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The phenomenon of social exclusion in European Union Countries in relation to Europe 2020 Strategy

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Abstract. "Europe 2020- A strategy for smart, sustainable and inclusive growth" is a long term programme of socio- economic development of European Union for 2010 – 2020. The present study is to examine the process of implementation of Europe 2020 Strategy indicators as regards social exclusion and poverty combating in Poland and other EU countries, as well as setting trends in this area and forecasting the objectives implementation period for the EU as a whole and for Poland individually. Another objective of the research is categorizing the EU countries as regards the similar level of measures describing the social exclusion phenomenon by means of TOPSIS and Ward's methods. The research period is 2005-2015.

Key words: *Europe 2020 Strategy, poverty level indicators, forecasts, TOPSIS method, Ward's method.*

Raktažodžiai: Strategija Europa 2020, skurdo lygio rodikliai, prognozės, TOPSIS metodas, Ward metodas.

Introduction

The problems of poverty and social exclusion are the main problems of European Union. The increasing level of unemployment which was observed in the EU countries and visible stratification of wealth between the residents of European Union were the result of economic crisis from 2008-2009 (in August 2014- the amount of unemployed reached 24,6 million, where 5 million were the people between 15 and 24 years old; the unemployment rate was 5,1% in Germany and 5,3% in Austria, up to 24,8% in Spain and 26,8% in Greece (Komisja Europejska, 2014a)). The Europe 2020 Strategy is a reaction to economic crisis from 2008-2009 and it's the attempt to avoid similar crisis in the future. "Europe 2020- A strategy for smart, sustainable and inclusive growth" is a programme of socio - economic development of European Union (EU) countries for 2010 - 2020 (Greta, Tomczak & Lewandowski, 2012). The Europe 2020 Strategy, in accordance with Communication from the Commission issued on 3rd March 2010, is a strategy for smart and sustainable development and social inclusion (Greta, Tomczak & Lewandowski, 2012; Komisja Europejska, 2014b). The objectives of the Europe 2020 Strategy are related to five main areas connected with: research and development, climate change and energy, education, employment and combating poverty. The strategy is to comply with long term challenges facing Europe which are connected with globalization, ageing of population or the rising need of rational use of the resources (Komisja Europejska, 2010).

Objective, subject and method of the research

The present study is to examine the process of implementation of one of Europe 2020 Strategy objectives as regards social exclusion and poverty combating (Table 1). The aims included in Table 1 relate to development favorable to social inclusion and they concern European programme of combating poverty.

The objective of the present research is the examination of Europe 2020 Strategy implementation when it comes to reducing the number of people who are in danger of poverty / social inclusion by at least 20 million people, as well as categorizing the EU countries as regards the similar level of measures describing the social exclusion phenomenon by means of TOPSIS and Ward's methods.

TOPSIS method

TOPSIS method is one of the methods of linear categorizing which belongs to basic methods of multidimensional comparative analysis. Multidimensional comparative analysis is a scientific discipline which enables the analysis of objects and complex phenomena which state and performance is simultaneously influenced by many characteristics (variables) (Hellwig, 1981, p.48). The basic aim of the multidimensional comparative analysis is the construction of synthetic measure enabling comparison of objects (here EU countries) which are described by means of many variables. TOPSIS method (Technique for Order Preference by Similarity to Ideal Solution) is a method of linear categorizing with the use of pattern and anti-pattern and it was proposed by C.L. Hwang and K. Yoon in 1981 (Hwang & Yoon, 1981). This method enables the creation of objects' ranking (EU countries) with regard to analyzed phenomenon. The basis to linear categorizing and creation of objects' ranking is synthetic variable which values are estimated on the basis of the observation of measurable diagnostic variables describing researched objects. At the beginning of procedure of linear categorizing the nature of the variables describing researched phenomenon is stated. Those variables are later divided into: stimulants, nominants and destimulants. The construction of synthetic measure is realized in the following steps:

a) create normalized data matrix (by means of quotient conversion):

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

where x_{ii} - observation of j variable for i object; j=1,...,n; i=1,2,...,m.

- b) define weight of variables, in the present study there are no weights applied, assuming that every diagnostic variable takes equal share in the created synthetic measure;
- c) define coordinates for objects: pattern z_{0j}^{+} and anti-pattern z_{0j}^{-} according to below rule:

$$z^{+}_{0j} = \begin{cases} \max_{i} \{z_{ij}\} forS \\ \min_{i} \{z_{ij}\} forD \end{cases}$$

$$z^{-}_{0j} = \begin{cases} \max_{i} \{z_{ij}\} forD\\ \min_{i} \{z_{ij}\} forS \end{cases}$$

where: S is a stimulant, D is a destimulant.

d) define Euclidean distances of researched objects from pattern and anti-pattern:

distance from pattern
$$d_{i0}^+ = \sqrt{\sum_{i=1}^m (z_{ij} - z_{0j}^+)^2}$$

distance from anti-pattern
$$d_{i0}^{-} = \sqrt{\sum_{i=1}^{m} (z_{ij} - z_{0j}^{-})^2}$$

e) define R_i relative distance (the ranking coefficient determining the similarity of objects to best alternative) on the basis of pattern:

$$R_i = \frac{d^{-}_i}{d_i^+ + d_i^-}$$

where $i=1,2,\ldots,m$ and $R_i \in [0;1]$.

The highest value of R_i coefficient indicates the best alternative (object) in considered issue of linear clustering.

Ward's method

In order to set apart groups of European countries with similar level of indicators as regards the poverty and social exclusion, methods based on synthetic development measures or clustering methods based on taxonomic similarity of multi-criteria objects can be applied. In the present study Ward's method was used to classify the EU countries, this method belongs to hierarchical agglomerative methods. Clustering of objects by means of agglomerative methods is realized in the following steps (Gatnar, 1998, p.100):

- create n classes including single objects;
- calculate the value of certain similarity measure (distances, here: Euclidean distances) for all pairs of classes;
- combine two classes with the highest level of similarity;
- if all objects belong to the same class- the clustering should be finished here, if not- follow the step 2 again.

The D distance matrix is the base for the creation of aggregation where, depending on the chosen method, there are different criteria of joining single units into groups. In Ward's method, the function of criterion in which we join the single units into groups is the sum of square distances between single units and the center of gravity of the group, which those single units belong to (squared Euclidean distances).

Using the distance matrices it is possible to divide the EU countries into: homogenous, typological groups as regards the obtained level of researched poverty indicators.

The graphic illustration of clustering of objects is dendrogram, which shows the connections creating in the consecutive steps of clustering (Warzecha, 2009, p.23). The number of groups is defined by the number of dendrogram's branches. The dendrogram is "cut" (in the particular point on the scale) with vertical line. The point of division is the point where the distances between clustered groups are the longest (the division by means of Mojena's rule was applied (Szkutnik, Sączewska-Piotrowska & Hadaś-Dyduch, 2015, p.75)).

Europe 2020 Strategy indicators connected with the phenomenon of poverty / social exclusion in European Union countries

The Europe 2020 Strategy assumes that the basic indicator in monitoring the implementation of actions pointed at combating the poverty and social exclusion is complex criterion which takes into consideration three partial indicators. In this regard, the indicator of being in danger of poverty or social exclusion is defined as the percentage of people being in danger of relative poverty or intensified material deprivation or living in households with very low work intensity. The person, who lives in a household experiencing at least one out of three of above elements, is considered to be in danger of poverty or social exclusion. It should be emphasized that those people are counted only once, even in the case when they are in danger of more than one form of poverty or social exclusion (GUS, 2017).

The target values of objectives connected with the poverty issue in the Europe 2020 Strategy were defined at the global level for the whole European Union as well as for particular member countries, which are differentiated with regard to social and economic areas. The actions concerning the implementation of objectives for Poland are coordinated by Ministry of Economic Development which fulfills the role of Europe 2020 Strategy national coordinator.

As it is shown in Fig.1., the Europe 2020 Strategy objective connected with the reduction of number of people who are in danger of poverty or social exclusion in 2015 was fulfilled by five countries: Poland, Latvia, the Czech Republic, Bulgaria (in comparison to 2010 only the Romania fulfilled the objective).

Table 1: Objectives and headline indicators of the Europe 2020 Strategy concerning the phenomenon of poverty and social exclusion

Headline objective of	Indicators				
Europe 2020 Strategy Eradicate the poverty in the EU scale through reduction of number of people in danger of poverty or social exclusion by 20 million. In Poland, reduction of number of people in danger of poverty or social exclusion by 1,5 million.	Indicator of being in danger of poverty or social exclusion (collective indicator made out of three indicators below):				
	Indicator of very low work intensity in household	is calculated as the share of people aged 0-59 living in households with very low work intensity, i.e.: households where adults (aged 18-59) work less than 20% of their entire work potential, in general population at the same age.			
	Indicator of being in danger of poverty (after taking into consideration social transfers)	is calculated as the share of people whose annual equivalent income to their disposal (after taking into consideration the social transfers) is lower than the poverty limit in general population. The limit of poverty is established at the level of 60% of median of annual equivalent income at disposal in particular country.			
	Indicator of intensified material deprivation	is calculated as the share of people in households who declare no possibility to realize, due to financial reasons, at least 4 out of 9 of below needs (in population in general): -financing the week-long leisure trip of all members of the household once in a year, -consumption of meat, fish (vegetarian equivalent) every other day, -heating up the apartment according to needs, -covering the unexpected expense (which equals to month's equivalent of the relative poverty limit adopted in particular country in the year preceding the research) -on time payments connected with apartment, installment plans and repayments, -possession of a color television, -possession of a washing machine, -possession of a phone (mobile or stationary)			

Source: own study on the basis of (Komisja Europejska, 2010; GUS, 2017)

As it is shown in Fig.2. the indicators of being in danger of poverty in the EU in general and in Poland were systematically falling down between 2005-2015 (which was an objective of Europe 2020 Strategy). It results from the Eurostat data that the indicator of being in danger of poverty in 2015 in comparison to 2005 fell down by about 2,1 percentage points for EU as a whole (from 25,8% in 2005 to 23,7% in 2015). And for Poland, it fell down by 22 percentage points (from 45,3% in 2005 to 23,4% in 2015). In 2015 the indicator of poverty in Poland was almost equal to

Union's mean which was 23,7% (the lowest value of this indicator could be found in the Czech Republic– 14% and the highest value in Bulgaria- 41,3%).

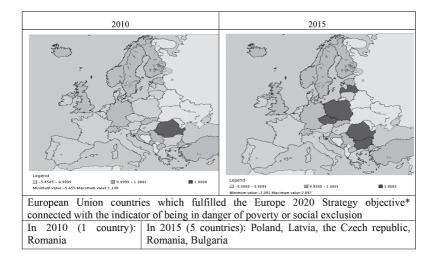


Fig.1. Indicator of being in danger of poverty or social exclusion

*- the countries that fulfilled the Europe 2020 Strategy national aim in particular year are marked with dark color.

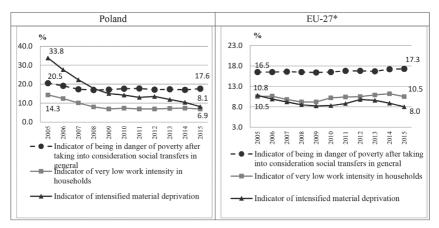
Source: own study on the basis of Eurostat data (Eurostat, 2017).

The visible fall of the value of complex indicator concerning the state of being in danger of poverty or social exclusion, observed in Poland between 2005-2015, was related mostly with the significant fall of the percentage of people in danger of intensified material deprivation in the same period of time (from about 34% to a little above 8% - Fig.2.). The values of other measures taken into consideration in complex indicator of being in danger of poverty or social exclusion (i.e.: the indicator of relative poverty and the indicator of very low work intensity in a household) were falling down as well between 2005-2015, respectively by about 3 percentage points and 7,4 percentage points.

The data included in Fig.2. indicates that the value of indicator of very low work intensity was about 7% in Poland in 2015. Between 2008-2015 the percentage of people who lived in households characterized with the very low work intensity was at very similar level, oscillating between 7-8%. Poland's result is favorable on the background of most member countries (the lowest indicator in Europe was achieved by Luxembourg- 5,7% and Sweden- 5,8%, and the highest indicator was in Ireland- 19,2% and in Greece- 16,8%).

In 2015, about 8% of Polish residents were living in households which experienced intensified material deprivation (in Europe, the lowest indicator was achieved by Sweden- 0,7% and the highest by Bulgaria- 34,2%). Over the period of time between 2005-2015, a significant fall of the percentage of people living in households, which could not fulfill their basic material needs, was observed in Poland. However, analyzing the value of the indicator of intensified material deprivation for the EU as a whole starting from 2009 to 2012, there was an increase (from 8,2% in 2009 to 9,8% in 2012 which was a result of economic crisis in 2008-2009- Fig.2.).

Between 2005-2015 the rate of relative poverty in Poland was at the similar level, reaching 17,6% in 2015. In 2015 the indicator of relative poverty in Poland equaled to 17,6% which meant that it was at a slightly higher level than the EU mean- 17,3% (the lowest value of this indicator was found in the Czech Republic-9,7% and the highest in Romania- 25,4%). About 6,8 million of people lived in 2015 below the relative poverty limit, while 88 million people experienced the poverty among all of the residents of European Union.



*- due to the fact that there is no data for Croatia between 2005-2009 only 27 EU countries were analyzed

Fig.2. Indicators of being in danger of poverty or social exclusion between 2005-2015 in Poland and in the EU-27

From the data included in Fig.3. it results that economic crisis between 2008-2009 resulted in the increase of an indicator of poverty in the EU as a whole. The increase of an indicator was observed from 2010 till 2012, while from 2012 till 2015 there was a decrease of the analyzed indicator of poverty.

According to the data in Fig.3. and the calculated forecasts for following years, there will be further decrease of an indicator of being in danger of poverty in general to the level of 19,16% for the EU-27 and to the level of 10,27% for Poland in 2018.

The estimated trend patterns are well adjusted to empirical data (determination coefficients are high). The forecasts of an indicator of being in danger of poverty

were calculated¹⁵ for years 2016-2018 and they are included in the table in Fig.3. along with the error forecasts. According to the theory of prediction, the forecasts with the mean error prediction not exceeding the level of 10% are acceptable (Biolik, 2013; Cieślak, 2005; Zeliaś, 1997). Therefore, the calculated forecasts for the EU as a whole and for Poland for years 2016-2018 may be accepted (the exception is the forecast for Poland for 2018). The empirical and theoretical values and the forecasts of being in danger of poverty in the EU-28 and in Poland are presented in Fig.4.

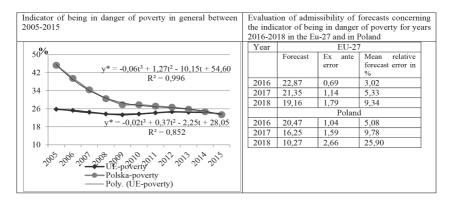


Fig. 3. Indicator of being in danger of poverty in general in the EU-27 and in Poland between 2005-2015 and the evaluation of admissibility of forecasts for years 2016-2018.

Source: own study on the basis of Eurostat data (Eurostat, 2017).

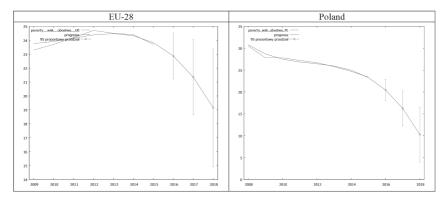


Fig. 4. Graph of empirical and theoretical values and forecasts of an indicator of being in danger of poverty in the EU-28 and in Poland.

Source: own study on the basis of Eurostat data (Eurostat, 2017).

¹⁵ All of the calculations, the proper choice of trend pattern, calculating the forecasts and prediction errors were made by means of GRETL programme.

Similarity of EU countries as regards the level of measures describing the phenomenon of social exclusion

It results from the Eurostat's static data that the level of measures describing the Europe 2020 Strategy phenomenon of social exclusion is diverse, while the issue of poverty concerns all of the member countries of European Union. The use of TOPSIS method enabled the creation of the EU countries ranking (Table 2) from which results that the countries experiencing poverty in the smallest extent are as follows: the Czech Republic, Slovakia, Slovenia, France and Austria (the highest values of synthetic measure – the best situation as regards the values of indicators of being in danger of poverty). However, Bulgaria, Romania, Greece, Latvia and Hungary are the countries with the biggest range of analyzed phenomenon.

Table 2: EU countries ranking on the basis of synthetic measure value obtained by means of TOPSIS method (2010 and 2015 status)

No	Unia Europejska 28 /	R	No	Unia Europejska 28 /	R
INO	European Union 28	2010	INO	European Union 28	2015
1	The Czech Republic	0,951	1	The Czech Republic	0,951
2	Slovakia	0,899	2	Slovakia	0,902
3	Slovenia	0,895	3	Slovenia	0,892
4	France	0,868	4	France	0,871
5	Austria	0,866	5	Austria	0,867
6	Luxembourg	0,858	6	Luxembourg	0,854
7	Sweden	0,841	7	Sweden	0,843
8	The Netherlands	0,841	8	Poland	0,837
9	Malta	0,834	9	The Netherlands	0,836
10	Finland	0,818	10	Malta	0,823
11	Denmark	0,818	11	Finland	0,819
12	Poland	0,817	12	Germany	0,817
13	Germany	0,817	13	Denmark	0,813
14	United Kingdom	0,783	14	Estonia	0,791
15	Estonia	0,771	15	United Kingdom	0,776
16	Portugal	0,755	16	Portugal	0,737
17	Belgium	0,734	17	Belgium	0,727
18	Italy	0,730	18	Italy	0,691
19	Cyprus	0,725	19	Spain	0,667
20	Spain	0,691	20	Lithuania	0,661
21	Ireland	0,657	21	Cyprus	0,659
22	Lithuania	0,631	22	Ireland	0,632
23	Croatia	0,619	23	Latvia	0,623
24	Hungary	0,589	24	Croatia	0,605
25	Greece	0,562	25	Hungary	0,591
26	Latvia	0,495	26	Romania	0,468
27	Romania	0,440	27	Greece	0,369
28	Bulgaria	0,307	28	Bulgaria	0,231

Source: own calculation on the basis of Eurostat data.

From the data included in Table 2, it results that the most visible and the most significant increase of the synthetic measure value was observed in Latvia- the increase from 0,495 in 2010 to 0,623 in 2015 and the change of position in ranking from 26th to 23rd place. For Poland, the increase of synthetic measure value is visible as well. In 2015 (0,837) in comparison to 2010 (0,817) there is an insignificant progress of Europe 2020 Strategy implementation as regards the actions against social exclusion and fighting the poverty (the change of position in the ranking from 12th to 8th place). However, Greece (0,562 in 2010 and 0,369 in 2015) and Cyprus (0,725 in 2010 and 0,659 in 2015) are the countries for which the synthetic measure value fell down significantly in the researched period, and the same, the indicators describing the poverty grew worse (Table 2 and Fig. 5.).

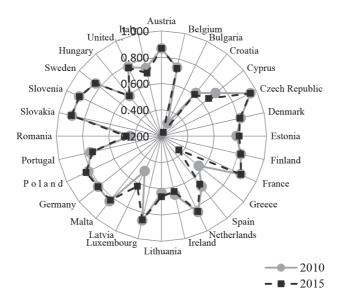
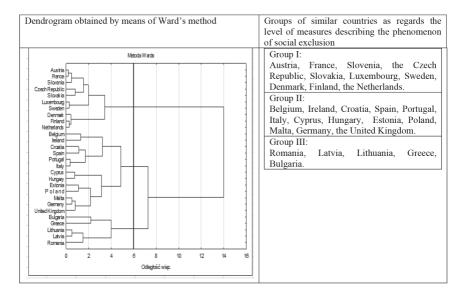


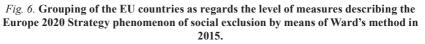
Fig.5. Distance of EU countries from pattern and anti-pattern of development on the basis of synthetic measure value calculated by means of TOPSIS method in 2010 and 2015.

The data included in Fig.6. indicate that the introduced Ward's method enabled the isolation of three groups of countries which are similar as regards the level of measures describing the phenomenon of social exclusion (the description of indicators in Table 1).

The countries belonging to group I are characterized by the lowest level of measures submitted to the research and describing the phenomenon of social exclusion (all off the measures, described in Table 1, are significantly below the EU

mean- especially the indicator of intensified material deprivation (the level lower by 59% with regard to EU mean)) – these are the countries that experience the poverty in the lowest extent. The highest extent of experiencing the poverty and the highest level of the measures describing the phenomenon of social exclusion can be found in group III (all of the measures, described in Table 1, are significantly higher than the EU mean- especially the measure of intensified material deprivation which level is twice as high (the level higher by 127% as regards the EU mean)). Poland was placed in group II, meaning the group where the indicators are equal to the EU mean (only the indicator concerning the very low work intensity in a household is insignificantly higher by 14% in comparison to EU mean).





Conclusion

1. In Europe 2020 Strategy the headline objectives concerning acting against the social exclusion and fighting the poverty were defined for the EU as a whole and for particular EU countries. Three indicators, which were described in Table 1, were proposed to use and to monitor the changes in these areas. The values of described indicators are very diverse and the problem of poverty is visible at different levels in every EU country.

- 2. From the statistical data results that the EU countries differentiate most when it comes to the indicator of intensified material deprivation (coefficient of variability 78,9%), and further on the indicator of very low level of work intensity in a household (coefficient of variability 32,7%).
- 3. The research methods that were used (methods of multidimensional comparative analysis- Ward's and TOPSIS methods) enabled the evaluation of the researched phenomenon from the point of view of all indicators adopted in the research which described the phenomenon of social exclusion. The research methods enabled as well the isolation of countries with the highest and the lowest level of poverty in the European Union.
- 4. The values of indicators of being in danger of poverty that were noted in the Czech Republic, Slovakia, Slovenia, France and Austria made clear that those countries are experiencing the poverty in the smallest extent in the whole European Union. However, Bulgaria, Romania, Greece, Latvia and Hungary are the countries with the highest scale of this phenomenon.
- 5. The indicator of poverty in Poland is almost equal to EU mean (Poland 23,4%; EU-27 23,7%). In Poland, the symptoms of better conditions as regards the poverty and social exclusion can be noticed. It is indicated by the improvement of values of analyzed indicators and the place taken by Poland in the EU structure (in 2015 in comparison to 2010 the improvement by 1 place as regards the indicator of people being in danger of poverty or social exclusion and the improvement by 1 place when it comes to people living in the households with very low level of work intensity, while there was a significant improvement by 6 places as regards the indicator of intensified material deprivation).

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Katarzyna Warzecha, Anna Skórska

Socialinės atskirties reiškinys Europos Sąjungos šalyse, atsižvelgiant į Strategiją Europa 2020

Anotacija

Europa 2020" – pažangaus, tvaraus ir integracinio augimo strategija – tai socioekonominė Europos Sąjungos valstybių vystymosi programa 2010-2020 metams. Ši strategija pakeitė Lisabonos strategiją, kuri buvo įgyvendinama 2000-2010 metais. Strategija Europa 2020 – tai reakcija į ekonominę 2008-2009 metų krizę ir bandymas išvengti panašių krizių ateityje. Ši strategija atitinka ilgalaikius Europos uždavinius, susijusius su globalizacija, gyventojų senėjimu ar didėjančiu poreikiu racionaliai naudoti išteklius.

Šiame darbe buvo nagrinėjami Strategijos Europa 2020 įgyvendinimo rodikliai, tokie kaip socialinė atskirtis ir kovojimas su skurdu Lenkijoje ir kitose ES šalyse. Tyrimo laikotarpis apėmė 2005-2015 metus. Taikant TOPSIS ir Ward metodus, ES šalys buvo suskirstytos pagal panašias priemones, apibrėžiančias skurdo ir socialinės atskirties reiškinius. Įverčiai, rodantys skurdo pasireiškimo pavojų, priskirti Čekijos, Slovakijos, Prancūzijos ir Austrijos šalims, parodė, kad šios šalys patiria mažiausią skurdo lygį visoje Europos Sąjungoje. Tačiau Bulgarija, Rumunija, Graikija, Latvija ir Vengrija yra šalys, turinčios didžiausią šio reiškinio mastą. Skurdo rodiklis Lenkijoje yra beveik lygus ES vidurkiui (Lenkija - 23,4%; ES -27 23,7%). Lenkijoje yra pastebimas skurdo ir socialinės atskirties situacijos gerėjimas. Tą patvirtina analizuojamų rodiklių vertės pagerėjimas ir vieta, kurią Lenkija užima ES struktūroje.

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