month. In fact, at the beginning of each funding period, the funds paid out were smaller, yet over time, their payment accelerated. In those years OV, the smallest voivodeship in terms of population, received €945 million under the ROP OV (*Regionalny Program Operacyjny Województwa Opolskiego na lata 2014-2020*, 2014). This amount was the highest since joining the EU, given that the Structural Funds are transferred over specific programming periods.

The course of the research process was carried out in several stages. The first provided an in-depth analysis of strategic development planning in a transnational, national and regional perspective. The second included an analysis of the literature of the issue under consideration, meanwhile, whilst the third comprised computations that show the quantifiable influence between the utilisation of EU funds and specific factors influencing regional development. The research enabled to show the correlation between the disbursement of EU funds and the selected macroeconomic variables of the region. As a result of the literature review, the choice of variables for analysis was limited to assess the influence of EU funds on regional economic management. It should also be strongly underlined that the study was based on the formed simulation models, and therefore intended to demonstrate the correlations under investigation in a simplified and generalised way. The entire research process was described according to the following stages, which also form the structure of this article. The first stage was a cascade process of strategic development planning and an analysis of the evolution and development of research on the concepts of

a region, development, sustainable development, smart growth and smart specialisations. In the next stage, an analysis of the impact of the ROP on selected macroeconomic factors of development was conducted, and the assumptions of the research methodology and the obtained results were presented and discussed. The final part of the article presents a summary of the article, and the research results are described in the utilitarian dimension, and potential limitations and planned future directions of research are indicated.

## **2. Cascade process of strategic development planning – adopted assumptions**

The article provides a cascade description of strategic planning for economic and social development, beginning with an overview of the development assumptions made at supranational level, namely the European Union. It then delves into the national perspective, focusing on Poland, and concludes by examining the regional context of the Opolskie voivodeship.

Such an approach to socio-economic development is important due to the fact that the Structural Funds are the main source of funding of public policies in Poland. Planning documents are developed both at EU, national and regional (OV) level and are the basis for negotiating Structural Funds for specific years.

The recent crisis has eroded the achievements of many years of economic and social progress, revealing the underlying structural vulnerabilities of the European economy. Simultaneously the world is undergoing rapid transformations, with long-term challenges such as globalisation, escalating demands for limited resources, and an ageing population are becoming increasingly pressing. Europe must safeguard its future by acting collectively as a unified entity, which necessitates effective strategic planning, encompassing the development of planning documents. The primary document in this regard is Europe 2020: a strategy for smart, sustainable, and inclusive growth which aims to enhance the intelligence, sustainability, and inclusivity of the EU economy. It seeks to foster social integration, achieve high levels of employment and productivity, and promote greater social cohesion. Europe 2020 is a vision of a social market economy for the 21st century Europe, with three interlinked priorities:

- smart growth: developing an economy based on knowledge and innovation;
- sustainable development: promoting a more resource-efficient, greener and more competitive economy;
- inclusive growth: promoting a high-employment economy delivering social and territorial cohesion.

The European Union had to determine where it wanted to be at the end of these planning periods. To this end, several superior, measurable objectives were proposed: the employment rate of the population aged 20-64 (should be 75%), 3% of the Union's GDP should be invested in research and development, the 20-20-20 climate and energy targets should be met (including a 30% reduction in carbon emissions

if conditions permit), the number of early school leavers should be reduced to 10%, and at least 40% of the younger generation should have a university degree, and the number of people at risk of poverty should be reduced by 20 million (EUROPE 2020. A strategy for smart, sustainable and inclusive growth, 2010).

When presenting the adopted process of strategic planning from a national viewpoint, it is worth noting that for the financial perspective of 2014-2020, European funds for Poland were indicated as the main, but not the only, source of financing for investments ensuring dynamic, sustainable, and balanced development. Therefore, the logic of programming is based on aligning European expectations regarding the concentration on the goals of the Europe 2020 Strategy with the national goals outlined in the medium-term country development strategy, namely the Country Development Strategy 2020: Active Society, Competitive Economy, Efficient State, as well as implemented in integrated strategies. This means that the development of Poland should be viewed in a broader context than just in terms of EU funding expenditure (Umowa Partnerstwa – programowanie perspektywy finansowej 2014-2020, 2020). This involves recommendations for public policies, providing a basis for changes in the development management system, including existing long and medium-term strategic documents (strategies, policies, programmes), as well as the verification of other implementation instruments. (Umowa Partnerstwa – programowanie perspektywy finansowej 2014-2020, 2020). Consequently, assumptions at the level of regions, including the Opolskie voivodeship, with regard to the implementation of EU funds had their basis there. When presenting detailed actions, it should be recalled that in 2017 the Polish government adopted a Strategy for Responsible Development by 2020 (with 2030 perspective). The main goal of the development activities outlined in the strategy is to create conditions for the growth of income for the population of Poland, while simultaneously promoting social, economic, environmental, and spatial cohesion. The strategy is aimed at inclusive socio-economic development; the document assumes that the main driving force behind development and public priority is social cohesion. The strategy aligns economic actions with the achievement of goals related to the level and quality of life of the inhabitants of Poland, and emphasises the importance of ensuring that the beneficiaries of economic development are residents and areas that have been overlooked in development policies to a greater extent than before. The strategy illustrates a new model of development – a responsible development, namely one that by building a competitive force with the use of new development factors, provides participation and benefits to all social groups living in different parts of the country. This will be achieved through a focus on legal, institutional, and investment actions in three areas: sustainable economic growth based increasingly on knowledge, data and organisational excellence; socially sensitive and territorially sustainable development; and effective state and institutions for growth, social integration, and

economic integration (Strategia Na Rzecz Odpowiedzialnego Rozwoju do 2020 (z perspektywą do 2030) 2017).

When presenting the process of strategic planning at regional level, it should be noted that sixteen Polish provinces base their development on strategic-planning documents, the most important of which is the development strategy. The second key planning document at regional level is the Regional Innovation Strategy which defines regional smart specialisations and development directions for the regional economy for a period of seven years. Both documents are equally important in the process of negotiations with the European Commission of the Structural Funds earmarked for the region in the given programming period. The Opolskie voivodeship, as the smallest in the country, is at the same time one of the smallest regions of the European Union, which offers potentially favourable conditions for the regional community as indicated in the Development Strategy for the Opolskie Voivodship until 2020 (Strategia Rozwoju Województwa Opolskiego do 2020 roku, 2012). The prevention and counteraction of depopulation processes was identified as the most important developmental challenge (Jończy, 2011). The inhabitants are of particular value of the OV, therefore it is important that all development projects improve the living conditions in the region. Meeting these challenges is possible through the implementation of comprehensive activities on many levels of social and economic life, activities supporting the family, attracting new investments, supporting entrepreneurship and innovation, creating new jobs, and increasing the professional competence of residents (Strategia rozwoju województwa opolskiego do 2020 roku, 2012).

The existing studies and regional expertise indicate that the development challenges formulated in the current strategy should to a large extent, after modification or supplementation, also be considered in the formulation of challenges for the coming years. Nevertheless, an important role should still be maintained for:

- the effective functioning of the labour market, with a stronger emphasis on the need to create high-quality jobs (innovative and attractive);
- innovation, including the applied technologies and systems, leading to a significant improvement in the attractiveness of the Opolskie voivodeship for investors and residents;
- making the OV an attractive place to live and invest, specifically addressing the need for infrastructure development that encourages the investment of domestic and external capital in the region (including foreign capital) and at the same time drawing attention to raising the standard of living of inhabitants;
- the sustainable development of the Opole agglomeration, cities and rural areas, aimed at a harmonious, coherent and sustainable development of the entire region, rather than a separate strategic objective for the aforementioned areas.

The proposed approach relates to the territorialisation of future development challenges or support areas (Malik et al. 2020; Opolskie – diagnoza regionalna. Opracowanie na potrzeby Strategii Rozwoju Województwa Opolskiego do 2030 roku, 2020).



The operational programmes (Umowa Partnerstwa – programowanie perspektywy finansowej 2014-2020, 2020) based on EU funds are the tool for implementing the strategy in each region. Thus, the financial layout of each regional programme is different, i.e. the financial emphasis is based on objectives of the regional strategy. The distribution of EU funds between regions is an average percentage of population, GDP and unemployment levels based on the Berlin method and negotiations between the Polish Government and regions (Umowa Partnerstwa – programowanie perspektywy finansowej 2014-2020, 2020). The Opolskie voivodeship, in the perspective for the 2014-2020 period, was the leader in spending EU funds.

### 3. Evolution and development of research: Region, development, sustainability and intelligent development, regional development

Poland's accession to the structures of the European Union initiated an intensified scientific discourse on development, regions, regional development, sustainable and smart development, and methods of their evaluation. Many publications were produced both in Poland and in Europe, which describe these issues directly or indirectly. The following theoretical analysis of the issue was carried out according to the plan of conduct shown in Figure 1.

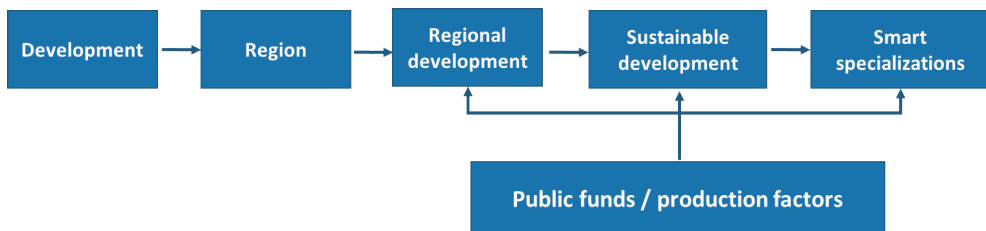


Fig. 1. Plan of the evolution of regional policy issues

Source: own study.

Czaja (1998) defined development as any change in economic, social, and environmental systems, with an attribute of such change being its irreversibility. Sztado (1998) stated that the concept of development refers to the desirable positive quantitative, qualitative, and structural transformations of a given system, therefore spatial and temporal irreversibility is not a unique development attribute. Another feature worth mentioning is a positive evaluation of changes taking place from the point of view of a particular system.

In relation to socio-economic development, Chądzyński et al. (2007) suggested that a region should be examined in terms of the interconnectedness between local and global dynamics (Chądzyński et al. 2007). Mauro et al. (2008) demonstrated that in the global economy, which is dominated by the process of globalisation, this area can become competitive only by leveraging its individual characteristics and adapting

to the conditions and requirements of the global environment. Currently, a region is classified mainly in the economic aspect, where it is possible to list coherent areas through the role of a specific service or industry branch (Bedrunka and Dymek 2016). Considering the local conditions, it is usually determined whether a given region is developing or not. Stawasz (2004) identified a region as a component of development policy in terms of its economic, institutional, demographic, natural, infrastructural, spatial, and living conditions aspects. On the other hand, Klasik (2006) argued that, in economic terms, a region can be examined in terms of the functioning and mutual relations between the private and public sectors. Regarding the logic of a market economy, regions – treated as entities of the public sector – operate within a multi-level system. The national and supranational level is mainly important in this respect, as regions which receive financial support from central authorities and supranational institutions, and where high-level institutions and infrastructure are located, have the opportunity to strengthen their competitiveness.

In this context, it is necessary to transition to the concept of regional development. According to Klasik (2006), this is increasingly defined as a holistic, structural, and strategic process in which a region's resources and conditions, its technological and cultural potential, and the opportunities identified in regional, national, and global markets are utilised by businesses. Sagan and Meyer-Stamer (2008) emphasised that regional development is influenced by both internal (endogenous) and external (exogenous) factors, while regional development models, defining a comprehensive, coherent way of explaining the mechanism of regional development, deal with identifying only key (priority) potentials that are relevant for development and they are mainly focused on economics. Szlachta (1996) defined regional development as the systematic improvement of competitiveness of entities and the living standards of residents, as well as the growth of economic potential of regions, contributing to the socio-economic development of the country.

Antonescu (2014) identified regional development as a contributor to the sustainable development of the European Union and, similarly, as an integral part of its economic and social policies in all member states. This approach aligns with the growth model proposed in the Europe 2020 Strategy, which is based on three priorities: smart growth, sustainable growth, and inclusive growth (Europe 2020. A strategy for smart, sustainable and inclusive growth, 2010). Smart growth entails enhancing the role of knowledge and innovation as drivers of future development. This requires improving the quality of education, enhancing research outcomes, promoting innovation and knowledge transfer within the Union, fully utilising information and communication technologies, and ensuring that innovative ideas are transformed into new products and services that contribute to economic growth, employment, and social challenges in Europe and worldwide. Essential elements include entrepreneurship, financial resources, and consideration of user needs and market opportunities (Europe 2020. A strategy for smart, sustainable and inclusive growth, 2010). Mazur-Wierzbicka (2015) described inclusive growth as the pursuit



of actions that support a high-employment economy, ensuring social and territorial cohesion, and implemented through programmes such as the New Skills and Jobs and the European Anti-Poverty Programmes. Lafuente et al. (2018) demonstrated in their study the effects of implementing the Europe 2020 Strategy in terms of goals related to poverty and social exclusion.

Sustainable development should also be considered in the context of the functioning of companies in the global economy. Research is currently being conducted on sustainable production, as described by Bedrunka (2020). Barska et al. (2020) assessed the progress in implementing the concept of sustainable development in the social aspect within the European Union from 2014 to 2018, with particular emphasis on Poland. Širá et al. (2020) argued that increased emphasis on knowledge-based economic factors enhances a country's competitiveness, which in turn contributes to its sustainable development. Many statistical methods and tools are used to evaluate regional development policies. Malik (2011) focused on the importance of considering their usefulness in multidimensional processes of regional development, which encompass the social, economic, and environmental dimensions of sustainable development. To assess the effectiveness of sustainable development, Malik (2004a) referred to the indicator analysis method, which should also be used to examine the effectiveness of strategies and programmes based on sustainable capital and regional development (known as integrated strategic efficiency) in terms of effectiveness, efficiency, and feasibility.

In the integrated efficiency indicator analysis method, the static, dynamic and criterion-based analyses were taken into account when examining the efficiency and effectiveness of sustainability for governance and capital, and in the analysis of capital, the criterion of integrating governance, the spatial and temporal criterion (Malik, 2004a). The complexity of the sustainable development category, in terms of a set of characteristics, objectives, principles and integration of governance, entails attempts to operationalise this concept and the size of the cross-sections of the indicator analyses. The criteria for classifying the indicators include, among others, the degree of achievement of characteristics, objectives and principles and of sustainable and balanced governance (Malik, 2004b).

According to Borys (2013), the EU funds for the period 2014-2020 and the closely related strategic vision of the document Europe 2020 clearly define the approach to the environment and its natural resources, which is explicitly based on the strong principle of sustainable development. The concept of smart specialisation promotes the orientation of regions towards the creation of eco-innovations, which according to Carley and Spapens (2000) and Castillo et al. (2011), involve entrepreneurial, product design, and integrated life cycle management stages that contribute to the ecological modernisation of societies by incorporating environmental issues into product development and related processes. Eco-innovations reflect the concept of a clear focus on reducing the environmental impact wherever it may

occur, not limited to product, process, marketing, or organisational aspects (Innovation. Framework, Practice and Measurement 2009).

Malik et al. (2020), proposed an original model for selecting regional smart specialisations, as well as for the development of the Regional Innovation Strategy until 2020 in the Opolskie voivodeship, based on the following methods and tools: content analysis, industry analysis, examination of existing sources, time series/trend forecasting, expert forecasting, stakeholder consultations, the Delphi method, creative visualisation, impact assessment, PEST (political, economic, socio-cultural, technological), logical framework, environmental scanning, visioning, and future workshops.

Another interesting example of research in this area is the analysis of higher education institutions as innovation brokers in the context of smart specialisation conducted by Kangas and Aarrevaar (2020), whereas Ponsiglione et al. (2018) analysed the entire regional innovation system in the context of lagging European regions.

#### **4. Analysis of the influence of the Regional Operational Programme on specific macroeconomic determinants of development**

The analysis of the impact of payments made under the Regional Operational Programme of the Opolskie voivodeship (ROP OV) on selected macroeconomic determinants described three fundamental spheres of the economy. The first sphere was the labour market (unemployment/employment), the second was average monthly wages and emerging job opportunities, while the third sphere of analysis was the housing market, which was characterised by two dimensions: the number of issued construction permits and the number of ongoing construction projects in the housing market.

The selection of the specified areas under research, the results from the analysis of issues concerning capital and governance was discussed by the authors in Section 2. It should be pointed out that the selected study areas are classified as economic capital and their analysis is aimed at demonstrating the impact of the ROP on the creation and consolidation of this capital.

Each of the areas was analysed according to a methodological approach that takes into account:

- the analysis of time variability of the examined determinants against the background of payments made under the ROP OV. The analysis of variability was performed by assessing the nature of development trends for the examined correlations.
- the analysis of correlation between the examined determinants and payments made under ROP OV. The correlation analysis was performed using Pearson's linear correlation, assuming that  $x$  and  $y$  are analysed random variables with discrete distributions.  $x_i$  and  $y_i$  are the values of random samples of those variables ( $i = 1, 2, \dots, n$ ), whereas  $\bar{x}$  and  $\bar{y}$  are the average values of those samples. The linear correlation coefficient estimator was then determined according to formula 1.

$$r_{xy} = \frac{\sum_{i=1}^n (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^n (x_i - \bar{x})^2} \sqrt{\sum_{i=1}^n (y_i - \bar{y})^2}} \quad (1)$$

- the functional correlation analysis for the area under investigation. The functional analysis of correlation  $\hat{y}_i = \hat{\alpha}_0 + \hat{\alpha}_1 x_1 + \hat{\alpha}_2 x_2$  was performed using commonly used multiple regression principles, according to the assumption that theoretical values of variable  $Y$  can be recorded in matrix form, cf. formula (2).

$$\hat{y} = \hat{a}X \quad (2)$$

The estimation of structural parameters of the model using the classic method of least squares was performed with the use of an estimator expressed by the formula 3.

$$\hat{a} = (X^T X)^{-1} X^T y \quad (3)$$

where  $\hat{a}$  – LSM estimator of unknown parameter vector  $\alpha$ ,  $y$  – column vector of observation on an explanatory variable of dimensions  $(n \times 1)$ ,  $X$  – observation matrix on dimensional explanatory variables  $[n \times (k + 1)]$ .

The data were collected on a monthly basis between January 2015 and July 2020, and were obtained from the databases of the Central Statistical Office and of the Marshal Office of the Opolskie voivodeship.

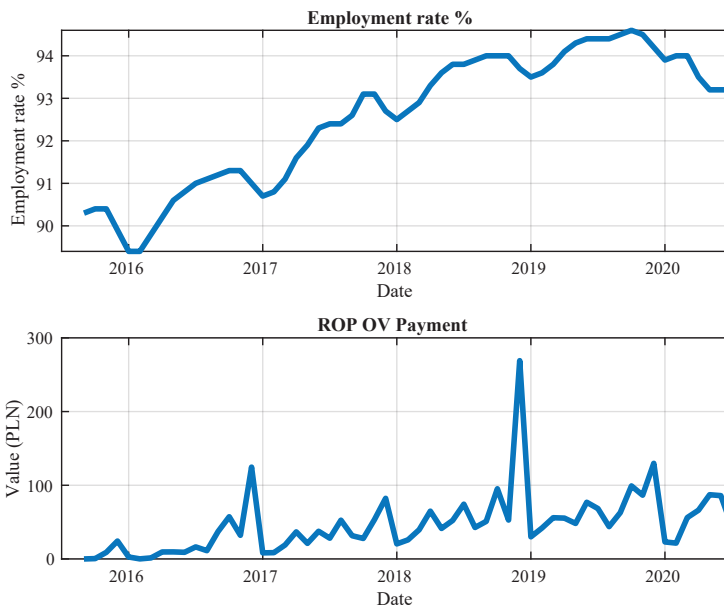


Fig. 2. Employment/Payments under ROP OV

Source: own study.

When analysing the time variability of the payments made, it should be noted that the increased payments occurred annually at the end of the year, and that in the two implementation periods there were significant deviations from the other periods. The first such situation took place at the end of 2016, whereas the second at the end of 2018. When analysing the second variable, i.e. employment, it should be noted that each year under analysis starts with an increased employment rate (see Figure 2). Comparing the data in Figure 2 one can argue that the payments made under the ROP OV influenced the employment level, moreover there is a time lag in the described dependencies. The same situation occurred with variable unemployment (see Figure 3).

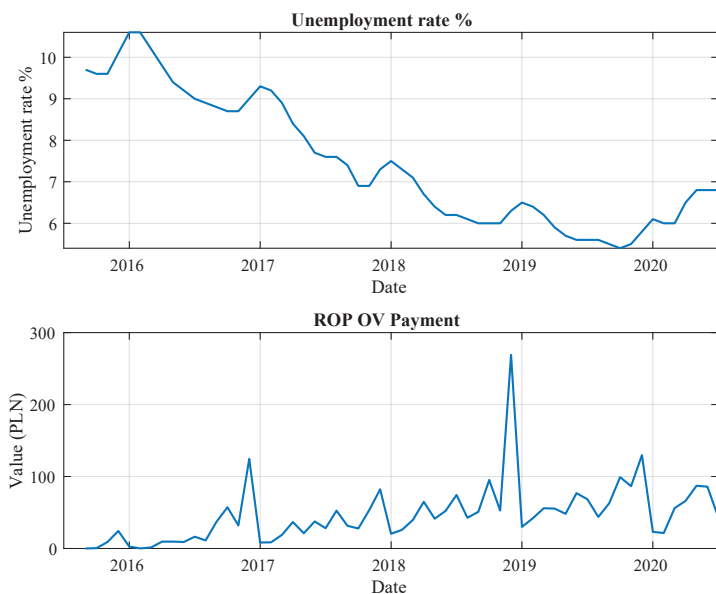


Fig. 3. Unemployment / Payments under ROP OV

Source: own study.

In order to indicate a significant delay between the described variables, cross-relation graphs were drawn up for the employment and unemployment variable compared to the payments made under the programme. From the presented graphs it can be concluded that in the period of 10 months the most visible effect of the implemented payments on the labour market occurred (see Figures 4 and 5).

In the next step, the quantitative impact of payments on the labour market was estimated. In Figures 6 and 7, an autocorrelation diagram is presented, together with a structured functional form of the described relations. From the received dependence, it can be concluded that an increase in payments by PLN 1 million results in an increase in employment in the region by 0.0326 pp. The dependency makes it possible to calculate changes in employment or unemployment in numbers depending on the value of payments made under the programme.

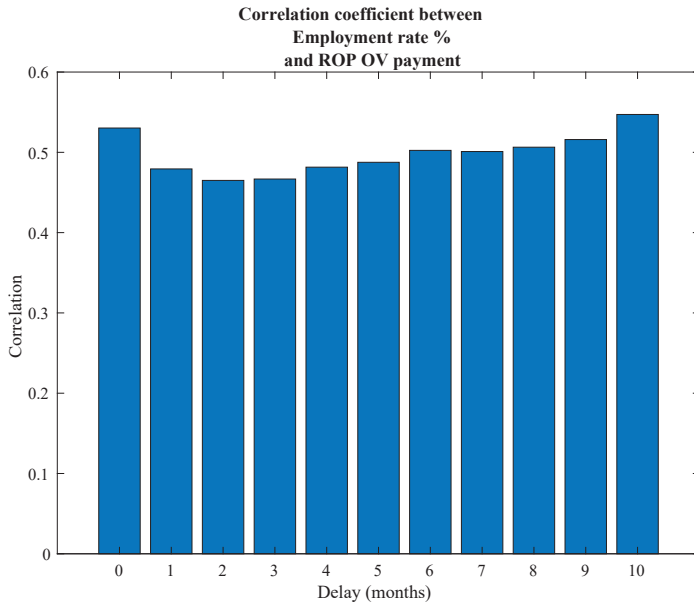


Fig. 4. Cross-relation between employment and payments made under the programme

Source: own study.

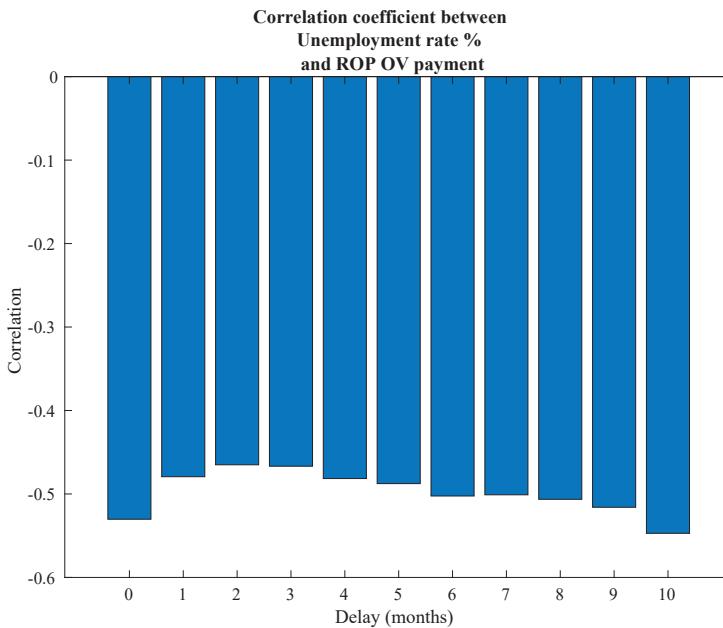


Fig. 5. Cross-relation between employment, unemployment and payments made under the programme

Source: own study.

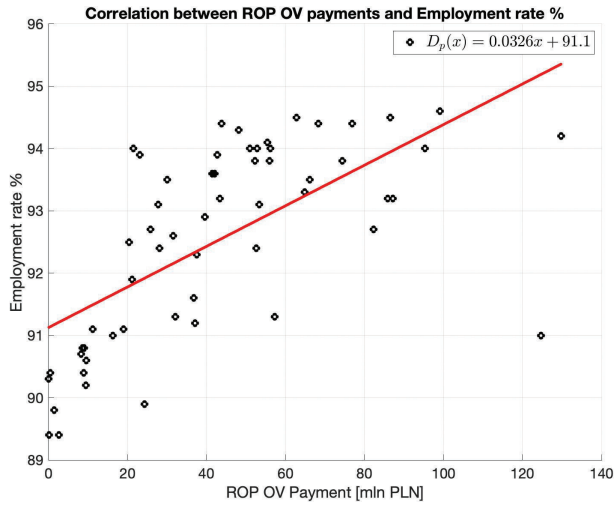


Fig. 6. Correlation function between payments under ROP OV and employment

Source: own study.

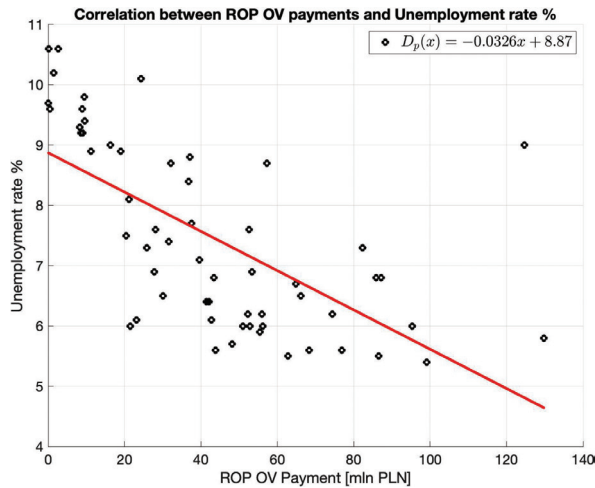


Fig. 7. Correlation function between payments under ROP OV and unemployment

Source: own study.

Another examined dimension is the impact of the ROP OV payments on job creation in the region. In Figure 7 one can observe a correlation that increased payments at the end of 2016 resulted in an increase in the number of created jobs. A similar situation took place in late 2019, when the increased payments under the Regional Operational Programme of the Opolskie voivodeship slowed down the unfavourable trends in newly created jobs.



It should be also pointed out that in the case of the variable salaries, it is not possible to indicate clearly from the charts the relations between the studied characteristics. It can therefore be argued that the remuneration in the economy/region is mainly dependent on other macroeconomic variables. In further detailed analysis of the described variables, only the results obtained for the job offers variable were discussed.

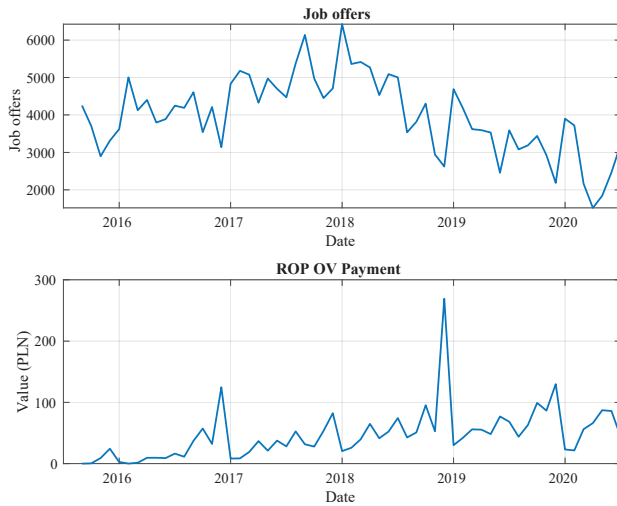


Fig. 8. Job offers and payments made under ROP OV

Source: own study.

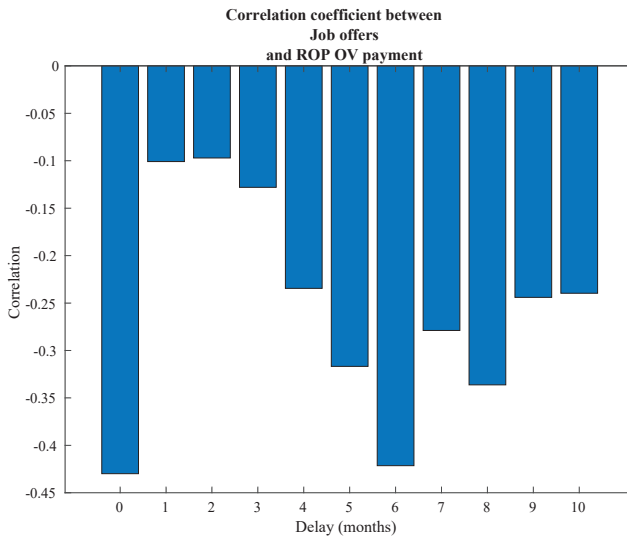


Fig. 9. Cross-correlation between payments made under ROP OV and job offers

Source: own study.

Analysing the time lag between the payments made under the ROP OV and the newly created workplaces, it can be concluded from Figure 9 that the most significant correlation of the lag between the variables under consideration occurred after six months.

The last examined area was housing. In Figures 10 and 11 one can see the visible impact of increased payments under the ROP OV at the end of 2019 on the increase in potential in the area of issued building permits and on housing under construction.

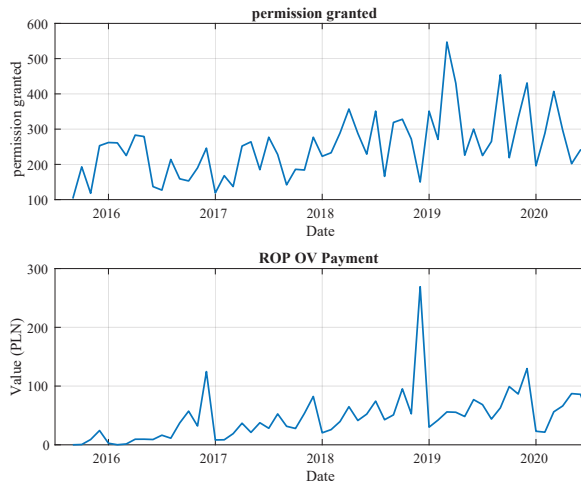


Fig. 10. Permits issued for the construction of new housing and payments made under ROP OV

Source: own study.

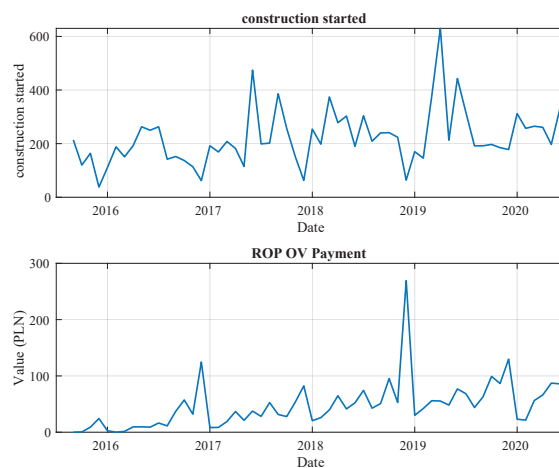


Fig. 11. Housing under construction and payments made under ROP OV

Source: own study.

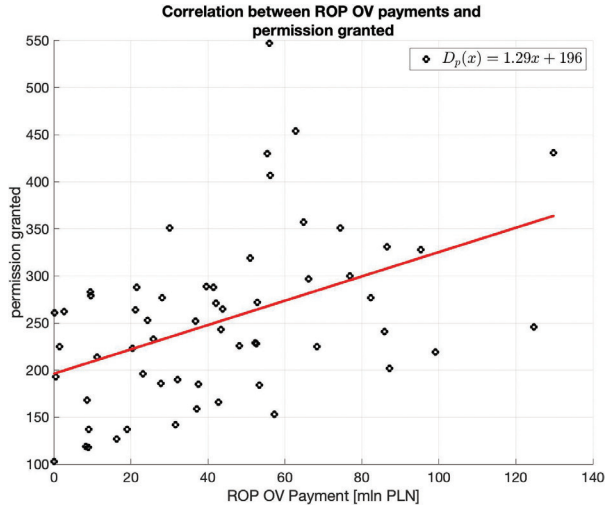


Fig. 12. Correlation function between payments made under the ROP OV and permits issued for the construction of new housing

Source: own study.

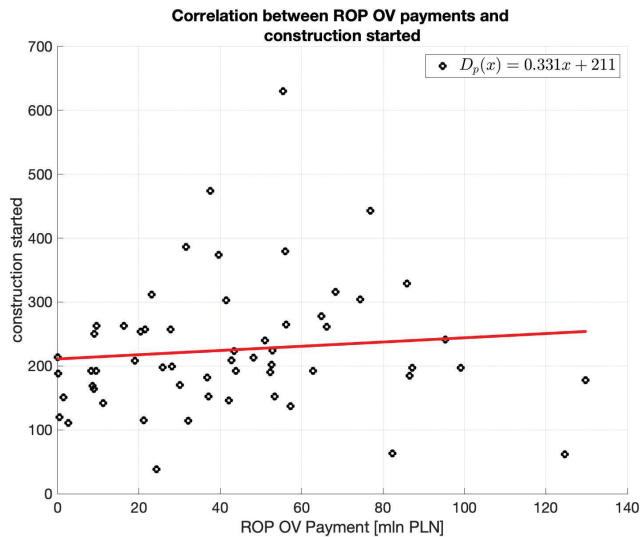


Fig. 13. Correlation function between payments under ROP OV and housing units under construction

Source: own study.

By attempting to quantitatively analyse the studied relations taking into account built regression models, it can be observed that if payments under the ROP OV were increased by PLN 1 million, on average this resulted in an increase in the indicator

value of the number of issued building permits by 1.29, while for housing under construction there was an increase by 0.331. The higher value of the indicator for issued building permits shows the greater flexibility of this economic variable in comparison to the number of housing units under construction (see Figures 12 and 13).

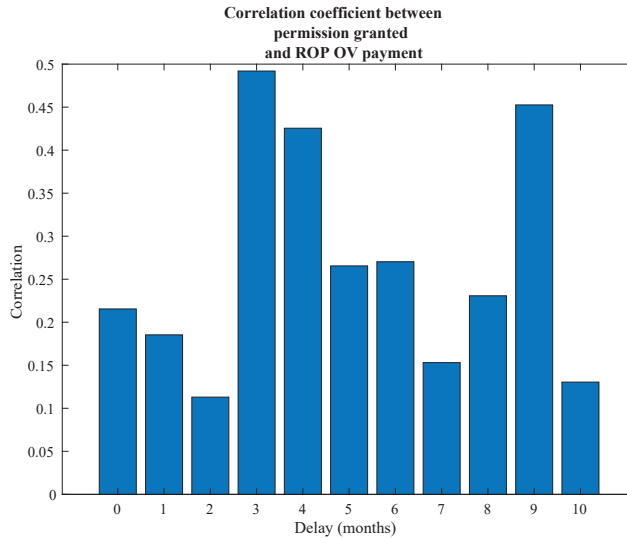


Fig. 14. Cross-correlation between payments made under ROP OV and permits issued for the construction of new housing

Source: own study.

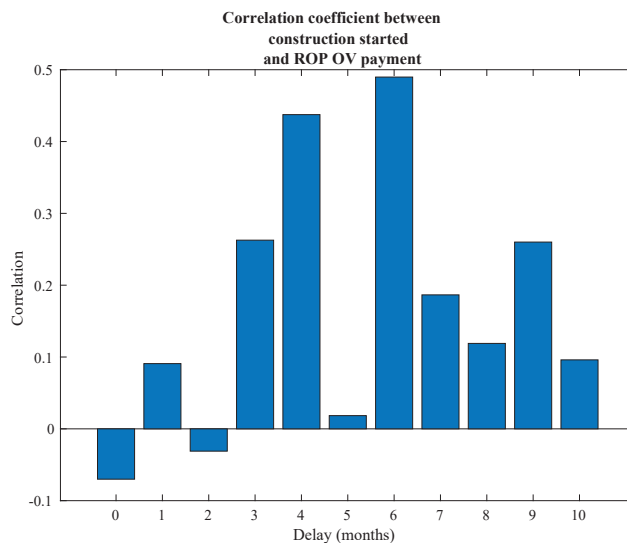


Fig. 15. Cross-correlation between payments made under ROP OV and housing under construction

Source: own study.

In assessing the significant time lag between the studied variables, it should be noted that, also in this case, issued building permits are characterised by greater flexibility of changes compared to housing units under construction. This fact is confirmed by the three-month delay period in comparison with the payments made under the ROP OV, as compared to the six-month delay period for housing units under construction (see Figures 14 and 15).

## Conclusion

The conducted research allowed for the identification and analysis of the impact of payments made under the Regional Operational Programme of the Opole voivodeship on the selected factors of production. Three key macroeconomic aspects directly influencing, among others, the creation of development potential and the building of the competitive position of the OV were subject to analysis. In order to conduct the research inference in a systematic manner, a literature review of the issue was carried out in the first stage of the research process. This analysis presented the significance of the cascading process of strategic planning and comprehensively described the evolution of the EU's approach to perceiving the development of individual regions (development, sustainable development, smart specialisation).

While discussing the utilitarian research dimension of the conducted analyses, it may be stated that:

- During the considered time period, there were annual increases in payments at the end of each calendar year.
- In two execution periods, payments were characterised by atypical values. The first such situation took place at the end of 2016, while the second at the end of 2018.
- From the conducted research it can be concluded that the period of ten months was when the most visible effect of the implemented payments on the labour market occurred. This effect was visible through a decrease in the unemployment rate (increase in employment).
- It can also be concluded that an increase in payments by PLN 1 million resulted in an increase in employment in the region by 0.0326 pp. The designated relation allowed to calculate changes in employment or unemployment in numbers depending on the value of payments made under the programme.
- The research showed that remuneration in the economy/region is mainly dependent on other macroeconomic variables than those used in the analyses in this study.
- Analysing the time lag between the payments made under the ROP OV and the newly created workplaces, it can be concluded that the most significant correlation of the lag between variables under consideration occurred after six months.
- Building permits reflected greater flexibility of changes to external economic incentives than the variability of the number of housing units under construction. This fact was confirmed by the three-month delay period in comparison with the

payments made under ROP OV, as compared to the six-month delay period for housing under construction.

The analyses showed the positive impact of the payments made under the Regional Operational Programme of the Opolskie voivodeship on the examined macroeconomic indicators. The obtained results may have a utilitarian aspect of decision making both at regional and national level.

Finally, it should be once again emphasised that it is not easy to assess the impact of public policies on the economy. The competitiveness of the region's economy is influenced by numerous and varied factors, and it is difficult to say that public intervention is a direct cause. When interpreting the results described in this study, it is important to recognize that they are based on a certain model, so demonstrate only a simplified picture of the reality. Another limitation of the research conducted in the described area was that only a selected catalogue of analysed macroeconomic variables were taken into account, as well as the regional area of conducted analyses. The presented limitations are a starting point for further research directions, in which it is planned to examine and analyse the impact of the Regional Operational Programme on other regions both in the national and international dimension. Research is already underway to analyse further macroeconomic variables selected by the authors.

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