ANALYSIS OF THE EFFECT OF GLOBAL FINANCIAL CRISIS ON EDUCATIONAL PATTERNS IN EUROPEAN COUNTRIES. STUDY ON EU-28 COUNTRIES.

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ABSTRACT: The recent global financial and economic crisis has set up a certain pressure on the financing of education and training process, although providing highly qualified human resources represents a dimension of sustainability in economic development, a necessary condition for creating a competitive Europe. Economists came to the conclusion that quality education is the best protection against economic crisis. In this paper, the existing educational patterns in EU countries were analyzed, using statistical variables grouped in four pillars: 1st Pillar - Economic frame, 2nd Pillar - Education (Financial side), 3rd Pillar - Education (Non-Financial side) and 4th Pillar - Labour Market. For each of these pillars average relative distances were calculated, characterizing the relative performance of each European country relative to the country with maximum performance. It was made a hierarchy of European countries, before and after the global economic crisis and the changes between the two periods were analyzed.

Key-words: educational pattern, relative distance, rank, correlation coefficient.

1. Literature review

Maintaining a healthy educational system represents a condition for a sustainable development, which is included in the EU Sustainable Development Strategy. But the recent global financial and economic crisis has set up a certain pressure on the financing of education and training process, although providing highly qualified human resources represent a dimension of sustainability in economic development, a necessary condition for creating a competitive Europe. Economists came to the conclusion that quality education is the best protection against economic crisis [1].

A number of studies revealed that countries with large public deficits experienced cuts of education expenditures, as a result of last global financial crisis. So, many countries have reduced their public expenditures in education by reducing the teacher numbers, salaries and funds for continuing professional development [2]. Unfortunately, there will be some European countries that will reduce the education and training budget in the next period.

Also, the economic financial crisis induced a major extent of the unemployment phenomenon dimension, which affected especially the young people. Thus, at EU-28 level, the unemployment rate of people aged less than 25 was 15,7% in 2007 and has dramatically climbed to 20,1% in 2009. The increase continued, so that the youth unemployment rate reached 23% in 2012 (EUROSTAT database on Labour Market). Also, "the impact of educational attainment on unemployment is much greater for younger people than it is for older adults" [3].

2. Data set:

The analysis was performed on a panel data set provided by EUROSTAT databases in the fields of: Economy and Finance, Education and Training and Labour Market [4]. Mostly, the data needed in computing the indicators mentioned below came from the EU Labour Force Survey. Phenomena and processes in the education sector are interdependent with the overall economic picture and labor market developments in the correspondent country. That is why, for a comprehensive and complex characterization of state and developments in the education sector, we have included in the analysis statistical variables in four areas related to the educational sector:

- Variables characterizing the overall economic development:
  - ***real GDP Growth Rate*** (*GDP_RATE*). According to the EUROSTAT definition, "Gross domestic product (GDP) (Percentage change on previous year) is a measure of the economic activity, defined as the value of all goods and services produced less the value of any goods or services used in their creation" (EUROSTAT, Metadata). In order to obtain the real GDP Growth Rate, it has to be computed, first, the index of real GDP, the GDP being valued at the prices of the previous year. The GDP index is a ratio between the GDP for the current year, valued at prices of the previous year and the GDP for the previous year. Than, the GDP Growth rate (percentage change in the current year, compared to the previous year) is computed by subtracting 100% out of GDP index (in percent).
- Variables that characterize the educational sector financially:
  - ***Expenditure on education as % of GDP or public expenditure*** (*EXP_ED*): according to the EUROSTAT definition, the indicator is defined as "total public expenditure on education, expressed as a percentage of GDP" (EUROSTAT, Metadata).

- ***Financial aid to students (% of total public expenditure on education)*** (*FIN_AID*): according to EUROSTAT definitions, financial aids to students include „Scholarships and other grants provided to students, (…), student loans" provided by Government and other public institutions. [5].

- Variables that characterize the educational sector non-financially:
  - ***Participation rates in education (% of corresponding age population)*** (*PART_ED*) refers to students aged 15-24 years with ISCED 1-6 educational level as percent of corresponding age population.
  - ***School expectancy*** (years) (*SCH_EXP*): in EUROSTAT vision, this indicator refers to "the expected years of education over a lifetime and has been calculated adding the single-year enrolment rates for all ages" (EUROTAT Metadata).
  - ***Early leavers from education and training (%)*** (*EARLY_LEAV*). According to the EUROSTAT approach, early leavers from education and training refers to persons aged 18 to 24 which have at most ISCED 3c educational level, or which did not received any education or training in the four weeks preceding the survey. The indicator in the relative (percentual) form is the ratio between the persons mentioned above and the total population aged 18 to 24, expressed in percents. (EUROTAT Metadata).
- Variables that characterize the labour market:
  - ***Youth unemployment rate (%)*** (*YOUTH_UNEMPL)* – represents unemployed persons less than 25 years as a percentage of the labour force in the corresponding age group. (EUROTAT Metadata).

Values of the variables included in the analysis are corresponding to the 28 European Union member countries and cover the period between 2004 and 2012. In order to comparatively analyze the four dimensions of economic development, mentioned above, before and after the last global financial crisis, the entire period of analysis was divided into two sub-periods: 2004-2007 (the period before the crisis) and 2008-2011/2012 (the period during and after the crisis).

3. Methodology:

In order to characterize each of the four economic dimensions, there have been established four main pillars, in which were analyzed the variables described above. The four pillars are:

- 1st Pillar - **Economic frame**
- 2nd Pillar - **Education (Financial side)**
- 3rd Pillar - **Education (Non-Financial side)**
- 4th Pillar - **Labour Market**

The four pillars and their component variables are shown in the table below:

Table. 1. The Pillars for characterizing the educational patterns

NO.	PILLAR NAME	STATISTICAL INDICATORS	
1st Pillar	**Economic frame**	○ GDP growth rate(%)	*GDP_RATE*
2nd Pillar	**Education (Financial side)**	○ Expenditure on education as % of GDP or public expenditure	*EXP_ED*
		○ Financial aid to students (% of total public expenditure on education)	*FIN_AID*
3rd Pillar	**Education (Non-Financial side)**	○ Participation rates in education (% of corresponding age population)	*PART_ED*
		○ School expectancy (years)	*SCH_EXP*
		○ Early leavers from education and training (%)	*EARLY_LEAV*
4th Pillar	**Labour Market**	○ Youth unemployment rate (%)	*YOUTH_UNEMPL*

Source: made by the author.

For each variable there were calculated relative distances corresponding to each of the European countries for two periods: the pre-crisis and the post crisis. If the pillar was composed of two or more variables there were determined average relative distances for the respective pillar, and relative distances for pre-crisis period were compared to the post-crisis period ones, for each pillar.

Average relative distance calculated for an European country, corresponding to a pillar, shows the performance of that country relative to the country with maximum (optimal) performance, in terms of the criteria for which the relative distance was calculated.

4. The Analysis

In the following table there are given the average relative distances for the four pillars, for the period before and after the global financial crisis.

Table 2. Relative distances for the four pillars, before and after the economic crisis, EU-28 level

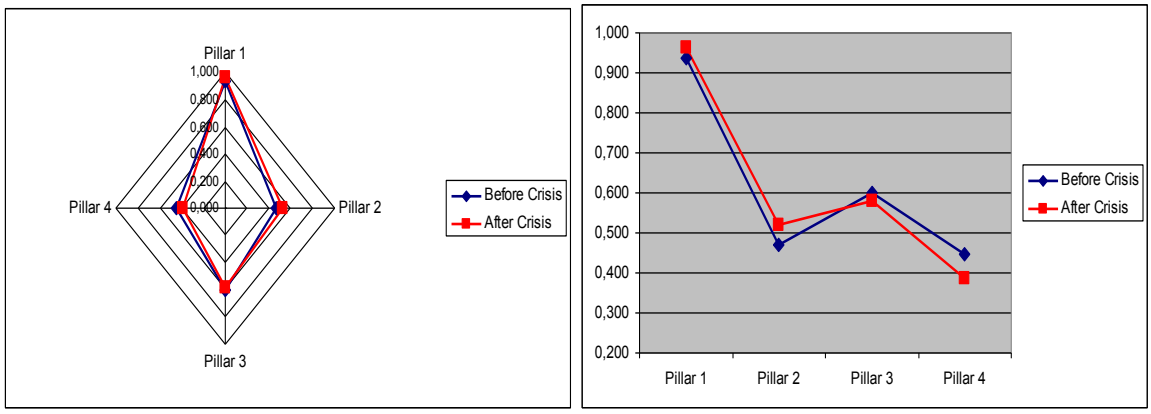
	Relative distances at EU-28 level			
	Pillar 1	Pillar 2	Pillar 3	Pillar 4
Before Crisis	0,935	0,468	0,601	0,448
After Crisis	0,962	0,521	0,581	0,386

Source: calculations made by the author, based on EUROSTAT data.

After comparing the relative distances for the two periods, the following conclusions resulted:

- European Union as a whole has improved its performance after the economic crisis, compared to the period before crisis, in terms of economic development (1st Pillar) and funding the educational process (2nd Pillar), but has worsened its achievements in terms of non-financial aspects of the educational process (3rd Pillar), and in terms of labor market processes (4th Pillar).
- Regarding the 1st Pillar, European Union as a whole has improved its economic performance, relative to the territorial unit with optimum performance. Thus, before the economic crisis, in terms of the average growth rate of real GDP, the European Union realized 93.5% of maximum performance (which belonged to Latvia, the country that recorded the highest growth rate of real GDP before the economic crisis). After the crisis period, European Union achieved 96.2% of maximum performance (reached by Poland). After ranking the European countries and the EU as an independent entity, we have concluded that before the economic crisis, EU (in terms of average GDP index) ranked 22nd, while after the economic crisis the EU ranked 14th, winning eight seats in the hierarchy. It follows therefore that the economic development in European countries favored an improvement of economic situation in EU as a whole, after the economic crisis.
- Regarding the financial aspects of the education and training process in EU countries, we found that there was a favorable trend in EU as a whole, the share of public expenditure on education in GDP increased from 5.02% (before the crisis) to 5.31% (after crisis). The average value of the indicator in the EU represented -before the crisis- only 46.8% of the performance of the top ranked country (Denmark), and increased to 52.1% (after the economic crisis). EU gained two places in this hierarchy (from 13th rank, before the crisis, to11th rank, after the crisis).

Figure 1. Relative distances for the four pillars before and after the global financial crisis, at EU-28 level



*Source: made by the author, based on EUROSTAT data***.**

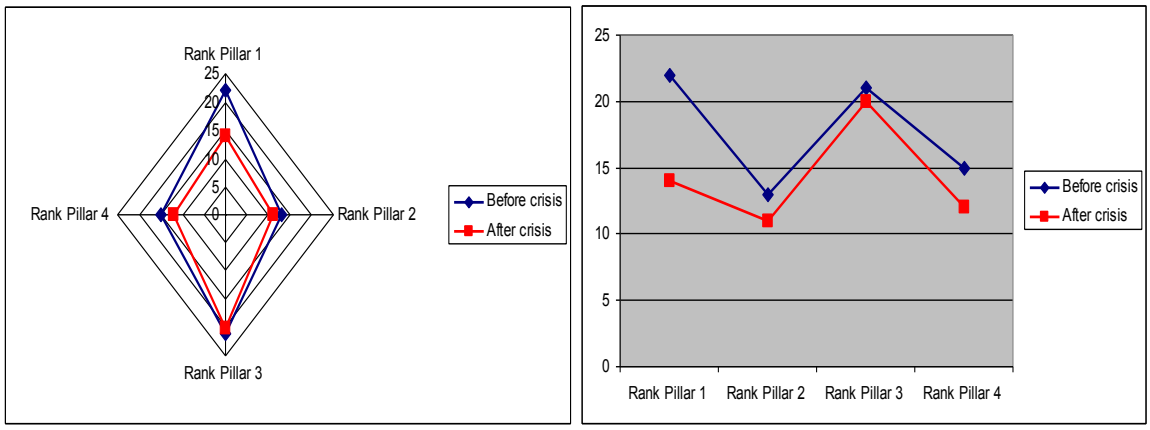
Table 3. Ranks for the four pillars, before and after the economic crisis, EU-28 level

	Before crisis	After crisis	Rank difference
Rank Pillar 1	22	14	8
Rank Pillar 2	13	11	2
Rank Pillar 3	21	20	1
Rank Pillar 4	15	12	3

Source: calculations made by the author, based on EUROSTAT data.

- If we look, however, to major developments of non-financial indicators in the education sector, we found that the EU performance decreased. Thus, if before the crisis the EU achievement represented 60.1% of the maximum performance (which belonged to Slovenia), in the period following the crisis this performance was only 58.1% of the country's most highly ranked (Slovenia). But the changes that occurred in the educational sector were less significant - in the two periods - than the changes in other areas analyzed. EU lost only one rank in the hierarchy. The rank wasn't, however, an important one, but the values of the indicators in this Pillar shows a rather large variation.
- Developments in the labor market had a negative trend, the average unemployment rate of young people (under 25 years) during the post-crisis period is higher than that before the crisis (19.6% after the crisis, compared with 17.8% before the crisis). Therefore, the economic crisis has had negative effects on young people included in the labor market, although developments in financial indicators of educational sectors have improved. The European Union has won 3 ranks in the hierarchy (from 15th place before the crisis, to 12th rank after the crisis).

Figure 2. Ranks for the four pillars before and after the global financial crisis, at EU-28 level

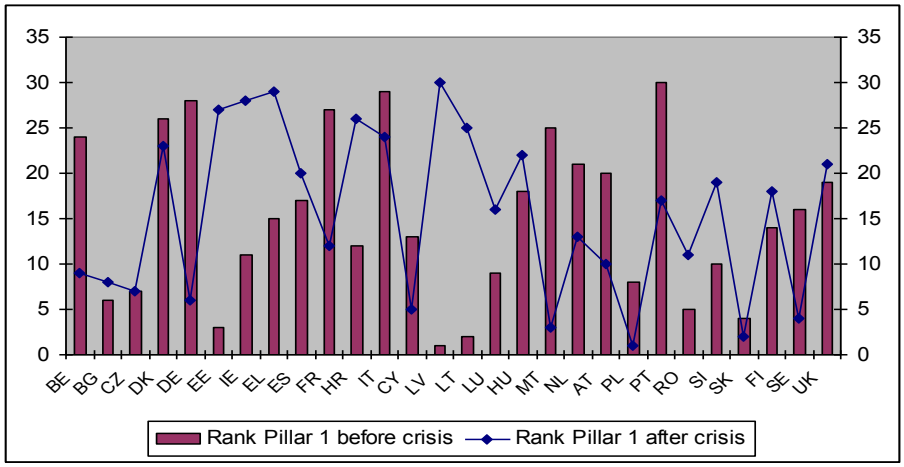


*Source: made by the author, based on EUROSTAT data***.**

Based on relative distances previously computed, we ranked the 28 European countries after their performance in the four areas studied, relative to countries with maximum performance. The rank of each country in the hierarchy before the crisis it was compared to the rank after the economic crisis, from the point of view of each pillar. Following the analysis we came to some conclusions, as follows:

- In terms of economic growth, developments in European countries have occurred in two ways, leading to an increase and a decrease as well in the growth rate of real GDP. Latvia had, before the crisis, the highest average real GDP growth rate (1st rank), followed by Lithuania and Estonia (2nd and 3rd rank). Last ranked countries during this period, were Portugal and Italy. After the economic crisis, the Baltic States have slowed the development rate, Latvia, for example was ranked last (losing 27 ranks). Among the last ranked countries there was also Greece, during the post-crisis period. Countries with the most performance developments were Poland and Slovakia.

Figure 3. Ranks for EU countries before and after crisis, 1st Pillar (Economic Frame)

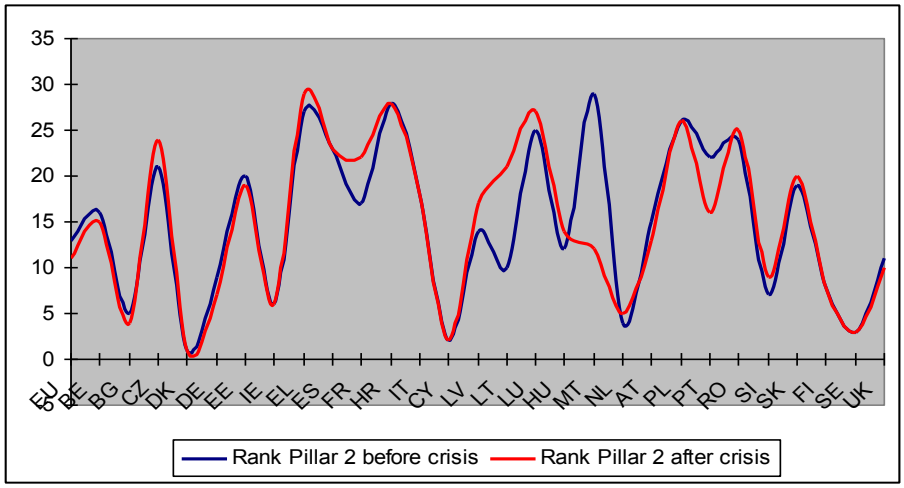


*Source: made by the author, based on EUROSTAT data***.**

- Analyzing the developments of financial indicators in education and training sector, it is observed that changes in the European countries as a result of the economic crisis were much smaller. This meant that most governments have realized that a way out of the economic crisis is to ensure a competitive workforce, well trained, so they continued to

fund this sector, during and after crisis, to similar funding levels as those before the crisis (in relative figures). The ranking of the most European countries was similar for the two periods (before and after the crisis). Both in the period before the economic crisis and in the post-crisis period, Denmark achieved the maximum performance (on average, in the period before the crisis, public expenditure on education represented 8.13 % of GDP, compared to 8.41 % - in the period after the crisis). The 2nd and the 3rd ranked countries - in both periods – were Cyprus and Sweden (Cyprus : the share of public expenditure on education in GDP increased from 6.92% on average, before the crisis to 7.78% on average, after the crisis; Sweden: the share of public spending on education in GDP increased from 6.84% on average, before the crisis to 7.00% on average, after the crisis). The last ranked countries were Croatia, Malta and Greece.

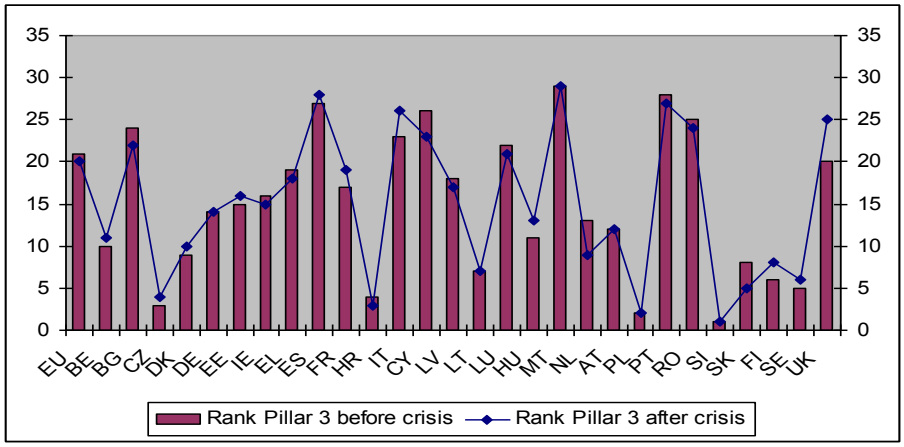
Figure 4. Ranks for EU countries before and after crisis, 2nd Pillar (Education - Financial side)



*Source: made by the author, based on EUROSTAT data***.**

- The crisis has had lower effect on the level of non-financial indicators in education and training sector, in European countries. The hierarchy of European countries did not change significantly between the two periods. The best ranked country in this regard is Slovenia (1st rank - in both periods), followed by Poland (2nd rank, maintained after the crisis as well) and Czech Republic (3rd rank, before the crisis, 4th rank after the crisis). The last ranks were occupied by Malta, Portugal (who won a rank) and Estonia (who lost a rank).

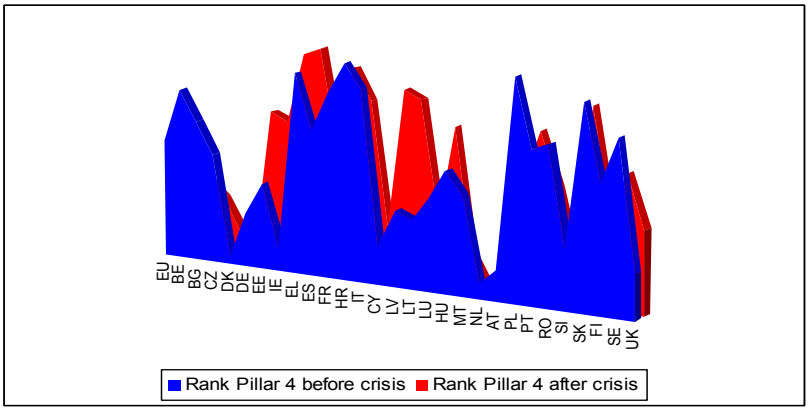
Figure 5. Ranks for EU countries before and after crisis, 3rd Pillar (Education – Non-Financial side)



*Source: made by the author, based on EUROSTAT data***.**

- The situation of the educational sector has a direct influence on the labor market, especially on unemployment. Young people are, usually, most affected by the economic crisis. Regarding the youth unemployment rate, in Denmark it reached the lowest level in the period before the crisis (1st rank). Lower levels of the indicator were recorded in the Netherlands and Ireland (2nd and 3rd ranks). Last ranked European countries were Poland and Croatia. In the Netherlands the youth unemployment rate had a favorable evolution after the economic crisis, so the Netherlands became the top ranked country, followed by Austria and Germany. In Ireland the situation deteriorated significantly during the crisis, so Ireland - originally a top country, before crisis - became a lower ranked country, after the crisis (placed in the second half of the hierarchy. Last ranked countries were Greece and Spain, where youth unemployment rate has risen sharply after the economic crisis.

Figure 6. Ranks for EU countries before and after crisis, 4th Pillar (Labour Market)



Source: made by the author, based on EUROSTAT data.

Therefore, we found that after the economic crisis there have been significant changes in ranking the European countries, by real GDP growth rate, a conclusion supported by a a low negative value of Pearson coefficient of correlation. This value is explained by the fact that the hierarchy of European countries supported major changes after the economic crisis, in terms of the analyzed indicator. Half of the countries have ranked better and the other half – have ranked worse. For educational sector, Pearson correlation coefficients have very high positive values, indicating that, in this area, the crisis effect was less felt. On labor market, the value of Pearson correlation coefficient shows that labor market was pretty much affected by the economic crisis [6] [7].

Table 4. Pearson Coefficient of Correlation between relative distances before and after crisis, for each Pillar

	Rel_dist Pillar 1 before crisis	*Rel_dist Pillar 1 after crisis*
Rel_dist Pillar 1 before crisis	1	
Rel_dist Pillar 1 after crisis	-0,21993	1

	Rel_dist Pillar 2 before crisis	*Rel_dist Pillar 2 after crisis*
Rel_dist Pillar 2 before crisis	1	
Rel_dist Pillar 2 after crisis	0,92280622	1

	Rel_dist Pillar 3 before crisis	*Rel_dist Pillar 3 after crisis*
Rel_dist Pillar 3 before crisis	1	
Rel_dist Pillar 3 after crisis	0,96529087	1

	Rel_dist Pillar 4 before crisis	*Rel_dist Pillar 4 after crisis*
Rel_dist Pillar 4 before crisis	1	
Rel_dist Pillar 4 after crisis	0,69143177	1

Source: calculations made by the author, based on EUROSTAT data.

5. Conclusions:

The recent global financial crisis has induced significant changes on the labor market and in the overall picture of economic development (synthesized by the growth rate of real GDP). For a more complete and comprehensive analysis of existing educational patterns in EU countries, we have built four pillars, according to the following areas: general economic frame (Pillar 1), the financial aspects of the educational sector (Pillar 2), the non financial side of educational sector (Pillar 3) and labor market (pillar 4).

After determining the relative distances for each country and each variable, relative to the country with maximum performance and, afterwards, calculating the average relative distances for each pillar, we have concluded that: the European Union as a whole has improved its relative performance during the post-crisis period, compared to the pre-crisis period, in terms of economic development (1st Pillar) and funding the educational process (2nd Pillar); on the contrary, the EU achievements (in terms of quantitative, non-financial aspects of the educational process - 3rd Pillar, and in terms of labor market – 4th Pillar) have worsened.

Our analysis confirmed that the majority of European Governments realized that the solution to overcome this crisis lies precisely in maintaining a workforce with the highest level of training and education and therefore maintained the public expenditure on education (as% of GDP) at least to pre-economic crisis level. Specifically, in Denmark - the country holding the best performance - public spending on education accounted for 8.13% of GDP on

average, in the pre-crisis period, and the percentage increased in the post-crisis period to 8.41%. In 2009 almost all EU countries have increased the share of public expenditure on education in GDP, compared to 2008, when they have experienced a stronger economic crisis. These developments that took place in the educational field will induce positively favorable economic development in the future, on the long run, in European countries.

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