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Clustering of Voivodships in Poland According to the Effectiveness of Professional Activisation in the Aspect of Changes in Procedures

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Abstract:

Purpose: *The aim of the research is the assessment of voivodships according to the effectiveness of basic forms of professional activisation and comparison of the results obtained for the new and old procedures of their determination.*
Design/Methodology/Approach: *The voivodships were clustered by using the k-means method for both new and old procedures of their determination. The impact of changes introduced from 2015 on results of clustering. The differences were examined using a simple measure of similarity. The study was conducted on the basis of statistical data on cost and employment effectiveness published in the Ministry of Family, Labour and Social Policy.*
Findings: *The greatest effectiveness of the use of the funds allocated for economic activisation was observed in Pomorskie, Lubuskie and Opolskie Voivodships, and the smallest in Mazowieckie, Warmińsko-Mazurskie, Świętokrzyskie and Podkarpackie Voivodships. The voivodships, in which greater funds were allocated for activisation (there were high values of cost effectiveness), generally used them to a lesser extent (employment effectiveness values were lower) and vice versa. In the analysed period, a change in the procedure of determination of effectiveness measures generally did not cause large differences in results of clustering. The year 2016 was an exception, and in 2018 the results of clustering were identical.*
Practical Implications: *The presented research can be used to assess the impact of various factors on socio-economic phenomena. It makes it possible to determine the impact of regulatory changes on the effectiveness of various social policy instruments.*
Originality/value: *The added value of the research is the comparison of results for both procedures of determination of effectiveness measures.*

Keywords: *Unemployment, employment and cost effectiveness, k-means method.*

JEL classification: *C38, J64, J68.*
Paper Type: *Research study.*

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1. Introduction

The phenomenon of unemployment has a negative impact on country's economy and on the functioning of households. In order to mitigate its effects, various forms of support and activisation of the unemployed are used. Expenditures on active labour market policy make it necessary to carry out analyses on the effectiveness of these activities. In the case of unemployment, these studies concern identification of groups of people at risk of long-term unemployment, assessment of the impact of the implemented programmes on exiting unemployment and monitoring the spending of funds allocated for these purposes. These analyses are based on the scientific achievements of James Heckman (Heckman, Lalonde, and Smith, 1999) – Nobel Prize winner in economics. Due to the different situation in different countries, research on effectiveness focus on different aspects of labour market policy.

In the USA, income effects of active employment programs are mostly studied. On the other hand, in the European Union (EU), in order to avoid high costs of long-term unemployment, employment effects are mainly analysed. In Poland, active labour market policies are implemented by voivodship and poviat labour offices. To assess the effectiveness of the implemented forms of professional activisation, two basic measures are used cost effectiveness and employment effectiveness. They are often criticised, therefore, in 2015, changes were made in the definition of the end of participation in activisation and the definition of employment, which was to improve their quality.

The aim of the article is assessment of voivodships according to the effectiveness of basic forms of professional activisation and to compare the results obtained for the new and old procedure of their determination. The k-means method and the measure of dissimilarity were used in the study. They made it possible to assess the impact of changes introduced from 2015 on the information value of both efficiencies. The study was conducted on the basis of statistical data on cost and employment effectiveness published in the Ministry of Family, Labour and Social Policy (Polish abbreviation MRPiPS).

2. Literature Review

Active state labour market policies can play two basic roles (Calmfors, 1995). The first is to maintain the economic activity of the unemployed, (Layard, Nickell, and Jackman, 1991), and the second is to adapt the structure of labour supply to the demand for labour (Jackman, 1994). Actions taken within its framework provide protection for people in a special situation on the labour market. On the other hand, current unemployment support systems in Europe have contributed to the persistence of unemployment. The impact of benefits, threshold wages and education on the duration of unemployment is explained by the search theory of unemployment. Stigler, a 1982 Nobel Prize winner, is considered its creator. This theory refers to certain principles that guide individuals in the process of seeking work. Nobel

laureates from 2011 Diamond, Mortensen and Pissarides have contributed to the development of this theory and its application mainly in the analysis of the labour market. Studies by Nickell (1979), Hughes and Perlman (1984) showed that the increase in unemployment benefits led to a longer period of seeking a job. The strength of this dependence weakened with the lengthening of the period of unemployment. The search theory on the labour market explains why the unemployed delay taking up employment and extend the period of unemployment.

The literature has long stressed that the potential time of unemployment benefits is strongly correlated with structural unemployment (Nickell and Layard, 1999). The prolonged duration of benefits and their increase usually discourages looking for a job and increases the duration of unemployment. This has led to the emergence of a trend to measure the effects of potential benefit duration on unemployment (Mortensen, 1977; Katz, 1986; Card and Levine, 2000; Hahn, Todd, and Van der Klaauw, 2001; Lalive, 2007; Lee and Munk, 2008; Brügger, Lalive, and Zweimüller, 2009). The effects of benefit levels, the impact of the replacement rate and the duration of benefit payment on labour market processes were studied. American precursors of the trend (Moffitt, 1985; Meyer, 1990) demonstrated the existence of unemployment exit intensity leaps in the area of benefit duration. Similar studies have been conducted in Europe and indicated similar effects of benefits (Micklewright and Nagy, 1998; Røed and Zhang, 2003). Research on the impact of benefits on exiting unemployment is also conducted in Poland (Bieszk-Stolorz and Markowicz, 2014; 2015).

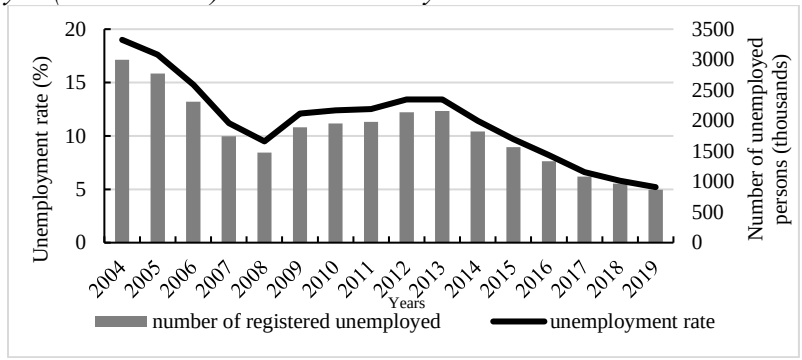
Excessively long search times can lead to long-term unemployment. Therefore, various programmes are introduced to increase the economic activity of people seeking employment. After Poland's accession to the EU, the scope of measures related to economic activisation of the unemployed, addressed to groups of people in a difficult situation on the labour market, increased. One of the main objectives of these changes is to increase motivation to look for a job. The conducted research indicates that these measures contribute to an increase in the probability and intensity of taking up employment by the unemployed (Bieszk-Stolorz, 2017). Instruments used by labour offices in Poland affect two sides of the labour market, supply (training, internships and professional preparation in the workplace) and demand (intervention works, public works, socially useful works, funds for starting a business activity or for equipping a workplace).

The use of EU funds forces the use of evaluation studies. Their aim is, among other things, to answer the question whether as a result of the undertaken actions positive socio-economic changes have taken place and, if so, how big these changes are. From the social point of view, it is important to employ as many job seekers as possible. On the part of institutions financing active support programmes, it is necessary to assess the spending of funds. For this purpose, the effectiveness of undertaken measures is examined. It is an important tool for measuring effectiveness. The studies conducted so far on the effectiveness of basic forms of professional activisation indicate that active labour market policy in Poland brings about a positive effect for the labour

market consisting only in temporary reduction of unemployment.

The basic measure of the labour market situation is the unemployment rate. The source of data, which are poviat labour offices, allows to determine the registered unemployment rate, which in Poland in the years 2004-2019 was changing. In 2004 (the year of accession to the EU) it was equal to 19% and in the following years it decreased to 9.5% (2008). Then, as a result of the global financial crisis, it increased to 13.4% (year 2012). It remained at the same level in 2013 and then decreased to 5.2% in 2019. The number of registered unemployed persons changed similarly (Figure 1).

Figure 1. *Registered unemployment rate (%) and the number of registered unemployed (in thousands) in Poland in the years 2004-2018*



Source: *Own study based on data from the Local Data Bank, https://bdl.stat.gov.pl/BDL/start.*

Numerous studies indicate spatial diversity of unemployment in Poland (Murawska, 2016; Tatarczak and Boichuk, 2018; Woźniak-Jęchorek, 2015). This may be due to the fact that the Polish labour market is strongly distorted by annual fluctuations of other macroeconomic factors (Hadaś-Dyduch, Pietrzak, and Balcerzak, 2016).

3. Research Methodology

In the case of the labour market, it is important to monitor the implemented support programmes for the unemployed. From the social point of view, it is important to employ as many job seekers as possible. On the part of institutions financing active support programmes, it is necessary to assess the spending of funds. In order to assess the effectiveness of the implemented programmes for basic forms of professional activisation, two measures are determined: employment effectiveness and cost effectiveness. The catalogue of basic forms of professional activisation is established by the minister in charge of labour. In the years 2005-2019 it changed (Table 1). The data concerning both effectiveness is published in MRPiPS studies[3].

[3]*https://archiwum.mpips.gov.pl/praca/fundusz-pracy/efektywnosc-form-promocji-zatrudnienia-i-aktywizacji-zawodowej/; https://www.gov.pl/web/rodzina/efektywnosc-form-promocji-zatrudnienia.*

Table 1. *Basic forms of economic activisation in Poland in the years 2005-2019*

Basic forms of professional activisation	2005	2006–2009	2010–2013	2014–2019
Training courses	+	+	+	+
Intervention works	+	+	+	+
Public works	+	+	+	+
Traineeships	+	+	+	+
Co-financing of business start-ups	+	+	+	+
Reimbursement of the cost of equipment/equipment for the workplace	+	+	+	+
Socially useful works	–	+	+	–
Preparing adults for the workplace	+	+	–	–

Source: *Own study.*

Employment effectiveness (re-employment rate) is the ratio of the number of the unemployed who, in a given year, after completing or interrupting participation in a given form of activisation, were employed for at least 30 days within 3 months to the number of people who completed participation in a given form of activisation in that year. It is an indicator that allows to determine the chances of finding employment after completing participation in the programme.

Cost effectiveness (cost of re-employment) is a ratio of the amount of expenses incurred in a given year for a given form of activisation to the number of the unemployed who, after completing participation in a given form of activisation, obtained employment within 3 months. By its means the cost of bringing an unemployed person into employment is assessed.

The research carried out on the employment effectiveness indicator indicated a loss of its ability to measure effective actions carried out by poviat employment offices. In the literature, the term performance paradox appears. Its occurrence is associated with a weak correlation between the effectiveness indicator and the effectiveness itself (Meyer and Gupta, 1994; Meyer and O'Shaughnessy, 1993). The relationship between actual and reported activities is decreasing, which may lead to an over-optimistic assessment of reality (van Thiel and Leeuw, 2002). Due to the inclusion of activities with a predetermined 100% effectiveness, the phenomenon of cream skimming, also known as cherry picking, may occur.

The MRPiPS analysis of the effectiveness of basic forms of professional activisation concerns a short period of time, i.e. three months. The Supreme Audit Office (Polish abbreviation: NIK) conducted an audit on the permanence of employment after two years from the beginning of the activisation process. In the opinion of NIK, the high employment effectiveness indicators set by poviat labour offices were overstated.

According to the methodology adopted by NIK, employment can be considered sustainable if after 2 years (or more) a given person does not return to the list of the

unemployed. Starting from 2015, the methodology for determining both efficiencies was changed. This change mainly concerned the change in the definition of termination of participation in activisation and the definition of employment. In earlier years, the date of completion of participation in activisation was the date of completion of participation in a given form of support or the date of completion of financing from the funds of the Labour Fund. The provisions of the Act of 20 April 2004 on employment promotion and labour market institutions defined the activisation completion date as the end of the obligation period.

Before 2015, a person was considered as employed, if after completing participation in a specific form of activisation, did not register again in the poviat labour office within 3 months. At present, it is required that an unemployed person after participation in activisation works for at least 30 days within a period of 3 months and on this account (with few exceptions) social insurance contributions are paid to the Social Insurance Institution (Polish abbreviation: ZUS).

Persons participating in a given form of activisation are understood as persons for whom the expenditure from the Labour Fund was made in a given year, regardless of the duration of activisation and repeated use of the same form of activisation.

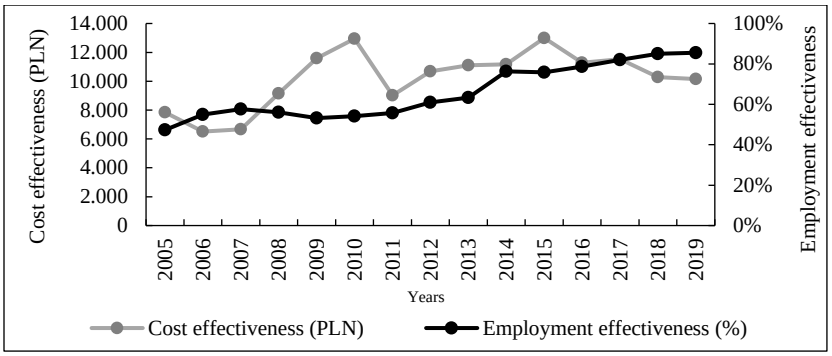
Persons who have completed participation in a given form of activisation are those who, in the audited year, completed participation in a given form of economic activisation financed from the Labour Fund, including persons who have completed activisation initiated in previous years. These changes were of particular importance in the case of business co-financing and reimbursement of the costs of equipment or retrofitting of the workplace. The modifications were to improve data quality. The value of both efficiency values has also changed.

In the years 2006-2010, a large increase in cost effectiveness (from about PLN 6.5k to about PLN 13k) was accompanied by a relatively stable employment effectiveness of about 55% (Figure 2). In 2011, there was a significant decrease in cost effectiveness compared to the previous year from about PLN 13k to about PLN 9K. Then, by 2015, both effectiveness showed upward trends, and after 2015, the employment effectiveness continued to increase with a decreasing value of cost effectiveness. This shows a better use of funds for economic activisation of the unemployed in 2015-2019.

Two hypotheses were made in the study:

H1: The change in the method of calculating both forms of effectiveness had a slight impact on their informative value.
H2: The effectiveness values improved and the differences between them in voivodships were decreasing.

Figure 2. *Total cost and employment effectiveness of activisation programmes in Poland in 2005-2019*



Source: *Own study.*

In the study, the *k*-means method was used to group voivodships. It is an iterative method, based on minimising the total sum of intra-group distances calculated from the centroid of the groups. The coordinates of the centroids are arithmetic means from the values of the features of the objects belonging to a given group (Cleff, 2019). The most important stage of the study is always the selection of objects and variables. In this analysis the whole population is subject to the survey. The selection of variables is made according to substantive and statistical-formal criteria.

The next step of the *k*-means method is the normalisation of variables. The purpose of normalisation is to enable comparative testing of objects described by variables measured on different measurement scales and having different titres. Since in the study all variables are measured on a ratio scale, it has been decided to use one of the quotient transformations, the data is given by the formula:

$$z_{ij} = \frac{x_{ij}}{\sqrt{\sum_{i=1}^{m} x_{ij}^2}} \tag{1}$$

where:
x_{ij} – value of *j*-th variable in *i*-th object,
m – number of objects,
n – number of variables.

The most commonly used distance measure was the Euclidean metric. The number of classes is determined by means of classification quality indices. If it is justified by the purpose of the study, it can also be selected subjectively. The differences between the results of clustering obtained for both efficiency counting procedures were estimated using a measure of dissimilarity, defined by a simple measure of distance. For each object, the clustering of new and old procedures was compared. As the group membership is a variable measured on a nominal scale, the only possible arithmetic

operation for this scale is to determine the equality and difference, given by the formula:

$$d_{SN}^{(i)} = \begin{cases} 1 & if \quad x_S^{(i)} \neq x_N^{(i)} \\ 0 & if \quad x_S^{(i)} = x_N^{(i)} \end{cases}, \tag{2}$$

where:
$d_{SN}^{(i)}$ – similarity between the *i*-th voivodship belonging to the group for the old and new procedure,
$x_S^{(i)}$ – the *i*-th voivodship belongs to the group for the old efficiency calculation procedure,
$x_N^{(i)}$ – the *i*-th voivodship's membership of the group for the new efficiency calculation procedure.

The similarity of the results of the voivodship clustering for the old and the new efficiency calculation procedure was determined by means of a formula:

$$d_{SN} = \frac{\sum_{i=1}^{m} d_{SN}^{(i)}}{m}, \tag{3}$$

where d_{SN} – the distance between the results of clustering obtained for the old and new efficiency calculation procedure in a given year. Calculated using formula (3), the measure is normalised between $\langle 0, 1 \rangle$. If the results of the clustering of voivodships for both procedures in a given year were identical, then the value of d_{SN} takes the value 0. If each voivodship was in a different group as a result of both procedures, then the measure described by formula (3) took the value 1.

4. Results

The research was conducted in two stages. In the first stage (years 2008-2018), the analysis was based on the current method of calculating the values of both effectiveness coefficients in a given year (new procedure). Then, in the second stage, an analogous clustering was made for the efficiencies determined on the basis of the old procedure (years 2015-2018). This approach made it possible to compare the results of clustering for both procedures.

In the applied *k*-means method, the objects were voivodships, and the variables were cost and employment effectiveness of particular forms of economic activisation. The number of clusters was determined as 3 in order to determine homogeneous classes with the best (the lowest cost and the highest employment), average and the worst efficiency values. The quality of clustering was examined by calculating the distance

between the classes. The criterion of division was to maximise it. The composition of each cluster in each year was different:

- Cluster 1 – voivodships with the most favourable effectiveness values.
- Cluster 2 – voivodships with average effectiveness values.
- Cluster 3 – voivodships with the most unfavourable effectiveness values.

The results of clustering for the new and old counting procedure are presented in Table 2. For the old procedure, those voivodships which were in a different group than in the case of the new calculation procedure were marked with a grey colour.

Table 2. *Voivodship cluster membership: new procedure (2008-2019), old procedure (2015-2019)*

Voivodships	**New procedure**												**Old procedure**				
	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2015**	**2016**	**2017**	**2018**	**2019**
Dolnośląskie	2	2	2	2	2	2	3	2	2	2	2	3	2	3	2	2	1
Kujawsko-Pomorskie	2	2	2	2	2	1	3	2	2	2	2	2	1	3	2	2	1
Lubelskie	2	2	2	2	2	1	2	1	1	3	2	2	1	3	2	2	2
Lubuskie	1	1	1	1	1	2	3	1	2	2	2	1	1	3	2	2	2
Łódzkie	2	2	2	2	2	1	2	1	1	1	2	3	1	3	2	2	1
Małopolskie	2	2	2	2	3	3	3	1	2	1	2	2	1	3	1	2	1
Mazowieckie	3	3	3	3	3	2	3	2	3	2	2	3	2	2	3	2	3
Opolskie	1	2	2	2	2	2	1	1	1	1	2	2	1	1	1	2	2
Podkarpackie	2	2	2	2	2	2	3	2	2	1	2	2	2	3	2	2	1
Podlaskie	2	2	2	2	2	3	3	2	3	2	1	3	2	2	3	1	1
Pomorskie	1	2	1	1	1	1	3	1	1	1	3	1	1	1	1	3	2
Śląskie	2	2	2	2	2	1	3	2	3	2	2	2	2	3	2	2	1
Świętokrzyskie	2	2	2	2	1	1	2	3	3	3	2	3	3	2	3	2	3
Warmińsko-Mazurskie	2	2	2	2	2	2	3	2	2	3	2	2	2	3	2	2	3
Wielkopolska	2	2	2	2	2	1	2	1	2	2	3	3	1	3	1	3	2
Zachodniopomorskie	2	2	2	2	2	2	3	2	2	1	1	2	2	3	2	1	1

Source: *Own study.*

When analysing the membership of voivodships to particular clusters, a certain regularity can be observed. Cluster 2 was the most numerous except for year 2014, in which the largest number of voivodships (as many as 11) was in cluster 3 containing voivodships with the most disadvantageous values of effectiveness measures. Cluster 3 in 2008-2011 was constituted only by Mazowieckie Voivodship. It belonged most often to this cluster. Cluster 1, i.e., voivodships with the most advantageous effectiveness values, was most often made up of Pomorskie, Lubuskie, Opolskie and Świętokrzyskie. In 2013 and 2015 this cluster was the most numerous.

Differences between the results obtained for the old and the new calculation procedure for the period 2015-2019 were examined using a measure of dissimilarity – formulae

(2) and (3). The values of d_{SN} in individual years were equal 0.063, 0.813, 0.5, 0 and 0.75, respectively. This shows that the results of clustering in 2018 are identical, and in 2015 they differ only in one case – for Kujawsko-Pomorskie Voivodship. In these years, therefore, the change in the method of determining both effectiveness measures did not affect the result. The situation in 2016-2017 and 2019 is different. In 2016, in most cases, the voivodships were assigned to different clusters. Almost always it is a change by one level (higher or lower). Out of the total number of 34 changes, in the case of 17 voivodships, the change consisted in moving to a higher cluster (in this case worse).

However, the number of such changes is too small to believe that the change in the counting procedure has worsened or improved the evaluation of the voivodships. In 2016 the differences in clustering results were the greatest, followed by year 2019. In 2017, in half of the cases, voivodships belonged to other clusters, depending on the adopted procedure for calculating effectiveness. In four cases, if the old calculation procedure was applied, the voivodships were placed in classes with worse effectiveness values, and in the remaining four cases – in classes with better effectiveness values.

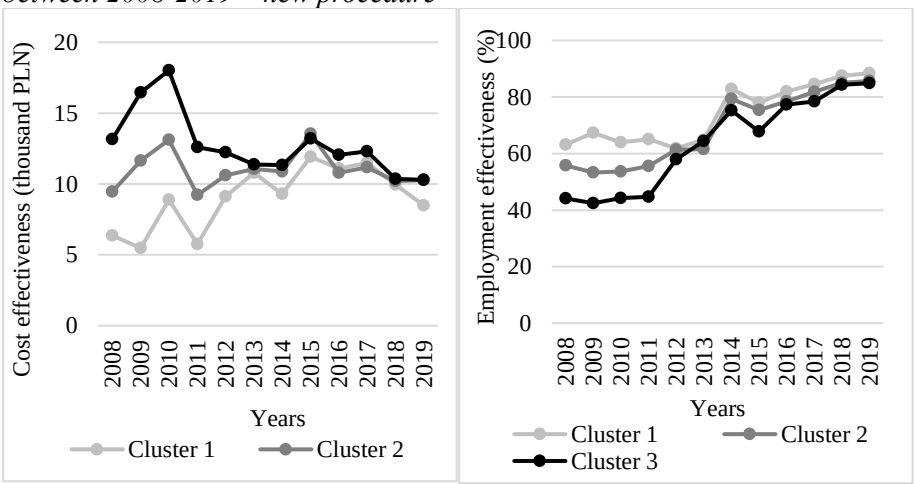
Figure 3 shows the average cost and employment effectiveness for each cluster in each year determined by the new procedure. The composition of each cluster in each year was mostly different. The total average cost effectiveness in cluster 2 did not differ significantly from the total average cost effectiveness for Poland (Figure 2). This is due to the fact that class 2 was generally the most numerous and thus had the greatest impact on the country-wide average cost effectiveness. In 2008-2011, there were much greater differences between clusters, and in subsequent years these differences decreased. This can be explained by the fact that in the first years clusters 1 and 3 were not numerous (they consisted of a maximum of three voivodships, and very often one).

Cost effectiveness in 2008-2013 were subject to strong fluctuations, and then in 2013-2018 for each cluster they remained relatively stable. In 2019 cost effectiveness for 1 cluster decreased, which indicates even better use of resources by the best voivodships. In the case of employment effectiveness in 2008-2011 the differences between clusters were also the biggest and remained more or less constant. From 2012 to the end of the studied period (except for 2015) employment effectiveness increased, which is a positive phenomenon, because it shows that an increasing percentage of people participating in activisation programmes took up employment. The aforementioned year 2015 deserves special attention. This year saw a significant increase in cost effectiveness and a decrease in employment effectiveness. At the same time, it was the year in which the procedure of calculating both effectivenesses was changed.

Generally, the most numerous was cluster 2, with average values of effectiveness. In the analysed period, the voivodships in which forms of economic activisation of the unemployed were realised most effectively (cluster 1) were usually Pomorskie,

Lubuskie and Opolskie. The group of voivodships with the worst values of cost and employment effectiveness (cluster 3) consisted mainly of the following voivodships: Mazowieckie, Warmińsko-Mazurskie, Świętokrzyskie and Podkarpackie. In voivodships where larger funds were allocated for activisation (high values of cost effectiveness), they generally used them less well (lower values of employment effectiveness) and vice versa.

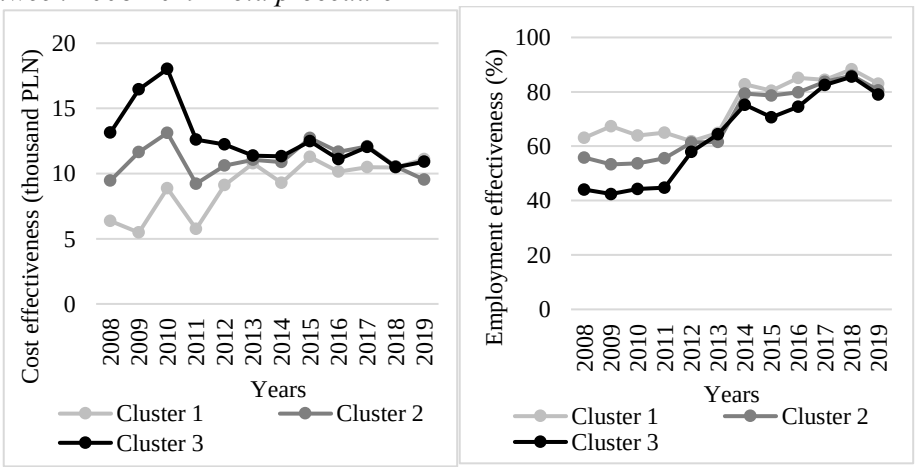
Figure 3. *Average values of cost and employment effectiveness in individual classes between 2008-2019 – new procedure*



Source: *Own study.*

Figure 4 shows the average cost and employment effectiveness for each cluster in 2008-2019, determined according to the old procedure.

Figure 4. *Average values of cost and employment effectiveness in individual classes between 2008-2019 – old procedure*



Source: *Own study.*

If we compare the course of the cost effectiveness curves between 2015 and 2019 using the old procedure of their determination (Figure 4) with the new procedure (Figure 3), we can see that despite a similar course there are small differences. For the new calculation procedure in 2016-2018 the average efficiency values in clusters 1 and 2 were almost the same. For the old procedure such a situation occurred for clusters 2 and 3. In 2019, according to the new procedure, the cost effectiveness in cluster 1 decreased, while according to the old procedure, it decreased in cluster 2. On the other hand, for the employment effectiveness calculated according to the new procedure, it can be seen that in the years 2015 and 2016 (Figure 3) the course of curves in all clusters was very similar, but if the old procedure was applied, the differences between clusters in those years were greater. In 2019, the employment effectiveness calculated according to the new procedure increased slightly, while according to the old procedure it decreased significantly in all clusters (Figure 4).

5. Conclusions

Direct actions related to counteracting unemployment are implemented at the poviat level. However, the analysis at the level of these territorial units is not easy, as it is difficult to identify the factors that significantly affect the effectiveness indicators (Bąk, Wawrzyniak, and Oesterreich, 2019; Bieszk-Stolorz and Dmytrów, 2019a). The reason is the large number of poviats in Poland. Additionally, a small number of people in some poviats participating in the programmes causes outlier observations. Therefore, it is reasonable to try to analyse at a higher level of data aggregation – at the level of voivodships.

The follow-up attention of the NIK on the length of time that should be considered as permanent employment is still open. Suggested 2 years are most appropriate. Including them would result in a significant reduction in the value of employment effectiveness and an increase in cost effectiveness. However, due to the annual accounting period for many activisation funds and the annual reporting period, this is in many cases inadvisable or impossible. In practice, the changes made in 2015 had an insignificant impact on the effectiveness values.

The results obtained in the conducted research are consistent with the results of previous analyses conducted by the Authors using other methods (Bieszk-Stolorz, Dmytrów, 2019b). They show that the use of funds by poviat employment offices for economic activisation of the unemployed has improved. This is particularly visible in the increase in employment effectiveness. Cost effectiveness has been set at an average level. What is important, the unfavourable disproportions in the values of both effectiveness values at the level of voivodships have decreased. In the initial years of the analysed period, high values of cost effectiveness and low values of employment effectiveness were in voivodships with large funds allocated for economic activisation. The equalisation of the value of effectiveness indicates a decrease in the scale of this unfavourable phenomenon. Thus, the *H2* hypothesis was confirmed.

The conducted survey also showed that the changes in the methodology of calculating employment effectiveness for basic forms of professional activisation introduced from 2015 had a slight impact both on their values and on the results of the clustering of voivodships. The change in the methodology concerned primarily a change in the definition of the end of participation in activisation and the definition of employment and did not significantly affect the feasibility of the results. The biggest differences occurred in 2016-2017 and in 2019. In 2015 the results of clustering were very similar, and in 2018 – identical. This confirms the *H1* hypothesis.

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