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STATISTICAL PERFORMANCES OF SOCIO-ECONOMIC DEVELOPMENT IN REPUBLIC OF NORTH MACEDONIA

Abstract: Socio - economic development is one of crucial components of sustainable development, or more correctly, succesful designed socio-economic model support sustainable development. In that conclusion, statistical analysis is necessary to be made on indicators with multidimensional character which reflect economic and social dimension of sustainable development. According to these statistical performances these indicators are predicting expected values of indicators in the future periods. These information are base for creating and development of the decision support system in strategic management, or more precisely, management of this component of sustainable development. Further, these information and information get from the comparative analysis in appropriate time series for indicators which relate countries in EU and surrounding are support for undertaking corrective activities and creating business development politics for successful realization of strategy of sustainable development.

Key words: socio-economic development, indicators of socio- economic development, analysis of time series, statistical forecasting.

1. INTRODUCTION

Development secures creative movements forward in a sense of higher levels of energy, improved efficiency, quality, productivity, and a higher complexity, understanding, realization and higher life standard. Development depends from many factors: new ideas, practices and habits, motives, obstructions, potential resources: capital, technology, infrastructure, available social facilities, productive resources etc. Also, with development, challenges and opportunities are accomplished, and growth secures increasing of productivity of resources, quality of organization and level of knowledge. In that sense, concept of sustained development is used to be created and developed based on a systematic access, whereof self cognition will help us to know the environment with all it complicated and serious problems, potential, needs and limits.

Sustainable development is based on the three pillars of sustainability: economic, environmental and social sustainability. It is only achieved when there is balance or a trade-off between these three aspects (Figure 1). Sustainable economic development through efficient and innovative use and reuse of all natural and human resources will be the best way to increase number of job vacancies, incomes, productivity and competitiveness (Osorio, 2016, p.1). For sustained development we are getting information from sets of indicators reflecting key trends and policy variables are useful instruments to respond to common political goals (Rocio, 2014, p.19).

Figure 1: Relationships in sustainable development – environmental, social and economic concerns.

Source: Taken on March 19th 2019 from the site

https://sisu.ut.ee/env-intro/book/1-1-sustainable-development

Figure 2: The most significant indicators of socioeconomic development.

Source: authors' contribution

Official list of indicators, (Look: **https://unstats.un.org/sdgs/indicators/indicators-list/**) is including global frame of indicators, as it is contained in A / RES / 71/313, which is agreed by Statistical commission on their 49th session, in March 2018. (E / CN.3 / 2018/2, Annex II). At that point, essential is their selection and classification in dependence from available and measurable data of national economies. One kind of that selection of socio-economic indicators are shown by (Rocio, 2014, pp.20-26). Furthermore, economic and social development can be treated as a sustainable development, and its main indicators are represented on a Figure 2, according on which in this work, statistical analysis of the time series is accomplished. Economic development is expected to improve health system, education, working conditions, domestic and international politics, market conditions, etc. Social development is based on essential and quality changes in social structure aiming better realization of goals and tasks of the society. In literature, often are found scientific works which are presenting interaction and simulation of indicators of socio- economic development by regressive model. (Волкова & Карманов, 2016, pp. 56-59). Information received by statistical analysis of indicators of socio-economic development are basis of creating strategies and business politics for social and economic development aiming improvement of business climate, producing higher revenue and more effective national economy. As a result of that is expected increasing of values of indicators of quality of life: better health system, education, life standard etc. EURSTAT statistical is including indicators for socio-economic development in frames of sustainable development in the European Union. Renaming the methodologies and standards of EUROSTAT, domestic statistics of North Macedonia, presents these indicators in Statistical Yearbook, 2018 and other publications such as: Sustainable development, 2018, Macedonia in numbers, 2018, etc. In that sense, for socio- economic development of Republic of North Macedonia, Institute for social democratic „Progress" make a study, „Politics in socio-economic development in Macedonia", setting a goal to take a review in a paradigm of new development of Macedonia in a direction of bigger exploitation of domestic resources (p. 3). Ministry of Environment and Physical Planning of Republic of North Macedonia, in 2010 is implemented project, Preparation of National Strategy for sustainable development in RM". That was a basis, and later a suggestion to the Government of RM, which is now implementing,, National strategy for sustainable development of Republic of Macedonia" Part I/II (2009-2030). With that strategy, Republic of North Macedonia is not only showing strong and fully dedication for Strategy of sustainable development of the European Union, but is also joining World movement for sustainable development (p. 4). According to this document, sustainable development includes three mutual dependent and intertwined dimensions:

      1. Economic dimension (economic resources, development and growth)

      2. Dimension of environment (natural resources, protection and sustainable use of nature and prevention and fight against pollution) and

      3. Social dimension (social resources, solidarity and fight against poverty). (p. 8)

Furthermore, in this document is identifying comprehensive diagnosis of sustainable development of RM (p. 20) and is defining suggested indicators of sustainable development (pp.35- 41).

Crucial is also a research considering Economic benefits and challenges of joining NATO / Institute of European politics, 2018, with which comparative data is presented for some indicators of socio-economic development of Republic of North Macedonia, and member states of NATO and EU which join the unions lately (p.6), (p.12) and (p.13).

2. ANALISYS OF DEVELOPMENT TENDECY OF INDICATORS OF SOCIO-ECONOMIC DEVELOPMENT OF REPUBLIC OF NORTH MACEDONIA

According to the data of indicators of socio- economic development of Republic of North Macedonia presented in a time series, appropriate statistical analysis can be made, whereof we are getting essential data which refers to their development tendency and approximation towards theoretical line of trend which enables forecast of their values in future time periods.
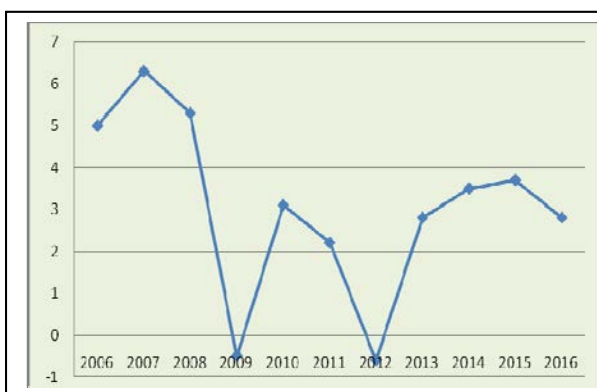

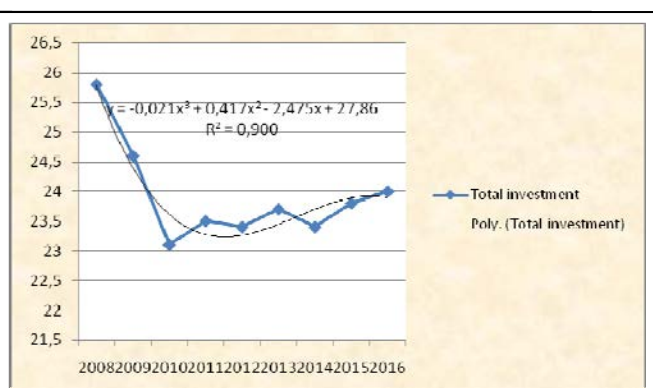**Figure 3:** Growth rate of real GDP, per capita (in %) from 2006 to 2016

Figure 4: Share of gross fixed capital formation in GDP (in %) from 2008 to 2016

Source: Authors' compilation using data from the Statistical Yearbook of the Republic of Macedonia, 2018, p. 646.

Figure 3 shows development tendency of Growth rate of real GDP, per capita, and macroeconomic indicator of economic activity of domestic economy, in observed time period. In that sense, this indicator its maximal value is realized in 2007, and its minimal values are realized in 2009 and 2012. Because of the high value of coefficient of variance (70, 84 %), low values of coefficient of determination are realizing, and a problem appears in choice of appropriate theoretical line of trend and with that appropriate valid forecast for future time periods is missing.

According to data in descriptive statistics for this time period, his value can be evaluated, which with Confidence Level (95.0%), is in interval of 1,60 % to 4,51%. Figure 4 shows development tendency of Share of gross fixed capital formation in GDP for time period from 2008 to 2016 year. In that sense, we can see significant drop of this percentage participation from 2008 to 2010 year, but afterwards there is continuous increase, followed by weak variability to 2016 year. Data in the observed time series for this indicator best approximates in theoretical cube trend, which is confirmed with high value of determination coefficient (0,900). This trend is good basis for forecasting participation percentage of Share of gross fixed capital formation in GDP for future time periods. Furthermore, with confidence interval of 0, 95 we claim that that value will be in the interval from 23,12% to 24,5%.
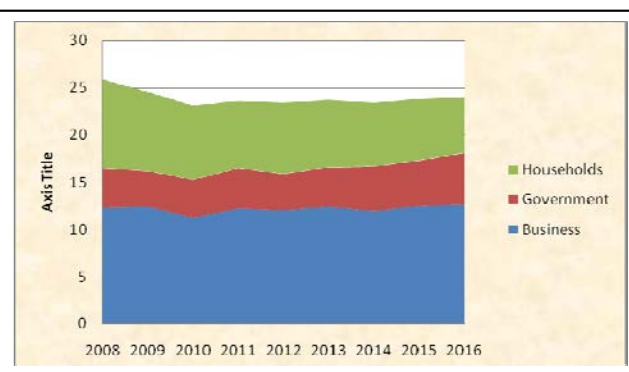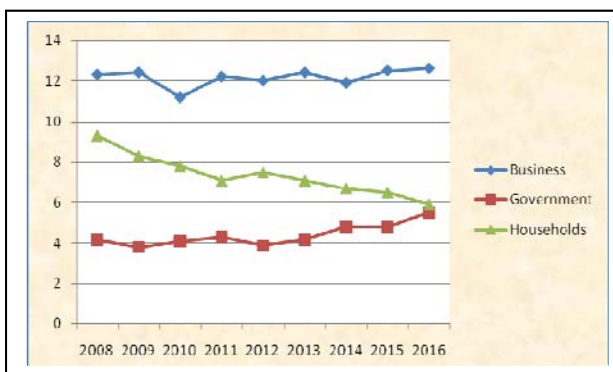

Figure 5: Share of gross fixed capital formation in GDP, by sectors (in %) from 2008 to 2016

Source: Authors' compilation using data from the Statistical Yearbook of the Republic of Macedonia, 2018, p. 646

Figure 5 shows development tendency and structure of Share of gross fixed capital formation in GDP, by sectors, for time period from 2008 to 2016. The highest participation of Share of gross fixed capital formation in GDP is in business sector and the lowest participation of Share of gross fixed capital formation in GDP is in public sector. Percentage participation in overall investments in fixed assets in GDP in business sector, in observed period, shows continuous stability in comparison with public sector and sector of households. Percentage participation in overall investments in fixed assets in GDP in sector of households, in observed period, shows continuous significant decline in comparison with public sector and business sector. Percentage participation in overall investments in fixed assets in GDP in public sector, in observed period, shows continuous significant growth, especially from 2013 to 2016.
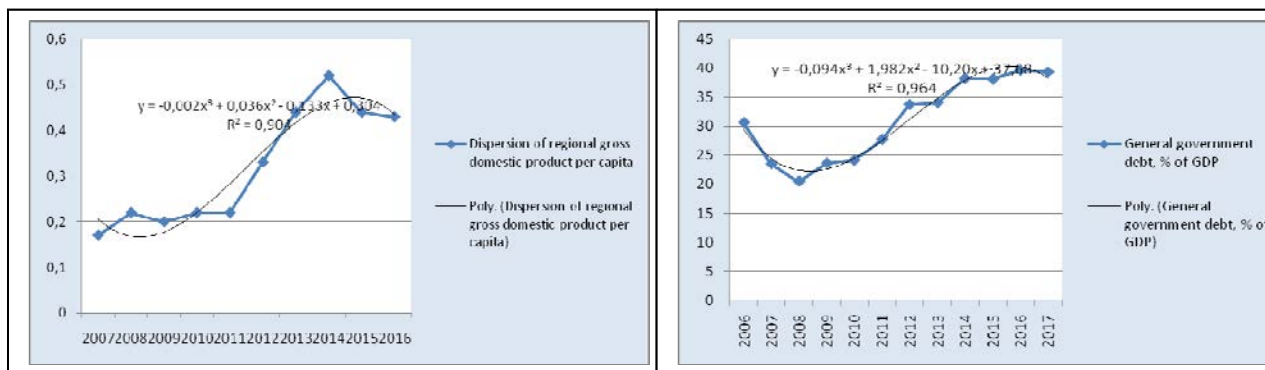

Figure 6: Share of research and development expenditure **Figure 7:** General government debt, % of GDP

in the total GDP**,** (in %) from 2007 to 2016   from 2006 to 2017

Source: Compilation and calculation of the authors using data from the Statistical Yearbook of the Republic of Macedonia, 2018, p. 646

Figure 6 shows development tendency of percentage participation of Share of research and development expenditure in the total GDP as a indicator of socio-economic development, in observed time period from 2007 to 2016. As it is shown, there is continuous moderate growth of percentage participation from 2007 to 2011, and afterwards until 2014 very significant development trend is noticed, where in observed period this indicator realized its maximal value. Furthermore, in the last two years of this observed period, follows significant decline of value of percentage participation. Data in observed time series for this indicator approximates the best in the theoretical cube trend, which is confirmed with high value of coefficient of determination (0,904). Using this trend we forecast expenditures for research and development in GDP for following time periods. According to this, with confidence interval of 0, 95 we claim that that value will be found in the interval from 0, 36 % to 0,71 %.

Figure 7 shows development tendency of percentage participation of national debt in GDP as a indicator of socio-economic development, in observed time period from 2007 to 2016. This indicator presents debt of the Government (central and local government and public funds) expressed as percent of GDP. In the first years of observed period we can notice continuous significant decline, but afterwards from 2008 is noticed continuous very significant development trend, where in observed period this indicator realized its maximal value. Data in observed time series for this indicator the best approximates on theoretical cube trend, which is confirmed with high value of coefficient of determination (0,964). Using this trend we can forecast percentage participation of state debt in GDP in following time periods. According to this, with confidence interval of 0, 95 we claim that that value will be found in the interval from 30, 65% to 36,39 %.

Figure 8 shows development tendency of energetic intensity of economy, as a indicator of socio- economic development, in observed period from 2007 to 2016, expressed in kgoe/1000 euro. Noticed is continuous significant decline of energetic efficiency of economy in observed period, with exception of the years 2010 and 2011 where is significant growth of this indicator. This indicator, in observed period, hit minimal value in 2016. Data in observed time series for this indicator has optimal approximation on linear trend, which is confirmed with high value of coefficient of determination (0,876). According to values of indicators of linear trend we can conclude that energetic intensity in economics in observed period in average, every year, declines for 14,94 kgoe /1000 euro. By assumption, development tendency of energetic intensity of economics will be realized as a linear trend for the following periods, with confidence interval of 0,95, and we can forecast that expected value for this indicator will be in the interval from 279,52 kgoe /1000 euro to 346,402 kgoe /1000 euro.
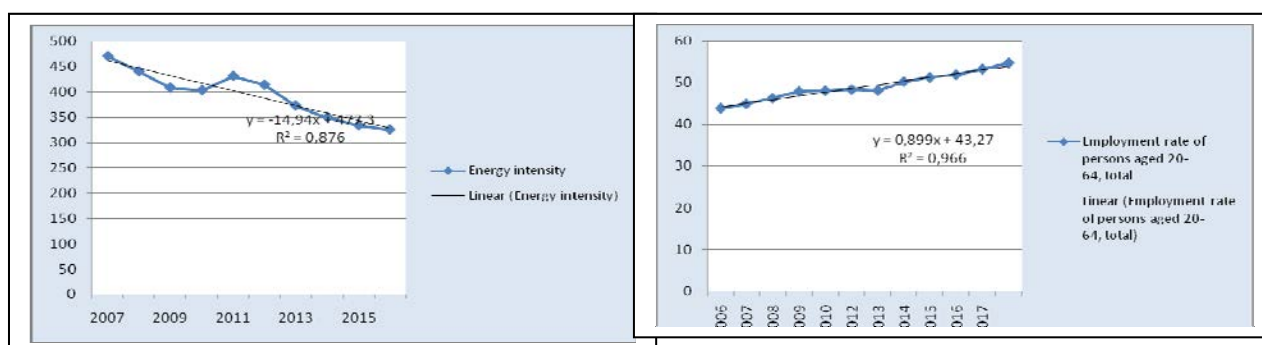
Rate of employment, as a indicator of socio-economic development, represents a relationship between number of employed people aged between 20 and 64 and overall population in the same age group Statistical Yearbook of the Republic of Macedonia, 2018 (p. 642). Its development tendency is represented in Figure 9 in observed period from 2006 to 2017. According to that, noticed is continuous significant growth on overall rate of employment in overall observed period. Maximal value, in this observed period, this indicator realized in 2017.

Data in observed time series for this indicator has optimal approximation on linear trend, which is confirmed with high value of coefficient of determination (0,966). According to values of indicators of linear trend we can conclude that in average, every year, in observed time period, overall rate of employment increases for 0,899%.   By assumption that development tendency of overall rate of employment will be realized as a linear trend in following time periods, with confidence interval of 0,95, and we can forecast that expected value for this indicator will be in the interval from 53,81% to 56,11%.

Figure 10 shows development tendency of rate of employment of population aged from 20 to 64, sorted by gender structure, in time period from 2006 to 2017. In that sense, we can notice parallel development mixed with continuous and significant growth of rate of employment, in the overall observed period in both genders. It is obvious that rate of employment have higher value for the population with male gender in the overall observed period. In this observed period, this indicator hit maximal value in 2017 for both genders. Data in observed time series for this indicator in both cases has optimal approximation on linear trend, which is confirmed with high value of coefficient of determination (0,914 and 0,984). According to values of indicators of linear trend we can conclude that rate employment in observed period in average, every year, increases by 0,965% for male gender and 0,826% for female gender. By assumption, development tendency of rate of employment for population aged from 20 to 64, according to gender structure, will be realized as a linear trend for the following periods, with confidence interval of 0,95, and we can forecast that expected value for this indicator will be in the interval from 63.25 % to 67.28% for people with male gender and 43,65% to 45,07% for people with female gender.

Overall rate of unemployment represents participation of unemployed people aged from 15 to 74, in overall workforce, Statistical Yearbook of the Republic of Macedonia, 2018 (p. 642). Its development tendency is represented in Figure 11 in observed period from 2006 to 2016. According to that, noticed is continuous significant decline on overall rate of unemployment in overall observed period. Minimal value, in this observed period, this indicator realized in 2016. Data in observed time series for this indicator has optimal approximation on linear trend, which is confirmed with high value of coefficient of determination (0,960). According to values of indicators of linear trend we can conclude that in average, every year, in observed time period, overall rate of employment decreases for 1,17%. By assumption that development tendency of overall rate of employment will be realized as a linear trend in following time periods, with confidence interval of 0,95, and we can forecast that expected value for this indicator will be in the interval from 20,8% to 24,06%.
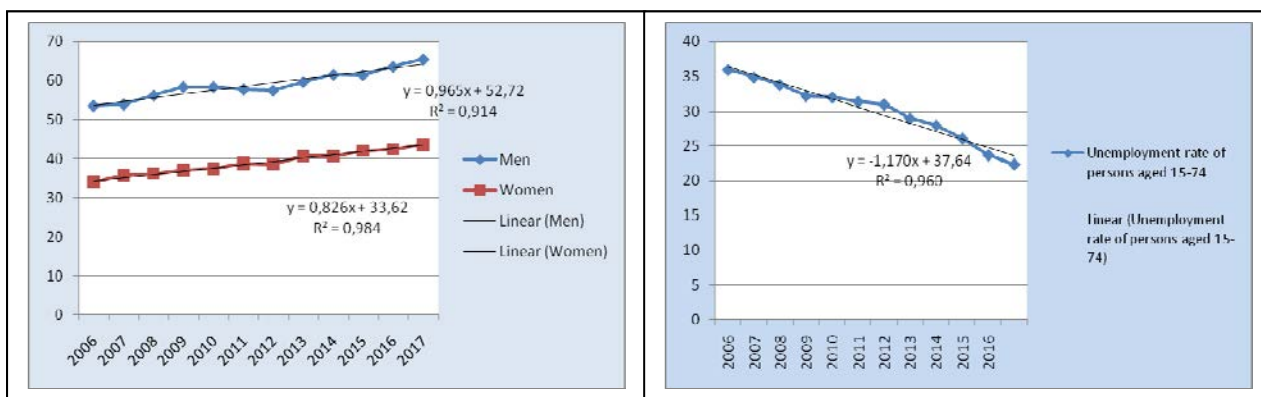

Figure 10: Employment rate of persons aged 20-64,   **Figure 11:** Unemployment rate of persons aged 15-74

gender (in %) from 2006 to 2017   (in %) from 2006 to 2016

Source: Compilation and calculation of the authors using data from the Statistical Yearbook of the Republic of Macedonia, 2018,

p. 647

Figure 12 shows development tendency of rate of unemployment of population aged from 15 to 74, sorted by gender structure, in time period from 2006 to 2016. In that sense, we can notice continuous and significant decline of rate of employment, in the overall observed period in both genders. It is obvious that rate of employment have higher value for the population with male gender in the overall observed period. In this observed period, this indicator hit minimal value in 2016 for both genders. Data in observed time series for this indicator in both cases has optimal approximation on linear trend, which is confirmed with high value of coefficient of determination (0,941 and 0,965). According to values of indicators of linear trend we can conclude that rate of unemployment in observed period in average, every year, decreases by 1,073% for male gender and 1,327% for female gender. By assumption that development tendency of overall rate of employment of population aged from 15 to 74, sorted by gender structure, will be realized as a linear trend in following time periods, with confidence interval of 0,95, and we can forecast that expected value for this indicator will be in the interval from 21,24 % to 24,92% for the population with male gender and from 19,68% to 23,12% for the population with female gender.

Figure 13 shows development tendency of rate of unemployment of two age groups: population aged from 15 to 24 and population aged from 25 to 74, in time period from 2006 to 2017. In that sense, we can notice parallel development mixed with continuous and significant decline of rate of unemployment, across the overall observed period in both age groups. It is obvious that rate of unemployment have higher value for the population between 15 and 24 years old, than to the population between 25 and 74 years old, in the overall observed period. In this observed period, this indicator hit minimal value in 2017 for both age groups. Data in observed time series for this indicator in both cases has optimal approximation on linear trend, which is confirmed with high value of coefficient of determination (0,901 and 0,948). According to values of indicators of linear trend we can conclude that rate employment in observed period in average, every year, decreases by 1,084% for population aged between 15 and 24 years, and 1,071% for population aged between 25 and 74 years. By assumption, development tendency of rate of employment for population aged from 15 to 74, according to gender structure, will be realized as a linear trend for the following periods, with confidence interval of 0,95, and we can forecast that expected value for this indicator will be in the interval from 43,75% to 48,67% for population aged between 15 and 24 years and 18,51% to 21,93% for population aged between 25 and 74 years.

3. COMPARATIVE ANALYSIS OF INDICATORS OF SOCIO- ECONOMIC DEVELOPMENT - STATISTICAL INFERENCES

According to comparative analysis of data of time series, which are related on the same time period, we can get some appropriate and essential data for the level of certain indicators of socio-economic development of Republic of North Macedonia as a country candidate for membership in the EU, comparative to European average or countries which are latest members of EU. With that, it can be created corrective and development business policy of domestic economy for its improvement and approximation to those levels measured in the indicators of socio- economic development as a one of the most important segment of sustainable development.

From Figure 12. showsdevelopment tendency of rate of unemployment of Republic of North Macedonia, latest members of EU (Bulgaria, Croatia, Romania and Slovenia) and EU(28 countries). It is conspicuous drastic difference in the value of rate of unemployment between rate of unemployment of Republic of North Macedonia and other countries and average of EU (28 countries). In this ten-year period we can notice significant decrease of that value, but Republic of Macedonia needs considerable period of time for that value to reach level of the latest members of EU, and especially average rate of unemployment of EU.
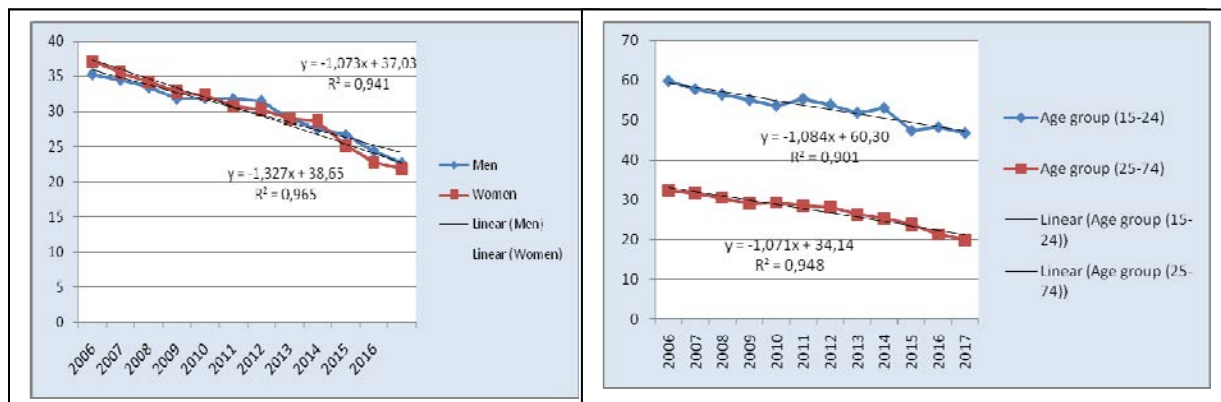

Figure 12: Unemployment rate of persons aged 15-74 by gender (in %) from 2006 to 2016

Figure 13: Unemployment rate of persons aged 15-74 by age group (in %) from 2006 to 2017

Source: Compilation and calculation of the authors using data from the Statistical Yearbook of the Republic of Macedonia, 2018, p. 647

Having in mind that data for those development tendencies of rate of unemployment in the defined time period, following null hypothesis can be defined:

H1: In the defined time period, there is no difference in the value of rate of unemployment that is realized in the indicated countries. Testing of this statistical hypothesis is realized with the use of parametric test ANOVA for one factor with more modalities.

Because theoretical value of F variable (*F crit* = 2,3683) is lower than calculated value of F variable (*F* = 152,0157), hypothesis that there is no difference in the value of rate of unemployment that is realized in the indicated countries is rejected. That difference is conspicuous and statistical very significant with confidence interval of 0,95. To the same statistical conclusion we come with comparison of p-values, empirical and theoretical, respectively (0.00 < 0.05).

Figure 15 shows development tendency of energetic efficiency of economies of North Macedonia, Serbia, latest members of EU and EU. Furthermore, conspicuous is very high value of this indicator of socio-economic development, in observed time period, to Serbia, Bulgaria and North Macedonia, which has significant decline comparative to European average, i.e. value of this indicator of EU (28 countries). Also, the value of this indicator to other indicated countries (Romania, Albania, Croatia and Slovenia) is higher than European average, i.e. from the value of this indicator for EU (28 countries). In this case also, significant time period will be needed for North Macedonia to get closer to European average. Having in mind that data for those development tendencies of rate of unemployment in the defined time period, following null hypothesis can be defined:

H2: In the defined time period, there is no difference in the value of energetic efficiency that is realizing in the indicated countries. Testing of this statistical hypothesis is realized with the use of parametric test ANOVA for one factor with more modalities.

Because theoretical value of F variable (*F crit* = 2,1564) is lower than calculated value of F variable (*F* =239,3059), hypothesis that there is no difference in the value of energetic efficiency that is realized in the indicated countries is rejected. That difference is conspicuous and statistical very significant with confidence interval of 0,95. To the same statistical conclusion we come with comparison of p-values, empirical and theoretical, respectively (0.00 < 0.05).

On Figure 16 are presented development tendencies of rate of employment of Republic of North Macedonia, latest members of EU (Bulgaria, Croatia, Romania and Slovenia) and EU (28 countries). It is conspicuous that, there is drastic difference in the value of rate of unemployment between rate of employment of Republic of North Macedonia and other countries and average of EU (28 countries). In this ten-year period we can notice significant increase of that value, but Republic of Macedonia needs considerable period of time for that value to reach level of the latest members of EU, and especially average rate of employment of EU.

According to data for those development tendencies of rate of employment in the defined time period, following null hypothesis can be defined:

H3: In the defined time period, there is no difference in the value of rate of employment that is realized in the indicated countries. Testing of this statistical hypothesis is realized with the use of parametric test ANOVA for one factor with more modalities.

Because theoretical value of F variable (*F crit* =2,3683) is lower than calculated value of F variable (*F* = 152,023), hypothesis that there is no difference in the value of rate of employment that is realized in the indicated countries is rejected. That difference is conspicuous and statistical very significant with confidence interval of 0,95. To the same statistical conclusion we come with comparison of p-values, empirical and theoretical, respectively (0.00 < 0.05).
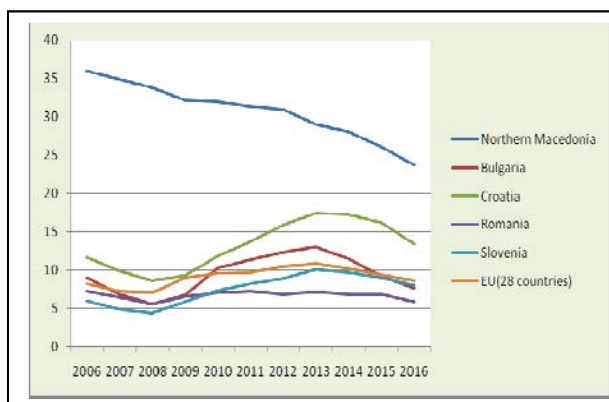

Figure 14: Unemployment rate of persons aged 15-74 (in %), the newest members of the EU and North candidate country, from 2006 to 2016

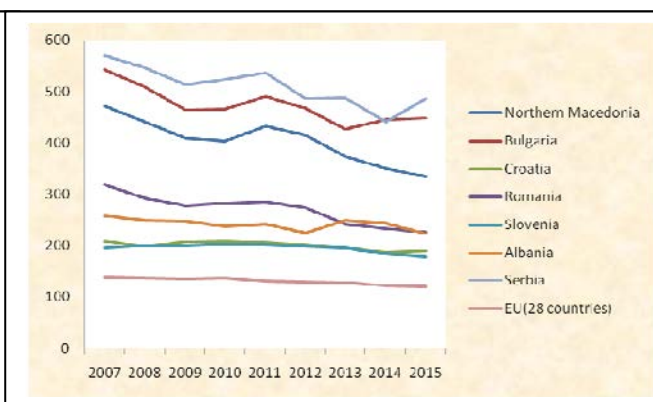Figure 15: Energy intensity of the economy, (in kgoe /1000 euro), the newest members of the EUMacedonia as a and North Macedonia as a candidate country, from 2007 to 2015

Source: Authors' compilation using data from the EUROSTAT: http://ec.europa.eu/geninfo/legal_notices_en.htm
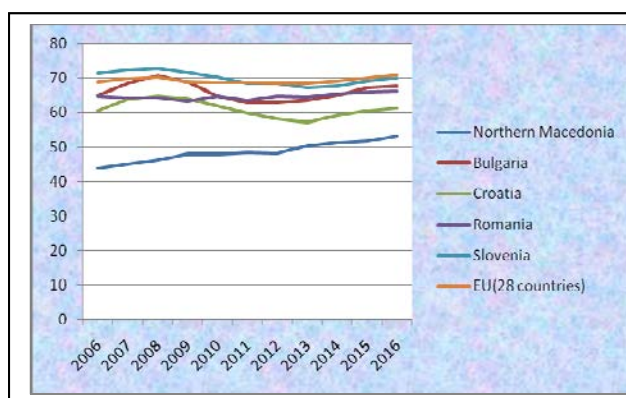
Figure 16: Employment rate of persons aged 20-64, total (in %) from 2006 to 2016, the newest members of the EU and North Macedonia as a candidate country, from 2007 to 2015
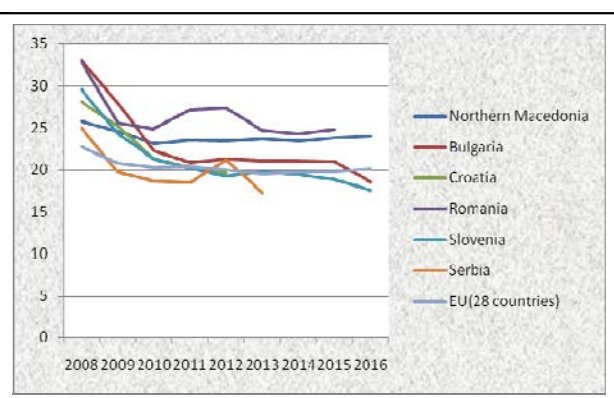
Figure 17: Investment by institutional sectors in % of GDP from 2008 to 2016, the newest members of the EU and North Macedonia and Serbia as candidate countries, from 2008 to 2016

Source: Authors' compilation using data from the EUROSTAT: http://ec.europa.eu/geninfo/legal_notices_en.htm

On Figure 17 are presented development tendencies of values of investments by institutional sectors in % of GDP of North Macedonia, Serbia, latest members of EU (Bulgaria, Croatia, Romania and Slovenia) and EU (28 countries). It is conspicuous that, there is difference in the value investments by institutional sectors in % of GDP between investments by institutional sectors in % of GDP in Republic of North Macedonia and other countries and average of EU (28 countries). In this ten-year period we can notice continuous uniformity of that value and significant changes are needed for that value to reach level of the average of the value from the members of EU. This statement also refers to the latest members of EU, especially Romania.

According to data for this development tendencies of investments by institutional sectors in % of GDP in the defined time period, following null hypothesis can be defined:

H3: In the defined time period, there is no difference in the value of investments by institutional sectors in % of GDP that is realized in the indicated countries. Testing of this statistical hypothesis is realized with the use of parametric test ANOVA for one factor with more modalities.

Because theoretical value of F variable ($F\ crit$ = 2,2946) is lower than calculated value of F variable (F = 4,4207), with confidence interval of 0,95, hypothesis that there is no difference in the value of investments by institutional sectors in % of GDP that is realized in the indicated countries is rejected. To the same statistical conclusion we come with comparison of p-values, empirical and theoretical, respectively (0.001235 < 0.05).

4. CONCLUSIONS

For credible research and creating of socio- economic development, as a continuous process for quality social changes, necessary is appropriate statistical analysis of the most relevant parameters. In that sense, obtained data for values of indicators in a period of time is of very significance, also and obtained knowledge from the interval evaluation and forecasting of their values in following time periods. Also, noticeable are lower average values of indicators of socio-economic development of North Macedonia comparative to average values indicators of socio-economic development of members of EU and countries that are latest members of EU. Rate of unemployment in Republic of North Macedonia is more than three times greater than countries members of EU (28 countries). Basis on discovered development tendency of this indicator, of Republic of North Macedonia, about 20 years are needed to reach European average. Also, value of indicator of energetic intensity of the economy is greater for almost four times than the average of EU (28 countries). Rate of employment is lower for almost 1,5 times than average in the EU (28 countries) and it is lags behind latest members of EU. Also, there is a difference in percentage participation in investments by institutional sectors. This information are good base for creating faster and more quality socio-economic development, in frames of strategy management of domestic economy of North Macedonia, as a two dimensions and functional components of sustainable development.

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