



## ORIGINAL PAPER

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## Cluster analysis of effectiveness of labour market policy in the European Union

**JEL Classification:** J01; J08; J11; J24; J88

**Keywords:** *labour market policy expenditure; effectiveness; efficiency; Ward's method; k-means method*

### Abstract

**Research background:** In the era of demographic changes and the need for rationalization of public expenditure, the European Union social policy promotes the activation approach. In addition, a growing importance of increasing the effectiveness and efficiency of public entities can be noticed. These phenomena are visible in the implementation of the labour market policy. However, the EU countries represent a different approach to spending public funds on issues related to the implementation of labour market policy.

**Purpose of the article:** The authors are presenting the main theoretical assumptions concerning effectiveness and efficiency of labour market policy. Moreover, in the paper the EU countries are classified in clusters according to their level of expenditure on different categories of LMP. A comparison of the situation over ten years — in 2004 and 2014 — has also been conducted. In 2004, ten new members entered the EU, and the year 2014 presents the most current data in the analyzed area.

**Methods:** As a research method cluster analysis was applied. Cross-country labour market situation throughout the EU is presented by the analysis of the Eurostat data. The countries are grouped in clusters following Ward's and k-means methods.

**Findings & Value added:** There is a need to work out a complex evaluation of labour market policies in the EU to provide comparative analysis of the EU countries (or groups of countries). It would allow to determine the level of development of the country in terms of the efficiency of labour market policies. The EU countries with the best labour market indicators represent diverse levels of LMP expenditure.

## Introduction

The European population is gradually aging. In such demographic situation, maintaining European welfare systems, pension schemes and public healthcare is increasingly difficult, while the overall demand for such services is likely to increase. As such, policymakers are concerned about how to ensure long-term sustainability of public finances in the face of a declining share of economically active people (Kumpikaite-Valiuniene *et al.*, 2016, p. 346). Finding a reasonable policy for growing efficiency and effectiveness of LMP can be treated as the priority of European cohesion orientation. The increasing of efficiency of LMP is one of the main objectives of economic policy as it influences the rationalization of usage of public expenditures as well as the improvement of employability of human resources (Marklund & Rollnik-Sadowska 2016, p. 210). Therefore, examining the determinants of the EU LMP seems to be an important research topic.

The purpose of the article is to introduce selected tendencies of the EU labour market policy in the context of both theoretical assumptions, definitions and measurement methods of LMP efficiency. The aim of the research is a comparison of the situation in the EU countries regarding LMP expenditure.

The structure of the paper is as follows: the authors start with literature review, which covers the theoretical background of labour market policies (LMP). This section primarily defines the LMP efficiency and provides classification of measuring methods applied in the European Union. Subsequently, an explanation of conducted research methods is presented. This concerns mainly the methods of statistical data analysis — Ward's and k-means methods. The next section indicates briefly the current changes in the EU labour market policy and contains the analysis of the public expenditure on different categories of LMP in the EU. This analysis proves significant diversification among European countries as to the scope of implementation of labour market policy. The authors discuss the determinants of efficient LMP. The paper is summarized by the discussion about the results of other studies and conclusions, which include suggestions for future research.

## Literature review

External actions appearing in the form of government intervention or legislative regulation are a reaction to the situation in which the market, which by its nature should endeavor to maximize the utility of production goods and services and optimally allocate resources, stops in the sense of Pareto optimum to function properly (Bator, 1958, pp. 351–379).

State intervention demands of the financial resources. These are generated mainly through taxes, which can cause interference in the allocation of resources and may lead to the reduction of economic growth. Therefore, public expenditures, if they are incurred, should be used to improve long-term growth prospects. Improvement of the efficiency and effectiveness of public spending allows for achieving the same results at lower costs, or an increase of ratio between price and quality by obtaining better results at the same level of expenditures (Mandl *et al.*, 2008, p. 4). The conceptual scope of the notions of efficiency and effectiveness arises as a question in this context. Efficiency is quite often identified with effectiveness. The difference in the understanding of these two concepts was noted by Helmes who stressed that "efficiency refers to doing things in the right way, and effectiveness refers to doing the right things" (Helmes, 2006, p. 211).

In the public sector, effectiveness relates the input or the output to the final objectives to be achieved, i.e. the outcome. The outcome is often linked to welfare or growth objectives and therefore may be influenced by multiple factors (including outputs but also exogenous environmental factors) (Afonso *et al.*, 2009, p. 23).

The efficiency can be understood as an effort-effect relationship either. The essence of efficiency in strictly economic effects is the relationship between the degree of effects and expenditures. A more precise definition is used in the concept of Pareto efficiency. According to the Pareto criterion, the economy produces effectively when it proves impossible to improve the economic well-being of the individual without worsening the situation of another entity (Stiglitz, 2000, p. 122).

The organizations of public sector are non-profit organizations. This is why it is difficult to use business measurement methods for the performance for public organizations. The problem arises because public spending generates many objectives and outputs, which often are not sold on the market. As a result, prices are not available, and the product cannot be quantified (Balabonienie & Večerskiene, 2015, pp. 314–320).

Different dimensions of effects can be considered. In the literature, the importance of maximizing utility is emphasized as a crucial criterion for economic evaluation and economic choice.

The above diagram explains the relationship between the effectiveness, efficiency and utility. An analysis of effectiveness associates expenditures with the results. Evaluation of efficiency requires comparing objectives and results. Utility analysis should answer the question of meeting the social needs. The extension of inference should include outside factors of the administration and analysis of consumption expenditure by authorities.

Reflections on the efficiency and effectiveness of labour market policy (LMP) require interpretation of this concept. Labour market policy (LMP) uses instruments aimed at adapting the structure of labour supply to the labour demand, focuses on solving short-term and medium-term structural, conjunctural and social problems of the labour market. The statistics of Eurostat distinguishes groups of labour market instruments, which can be divided into services, measures and supports (Eurostat, 2013, p. 13)<sup>1</sup>.

Experience in the implementation of LMP demonstrates higher effectiveness of active policy in comparison with passive. Pissarides (1985) finds that employment subsidies reduce unemployment while unemployment benefits and wage taxes raise it. Many other researchers demonstrate positive effects of active measures implementation, these include Lindbeck *et al.* (1986), Layard *et al.* (1991), Calmfors (1994), Martin (2000), Martin *et al.* (2001), Jackman (2002), Calmfors *et al.* (2002), Layard (2004), Woźniak (2016). Esping-Andersen notes that the longer tradition of implementation of active labour market programs (ALMP), the higher level of their effectiveness, and the better understanding and social acceptance for this type of action (Esping-Andersen *et al.*, 2001). It is also necessary to emphasize that the foundation of effective implementing LMP is the simultaneous occurrence of certain determinants of the effectiveness. Empirical literature indicates, for example, that even moderate benefit sanctions increase the job-finding rates of the unemployed (Cahuc & Zylberberg, 2004; Sengul, 2017). Sanctions also increase the exit rate from unemployment to an ALMP for flat-rate labour market support recipients (Busk, 2016). However, the circle of conditions is much wider and contains such factors as: reducing the threshold level of wage, accepted by the unemployed, so that they were willing to take lower-paying jobs in relation to their original expectations (Meager & Evans, 1998, pp. 1–102); creation of new workplaces (Calmfors *et al.*, 2002, pp. 32–36) etc..

The high costs of implementing the instruments of LMP, formulate expectations for evaluation of active forms of counteracting unemployment. Governments pay more attention to the defined results of LMP. Their as-

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<sup>1</sup> Until 2013, the Eurostat methodology distinguished 9 groups of instruments divided onto active and passive support. Services and measures were included to active labor market policies (ALMP).

assessment in the European Union countries is rather not a subject of systematic evaluation, but only the process of monitoring. Moreover, the monitoring methods assess rather LMP effectiveness not efficiency, and there is no common measure for all the EU countries.

The evaluation studies used for LMP appraisal can be divided into process and impact evaluations. Process evaluation analyzes the goals of active forms of counteracting of unemployment for compliance with the priorities of socio-economic policy. Its results aim to improve the management of active programs, reviewing the assumptions, theories and paradigms. Impact evaluation is looking for causal relationships between participation in active program and the results obtained. They allow to define so-called net effects of the intervention. Evaluation of the impact is usually carried out at the microeconomic level (it analyzes the effects of support in relation to the participant and evaluates the change of his position in relation to the state, in which a support would not have been received) and macroeconomic level (measurement and analysis of the effects of the aggregated impact of ALMP on the market and the whole economy).

Another type of evaluation is cost-benefit analysis. It allows to identify all the costs and benefits arising in connection with the implementation of the program. Benefits include the net effects at the micro and macro dimensions. In contrast, the costs include all expenses related to the implementation of the program and the side effects of its impact (Schmid *et al.*, 1996).

The most commonly used is the evaluation of net effects at the microeconomic level, assessment of the effectiveness of the entity benefiting from support (Schmid *et al.*, 1996). This evaluation, relying on different methodological approaches, has been developed since the nineties of the last century thanks to the European Commission, and is becoming a significant instrument to evaluate and improve the effectiveness of public policies.

Assessment of the net effect requires comparing economic values obtained in the situation of the unemployed participating in the program with the actual values of the analogical situation generated in the opposite case, if the unemployed do not take a part in the program. Such counterfactual situation constitutes an appropriate reference plan for the evaluated program. Evaluation based on counterfactual states is developed on the basis of statistics and econometrics. The statistics approach is represented by works of Rubin (Rubin, 1974, pp. 688–701). Econometric trend has been developed on the basis of Heckman's research (Heckman & Robb, 1985, 239–267).

## Research methodology

As a research method, cluster analysis was applied. It is a very popular multidimensional statistical method, whose fundamental aim is to classify (observe) the objects into groups (clusters).

The cross-country labour market situation throughout the EU was based on the analysis of the Eurostat data.

The EU countries were grouped in clusters following Ward's and k-means methods, taking into consideration the level of public expenditure on LMP as a share of GDP (regarding 9 categories of LMP<sup>2</sup>). Two years of analysis are selected — 2004 and 2014 to verify if the EU countries made changes concerning LMP priorities during that period. In 2004 ten new members entered the EU and the year 2014 presents the most current data in the analyzed area.

The selected methods are useful in data presentation for groups of countries with diversified situation like the EU member states (Rollnik-Sadowska, 2016, pp. 84–87).

The Ward's method is the most popular hierarchical agglomerative method used in social sciences (Aldenerfer & Blashfield, 1984). This procedure creates groups which are highly homogeneous by optimizing the minimum variance, or an error sum of squares (ESS), within clusters (Teo, 2014, p. 110).

The K-means method classifies a given data set through a certain number of clusters (assume k clusters) fixed a priori. The main idea is to define k centroids, one for each cluster (MacQueen, 1967, pp. 281–297). It is the most useful for forming a small number of clusters from a large number of observations. It requires variables that are continuous with no outliers.

In the below analysis there were selected the following 3 variables (Figure 3 and Figure 5):

v1 – public expenditure on LMP services (category 1), which covers the costs of the public employment service (PES) together with any other publicly funded services for jobseekers;

v2 – public expenditure on LMP measures (categories 2–7), which covers activation measures for the unemployed and other target groups including the categories of training, job rotation and job sharing, employment incentives, supported employment and rehabilitation, direct job creation, and start-up incentives;

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<sup>2</sup> Expenditure on labour market policies (LMP) is limited to public interventions which are explicitly targeted at groups of persons with difficulties in the labour market: the unemployed, the employed at risk of involuntary job loss and inactive persons who would like to enter the labour market (Eurostat).

v3 – public expenditure on LMP supports (categories 8–9), which covers out-of-work income maintenance and support (mostly unemployment benefits) and early retirement benefits.

## **Results of clustering of the EU labour markets**

The current socio-economic conditions in the EU, resulting in the decline of labour supply, have triggered the activation approach which determines certain changes in public policy. One of them is an increasing importance of active measures. Their objective is not only the activation of the unemployed, but the stimulation of inactive labour resources as well.

The change is also noticed on the level of the structure of labour demand. One crucially important phenomenon is the expansion of flexible and atypical employment (Gialis & Leontidou, 2016).

The employment flexibility is a part of creation of transitional labour markets, which are institutionalised arrangements to support the change of the employment status or the combination of labour market work with other socially (and to some extent even economically) useful activities. Important elements of such strategy are the combination of working time reduction with life-long learning, the use of explicit wage subsidies for lower income groups or hard-to-place people, and legally or contractually bargained entitlements to transitional employment. Such transitional labour markets would also serve as a flexible buffer which expands in periods of recession and contract during booms (Schmid, 1998, p. 3).

The European Commission has recommended implementation of flexicurity model. That strategy combines the flexibility and security in the labour market. However, the model in terms of its security part does not seem to work outside Nordic countries as it is connected with specific social mentality as well as the adequate level of generous welfare state. Even in Denmark, security is mainly assured by private contribution and certain conditionality for granting benefits (Rollnik-Sadowska, 2015).

The situation in the EU countries varies in terms of the scope of implementation of labour market policy, which reflects the level of input — expenditure on different categories of LMP.

The EU countries were grouped into clusters following Ward's and k-means methods. In 2004 both clustering methods gathered the EU countries into three clusters — Figure 2 and Figure 3. While analysing the cluster participants, it can be noted that they are comparable in the groups selected by Ward's method and k-means method. Cluster 1 consists of: Belgium, Germany, Finland, France, Sweden, the Netherlands and Denmark.

The cluster 2 created by the Ward's method gathered Bulgaria, Italy, Luxembourg, Poland, Ireland, Austria, Spain, Portugal, the United Kingdom. At the same time cluster 2 formed by k-means method contained five out of the above countries like Ireland, Austria, Spain, Portugal, the United Kingdom.

The cluster 3 determined by the Ward's method included the Czech Republic, Malta, Slovakia, Hungary, Slovenia, Estonia, Lithuania, Greece, Cyprus, Latvia and Romania while k-means method additionally grouped Bulgaria, Italy, Luxembourg and Poland.

K-means method allows for profiling the clusters in terms of selected variables. In 2004, the countries grouped in cluster 1 (Belgium, Germany, Finland, France, Sweden, the Netherlands and Denmark) represented the highest public expenditure on LMP (taking into account all categories) — figure 3. Those countries are characterized by different labour market models — Scandinavian model in Nordic countries and the Netherlands and corporate one in Germany. The year 2004 represented the period of economic stability and those countries disposed financial resources for creating generous welfare state including LMP.

The countries selected by the k-means method to the second cluster — Ireland, Austria, Spain, Portugal, the United Kingdom, represented the average level of LMP expenditure. However, in comparison to the cluster 1 there was only a slight difference of public expenditure on LMP services. That cluster groups western European countries, mainly with liberal social policy model — like Ireland and the UK, as well as Mediterranean model countries — Spain and Portugal with low level of rationalisation of social spending.

In 2004 Bulgaria, the Czech Republic, Estonia, Greece, Italy, Cyprus, Latvia, Lithuania, Luxembourg, Hungary, Malta, Poland, Romania, Slovenia, Slovakia represented the lowest public expenditure on LMP out of the EU countries.

In 2014, after the influence of the crisis effects on the labour market, the list of countries included in the selected three clusters was changed (Figures 4 and 5).

Following the Ward's method, the first cluster was joined by Austria, Ireland, Spain, Italy, Portugal and left by Germany, Denmark and Sweden.

According to the k-means method, the first cluster consisted of Denmark, Germany, France and Sweden, so it was left by Belgium, Finland and the Netherlands (figure 4).

The second cluster by Ward's method was consisted of Denmark, Hungary, Sweden, Germany and the United Kingdom. K-means method

selected different countries to that group, such as Belgium, Ireland, Spain, Italy, the Netherlands, Austria, Portugal and Finland.

The third cluster determined by the Ward's method gathered the "new members" of the EU (Bulgaria, Slovakia, Croatia, Latvia, Lithuania, Estonia, Malta, Romania, the Czech Republic, Poland, Slovenia, Cyprus), Greece as well as Luxembourg. In Luxembourg, where GDP is the highest per capita in the EU<sup>3</sup>, the labour demand surplus occurred, so there is no significant need for public expenditure on LMP and labour supply support. That could be the reason that Luxembourg in both analysed years joined the third cluster. Low expenditure level in Greece on the one hand is surprising in the light of difficult situation of Greeks on the labour market and the need of support of the substantial group of the unemployed. On the other hand, it may result from the deficit in budget revenue. The k-means method in the third cluster additionally grouped the United Kingdom, the country where continuing liberal reforms decreased the level of public expenditures, including those on labour market policies (Rollnik-Sadowska, 2013, pp. 80–84).

In 2014 the representatives of the first cluster selected by the k-means method — Denmark, Germany, France, Sweden still demonstrated the highest public expenditure on LMP services and active measures but substantially had been decreasing the spending on passive support, which occurred even lower than in the second cluster (Figure 5). Simultaneously, the first cluster's countries increased the expenditure on LMP services<sup>4</sup>.

The representatives of the second cluster (Belgium, Ireland, Spain, Italy, the Netherlands, Austria, Portugal, Finland) extended the share of all categories of LMP expenditure. However, the most significant increase concerned the passive support.

The countries gathered in the third cluster (Bulgaria, the Czech Republic, Estonia, Croatia, Cyprus, Latvia, Lithuania, Hungary, Malta, Poland, Romania, Slovenia, Slovakia, Greece, Luxembourg, the United Kingdom) maintained relatively the lowest level of all categories of expenditure on LMP in comparison with two other clusters.

The cluster analysis carried out among the European Union countries points to the importance of the existing labour market policy model. The liberally oriented countries are less eager to spend on LMP services and measures rather than the ones representing corporate and Scandinavian models. Moreover, the influence of economic decline for the structure of LMP expenditure is noticed as the passive supports increase in the coun-

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<sup>3</sup> In 2015, GDP per capita in PPS in Luxembourg obtained 264 with respect to EU28 = 100 (Eurostat, 2017).

<sup>4</sup> That situation could be connected with the increase of PES employment.

tries suffering from the crisis effects. The diversity in the level of expenditure is also related to the general level of economic development and for over ten years it remains constantly low in the CEE countries and in Greece.

## **Discussion**

Some authors present the view of the dependence of LMP expenditure level on the employment rate. Rovelli and Bruno (2008) by analyzing the four types of social policy models (Nordics, Anglo-Saxon, Continental and Mediterranean) prove that countries with higher rates of employment are those that have higher expenditures on labour market policies and lower rigidity in labour market institutions and product market regulation.

However, the results of the above cluster analysis only partially support that thesis. In 2004 countries with the highest LMP expenditures not always were the ones with the best employment rates out of all the EU countries as the indicator for Belgium, Germany, France was noted below 70%. In 2014 the employment situation in Germany significantly improved, and this country, with the highest LMP expenditure next to Denmark and Sweden, represented the best employment achievements. Simultaneously, France included in the cluster with the most generous LMP expenditure still hasn't reached the employment rate above 70%. On the other hand, in both analysed years, countries with lower level of LMP expenditures like the United Kingdom reached very good employment results.

The employment situation seems to be the more complex dependency resulting from the social policy models. The ones based on major investments in labour market active policies (Nordics countries) are still those that achieve the best results (Dimian *et al.*, 2013, p. 69). Employability is also connected with labour demand potential (Rollnik-Sadowska, 2014, p. 61).

## **Conclusions**

It occurs that the countries with the best labour market indicators — the highest employment and the lowest unemployment rates (like Germany, Denmark, Estonia, the Czech Republic, Luxembourg, the Netherlands, Austria, Sweden, the United Kingdom)<sup>5</sup> have been grouped in different

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<sup>5</sup> Following Eurostat data, in 2015 those countries achieved the highest employment rate

clusters with diverse level of LMP expenditure. It encourages the need for future research of determinants of labour market situation in the EU and positioning the role of LMP.

One of the suggestions for future research is the analysis of efficiency of LMP in the EU by identifying the input variables (which are not only limited to expenditures) as well as the effects of LMP. Moreover, while measuring the efficiency it is crucial to take into account different economic conditions of the EU countries, which affect transformation of inputs into outputs.

However, the research of efficiency of the EU LMP meets significant limitations. The monitoring of LMP in the EU covers mainly the measurement of effectiveness of ALMP. The European Union has not yet worked out a common evaluation system of LMP efficiency.

The EU LMP data includes statistics on LMP expenditure and participants. Data set, provided by participant, entries, exits and trends of exits are collected. However, there is not available the standardized publication providing information on trends of exits. The reason is that the data is still incomplete for some countries and there are differences in the observations used.

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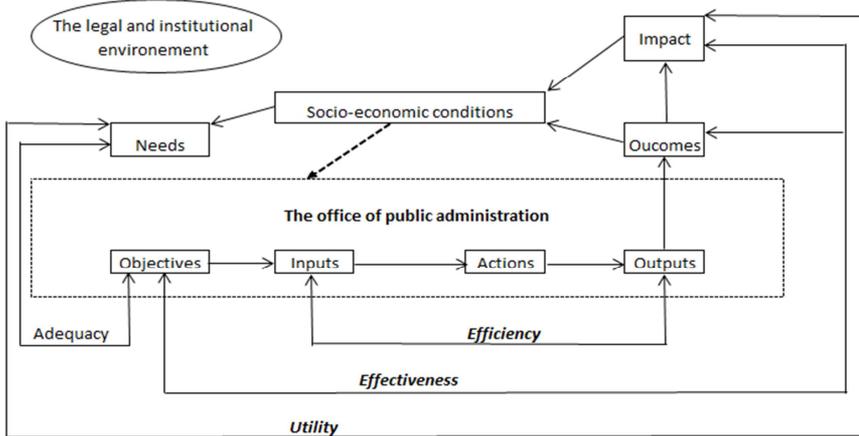
(over 70%) and the lowest unemployment rate (between 4,6% in Germany and 7,4% in Sweden).

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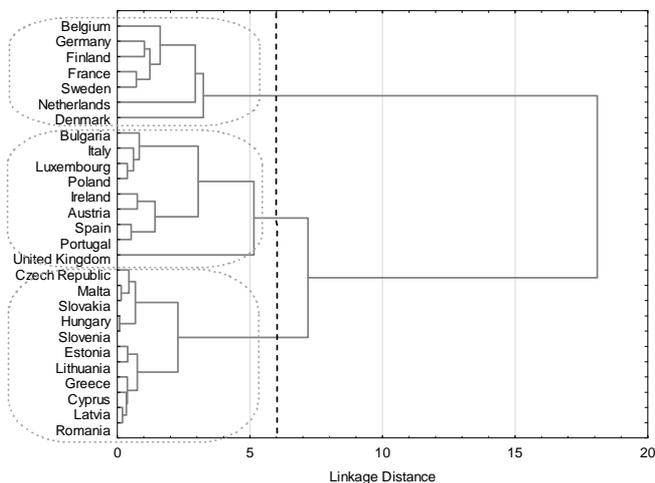
## Annex

**Figure 1.** The relationship between efficiency, effectiveness and utility in the unit of public administration



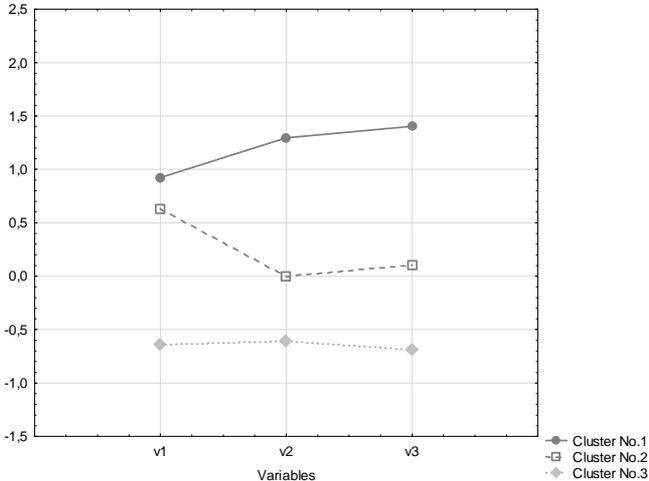
Source: Pollitt and Bouckaert (1999, p. 13).

**Figure 2.** Tree Clustering of the European Union countries according to public expenditure on LMP in 2004



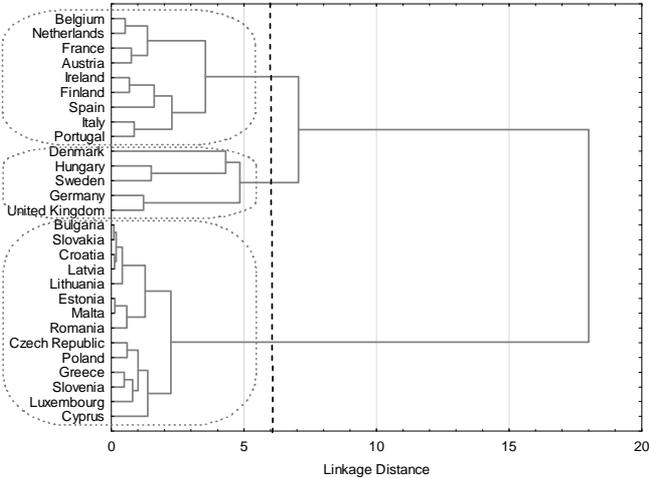
Source: own work based on Eurostat data (2017).

**Figure 3.** K-means Clustering of the European Union countries according to public expenditure on LMP in 2004



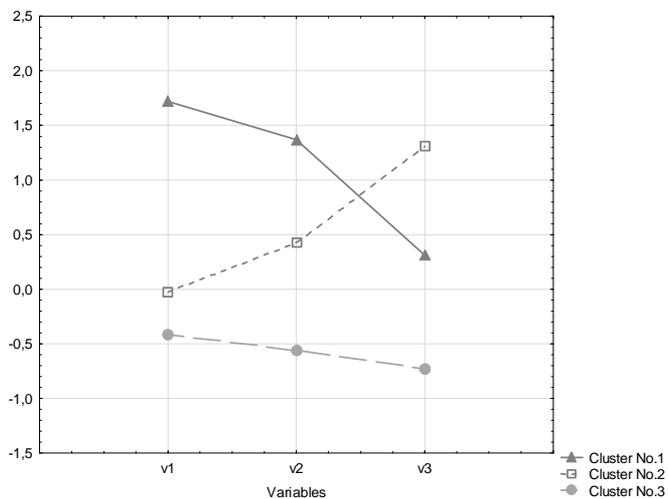
Source: own work based on Eurostat data (2017).

**Figure 4.** Tree Clustering of the European Union countries according to public expenditure on LMP in 2014



Source: own work based on Eurostat data (2017).

**Figure 5.** K-means Clustering of the European Union countries according to public expenditure on LMP in 2014



Source: own work based on Eurostat data (2017).