Szent István University
Doctoral School of Economic and Regional Sciences

Ph.D. Dissertation

ECONOMIC EFFICIENCY OF WATER USE IN KOSOVO WITH INTERNATIONAL COMPARISON

by

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1. INTRODUCTION

The study analyses the agricultural conditions of the selected countries of the world economy with Kosovo in fields of production efficiency, income conditions of farm households, and subsidies for farmers. The selected 15 countries in the scientific research are Albania, Austria, Bosnia-Herzegovina, Bulgaria, Croatia, Czechia, Finland, Greece, Hungary, Kosovo, Portugal, Romania, Serbia, Spain, and the UK. The EU-member states are 11 countries from these selected countries and during the research period, the UK was a member state of the EU.

The principles of selections of countries in this research were first, because some of them are close to Kosovo and majority of these countries are EU member states, with which Kosovo wants to create strong economic cooperation. Also, in spite that all of these countries are within Europe, these countries have completely different economic and natural features, therefore, these geographical and economic differences can successfully make the analyses be interesting. Some of countries in Northern and Middle East parts of Europe –Austria, Czechia, Finland, Hungary, Romania, Serbia and the UK - have more water supply, while the other one in Southern Europe - Albania, Bosnia-Herzegovina, Bulgaria, Croatia, Greece, Kosovo, Portugal, Spain, - have less favourable geographical and water conditions. Through its development cooperation, the EU is funding projects to promote access to water and sanitation: since 2004 more than 70 million people have been connected to improved drinking water, and more the 24 million people are connected to sanitation facilities. The Conclusions include the EU's commitment to consider the importance of water and sanitation in the programming of future financial and technical cooperation with partner countries (EEAS, 2019; UNDP, 2018; UNDP, 2019). This means that the farmers and agricultural policy of Kosovo can get wide-side experiences in field of water management from either humidity areas and sub-dray or more dray areas from one continent. In this case the water management has wide-side overview possibility.

Also, these countries have different qualified water irrigation systems, because some of them have highly developed system, for example Austria, Czechia, Finland, Hungary and UK but some of them, for example Albania, Bosnia-Herzegovina, Bulgaria, Croatia, Greece, Kosovo, Portugal, Romania, Serbia and Spain, have less developed one. Naturally different water use efficiency results different income conditions for further water management and irrigation development.

The study objectives focus mainly on the economic background for water management in several selected countries, mostly neighboured countries including Kosovo in Balkan Region and other EU regions and other important countries out of the EU. The international comparison is needed for analysing the possible future trends for improving the technological development in the agricultural industry emphasizing water management. The study of the dissertation overviews the above-mentioned objectives for the period of 2010 and 2018 based on analysing data coming from national statistical published materials and Eurostat accompanying with some data of FAO. Furthermore, this study research the significant role played by international institutional arrangements and international organizations in promoting cooperation on water resources is analysed as stated "Bilateral cooperation addresses the circumstances of the particular case, while multilateral cooperation evidences interdependence at the regional and global level" by FARRAJOTA, 2009 and UNESCO, 2003.

My research focuses on analysing the efficiency of agricultural production in selected countries, using advanced technology for increasing the efficiency of inputs accompanying water use efficiency in the field of cost-income ratio using international experiences of the EU. The analyses encompass the agricultural production conditions in cases of farmers in Kosovo because the international competitiveness of farmers is needed for developing the mechanization accompanying increasing subsidies for farmers. In my dissertation, I focus on the international compare for profitable agricultural production with water use efficiency in selected countries including Kosovo.

The main aims of the research are as follows:

1. Analysing the efficiency of the agricultural industry based on the agricultural value-added, the total country area cultivated, and renewable water resources accompanying with human development index in researched selected countries. Analysing the possible improvement for mechanization and logistic system of water supply and water use for agricultural production, thus analysing correlations of total renewable water resources per capita, total internal renewable water resources per capita, and dam water capacity per capita in selected countries.
2. How the improving technological development including water use efficiency may influence the production technology and production efficiency in the countries under

the study emphasizing these conditions of Kosovo. Analysing the correlations between GDP growth and agricultural total areas cultivated in selected countries.

3. Analysing the adequate qualified agricultural lands are very few or the land natural resources are a scarcity in Kosovo, which is resulted in less favourable water supply and longer period drought. How do the qualified cultivated agricultural lands distribute into river bases?
4. Analysing the agricultural production efficiency at the farming system level in Kosovo. What are the parts of the family farms, which can acceptably be supplied by an advanced water channel system?

The Research Hypotheses in my dissertation are as following:

1. The correlations between renewable water resource use and dam capacity per capita are important in selected countries.

2. There is opposed correlation among the renewable water resources and the GDP growth, and between the agricultural value-added and the GDP growth rate at the level of the selected countries based on improving mechanization in agricultural production.

3. Human development index has weak influence on the development of the agricultural industry based on using more total country area cultivated in selected countries. There is not strong correlations between the two variances.

4. The total country area cultivated is highly influenced by the agricultural value added at the level of the selected countries. Adequate qualified agricultural lands are very few and scarcity in Kosovo, which also is resulted in a less favourable water supply and longer drought.

5. There is strong correlation among innovation knowledge, educated level, and skills of farmers and using advanced irrigation systems in Kosovo.

The water issue and water use are very important for the economic development and growth and the agricultural industry and also irrigating water consumption for the agriculture in EU and Kosovo with comparison with neighbouring countries. Thus, naturally the international cooperation should be realised to solve the very sensitivity water irrigation difficulty for

agriculture. No country can withdraw itself from this very dangerous problem, therefore the international solution is needed. This is the reason for extending the objective of my study for selected EU member states and Kosovo.

2. MATERIAL AND METHODS

In the dissertation I compared the dissimilarities and similarities among the selected economies in the field of the economic background of the productivity of agricultural production concerning water management. The general research methods consist of two main parts, namely the statistical analyses:

- The methodology focuses on the analyses of the efficiency of the agricultural industry based on the agricultural value-added, the total country area cultivated and renewable water resources accompanying with human development index in researched 15 selected countries including EU member states, Kosovo, and its neighbouring countries. The data were collected from different national data resources and international institutions.
- The analyses focus on the possible improving technological development and their influences on the production technology and production efficiency in countries researched in the study accompanying with comparing these data with the irrigation developing trend of Kosovo and its neighbouring countries. The analyse of the irrigation system and its developed level in Kosovo based on primary data coming questions for which farmers replied during 2019.

In the first case of analysing the efficiency of the agricultural industry based on the agricultural value-added, the statistical data at national levels in researched countries will be processed based on the SPSS (Statistical Program for Social Sciences) statistical analyses which include seven economic variances and selected 15 countries such as Albania, Austria, Bosnia-Herzegovina, Bulgaria, Croatia, Czechia, Finland, Greece, Hungary, Kosovo, Portugal, Romania, Serbia, Spain, and the UK coming from 11 EU member states and other four countries from Balkan Region.

Based on the factor analyses, principal component analyses, correlation matrix, rotated solution based on the varimax method, factor score based on the regression method within the SPSS statistical system seven economic variables are % of the total country area cultivated (%) by the short name TAreaCult1; Gross Domestic Product growth (GDP, in current US$) by the short name GDPGrowth2; Agriculture, value added (in % GDP) by the short name AgrVaAd3; Total internal renewable water resources per capita (m^3/inhab/year) by the short name InterWRCap5;

Human development index (HDIndex4) is based on three features, namely educated and skilled level of farmers; purchase power parity (PPP) of farmers to buy input elements and covering the consumption of fixed capital on farms; working capacity of full-time and part-time workers on farms, life-length study of farmers and workers in the agricultural industry. The total renewable water resources per capita (m^3/inhab/year) by the short name TRenewWRCap6 and the last seventh economic variance is Dam capacity per capita (m^3/inhab) by the short name DamCapita7.

Also, there is a difference between the total renewable water resources and the total internal renewable water resources based on CIA 2015 and CIA 2019 reports. Fresh and unpolluted water accounts for 0,003% of total water available globally (GLEICK ET AL, 2013). The values have been adjusted to account for overlap resulting from surface flow recharge of groundwater sources. Total renewable water resources provide the water total available to a country but do not include water resource totals that have been reserved for upstream or downstream countries through international agreements. Annual available resources can vary greatly due to short-term and long-term climatic and weather variations (CIA, 2019). Renewable internal freshwater resources per capita are calculated using the World Bank's population estimates (FAO, 2018a; FAO 2018b).

In my study, the Total renewable freshwater resources per capita in m^3 includes more amount of water than one of the Total renewable internal freshwater resources per capita in m^3, because the water coming from out of a country, this will add to the amount of water of the given country. Therefore, in most cases, the countries have considerably more amount of water as Total renewable freshwater resources per capita in m^3 then the amount of water as Total renewable internal freshwater resources per capita in m^3.

Based on the SPSS statistical analyses seven economic variances distribute into three main Components, as Component-1, which includes three variances namely InterWRCap5, TRenewWRCap6, DamCapita7, the Component-2 includes the (Minus) - GDPGrowth2, and AgrVaAd3, while the third one as Component-3: TAreaCult1.

According to the analysing the profitability and production efficiency accompanying with income conditions based on the collected statistical data from individual farm households in Kosovo based on the questioners, I requested some questions for the farmers in Kosovo:

- Each kind of animal husbandry in value form all of the production;
- Irrigated lands, Arable land, Green grass area, and Forestry in hectare and their distributions in the agricultural industry on the farm;
- Subsidies on the agricultural industry in value and the fields of activities subsided; and
- Factor income per annual working unit or each farm household in Kosovo.

The other main research questions form farmers in Kosovo for the survey were as following:

1. What are the irrigation types at the farm level?
2. What are the requirements of the crops for the water quantity?
3. The level of inputs used for irrigation, and what is the yield of agricultural production? and
4. What are new irrigation technologies applied in your farm (crops), what is the level of investments for new irrigation technology, and what are the changes in yield before and after new irrigation technologies applied? How much was the price income of farmers per each water used in a cubic meter?

3. RESULTS AND DISCUSSION

From point of view of these ranges the very strong correlation is by the value of 0,997 (99,7%) between Total renewable water resources per capita (m3/inhab/year) and Dam capacity per capita (m3/inhab/year). Also, there is a very strong correlation by the value of 0,994 (99,4%) between Total internal renewable water resources per capita (m3/inhab/year) and Dam capacity per capita (m3/inhab/year).

The very strong correlation is by the value of 0,993 (99,3%) between Total internal renewable water resources per capita (m3/inhab/year) and Total renewable water resources per capita (m3/inhab/year). This strong correlation is very logical because the total internal renewable water resource (per capita) is coming from the total renewable water resource (per capita), because this last one as the amount of water has additional water amount coming abroad, from those water resources, which originally flows from the neighbouring countries. These geographical closing positions should stimulate neighbouring countries to make agreements to use commonly renewable water resources within the international cooperation over borders.

The other considerable correlation is by 0,466 (46,6%) between the GDP growth and total country area cultivated, which means that if the total country area cultivated increases, this can increase the contribution of the agricultural industry to increase of the GDP. But if the total country area cultivated decreases, this can make unfavourable influences on the decreasing of the GDP within the economic conditions of the researched 15 countries for the period of 2008 and 2017.

Also, the are the other considerable correlations among economic variances, namely the HDI has considerable correlations by value of 0,466 (44,6%) with Total internal renewable water resources per capita (m3/inhab/year), by value of 0,441 (44,1%) with total renewable water resources per capita (m3/inhab/year) and by value of 0,448 (44,8%) with dam capacity per capita (m3/inhab/year). This means that if the HDI increases, namely the educated level (BSc and MSc) and purchase power parity and life-length study period of farmers and population at the national level, the supply of renewable water resources can increase better technology of water withdraw, keeping more water and river running over from the country even if the country is transit for the water flow, like Hungary. These waters

use technologies can lead to more efficient water use in the researched 15 countries. Dam capacity is a kind of efficient water use in any country by using the dam for agricultural water irrigation and producing electric power energy, as a renewable energy resource. If one country has the more scientific and technological capacity to realise such water using investment, this country also has to have the human resources to realising such investment. Farmers have to have such an educated level to apply more water-use efficiency for agricultural production.

In some of the international cases the GDP growth can have an opposite correlation with the other economic variances, for example with the agriculture, value-added (in % of GDP). In this case, the minus for GDP means that this is in inverse ratio to the economic variance as the agricultural value-added. This means that if the GDP increases in any country, the agricultural value-added decreases in % of GDP, or opposite to these conditions. If the GDP decreases the agricultural value-added of countries can mostly increase in % of GDP. If the agricultural value-added increases in % of GDP, because of increasing yields based on the more using water resources and increasing the investment and consumption of fixed capital, therefore, the other economic sectors provide less results, which can lead to the decreasing trend or less increasing trend of the GDP, because the other industrial sectors have less development trend. The development of the agricultural industry has been accompanying by less share in the GDP of other economic sectors for this period of 2008-2017, therefore the GDP growth decreases (FAO AQUASTAT, 2018b). In the case of the researched 15 countries, this contradicts correlation is not important by the value of minus 0,192 but the wider international experiences can provide other examples for this correlation.
In the case of 15 countries the increase of agricultural value-added doesn't contribute to increase GDP growth because other economic sectors don't develop enough or in some cases, these can decrease. Also, other economic sectors of some countries from 15 countries are not enough developed to increase agricultural value-added. This correlation can also provide proof of some backwardness of economic background for the agricultural industry based on the agro-business in some of the 15 countries.

In the same period HDI increases at the level of value 0,8 at the same time within the 15 countries, which also provides proof that these two economic variances there is a considerable correlation with each other, can be seen in Table 2 (FAO AQUASTAT, 2018b). This means that in Bosnia-Herzegovina the extending the total area cultivated

connected with more extensive methods for agricultural production and agricultural value-added, while the HDI was at a relatively high level.
Mainly less use of mechanization and mechanical equipment was in Bosnia-Herzegovina and some other selected countries, which can be followed in different data in the field of decreasing rate of agricultural value-added. Naturally, the total area cultivated can also increase by increasing irrigation, and the total internal renewable water resources per capita increased, while the GDP decreased. But the total renewable water resources per capita also little increased, because the rivers of neighbouring countries could bring little more water to Bosnia-Herzegovina. In spite that the water yield of rivers coming from these countries is not so much comparably to the total internal renewable water resources per capita.

Also, the GDP and agricultural value-added mostly the same decreased by 5,9% and 5,4%, while the agricultural value-added of the 15 countries averagely decreased by 1,15%. The HDI has little increased to the level of 0,8 value, while the GDP rate considerably decreased for the researched period, which shows that the GDP growth rate decrease led to the lower level of the standard of living accompanied with the decrease of power purchase parity. The other two elements of the HDI, as healthy-life and knowledgeable, could independently increase from the GDP, see more in Table 2 (FAO AQUASTAT, 2018b). Generally, the HDI can be accepted as an adequate level, if the value of the HDI is more than 0,5 and also mostly the HDI can be calculated within the value of "1". Sometimes it can happen that the value becomes over the level of the "1" if the development trends of the HDI extremely were resulted.
The countries, namely Serbia, Croatia, Bosnia-Herzegovina, Bulgaria could achieve an increase in their renewable water resources per capita and increase total area cultivated and level of the HDI with decreasing or less increase in the researched period.

The total area cultivated increased was considerably increasing by 4,8% in Bulgaria, which was in inverse ratio to decreasing trend by 2,6% of the average level of the 15 countries, and also, only this one increased by 3% in the UK by 2% in Bosnia-Herzegovina. This means that Bulgaria focused on the extensive methods for the agricultural production increase additionally to the above mentioned both of countries. But Bulgaria also emphasized some parts of the extension methods for the agricultural production increase by improving the renewable water resources per capita, which can be used for irrigation.

In Romania the agricultural production has similarly had the conditions of Croatia by decreasing trend namely 10,6% in the field of decrease of the agricultural value-added for the same period. The general economic conditions of Romania were more favourable than in Croatia because of consequently increasing GDP. This increase has resulted in the positive prosperity trend of GDP growth rate by 3,5% based on the increasing trends of the more intensive FDI (Foreign direct investment) mostly coming from highly developed economies of EU-28 and the United States (US) for the latest period. Romania has also a positive favourable geographic condition to increase the total internal renewable water resources per capita by 2,5%, which was resulted in the more intensive extend the possible river basins. Also, the mountain areas make a relatively favourable possibility to extend the Dam capacity per capita. In spite that the water supply in Romania, as the water basin was generally satisfactory for developing the irrigation system for the agriculture, the agricultural production fully sharply declined, which emphasized missing financial capital and luck of consumption of fixed capital.

In Hungary the GDP rate decreased by 4,7%, while the decreasing trend of the agricultural value-added little decreased but less rate, like 3%, mostly until 2010, but after that, the increasing trend of the GDP growth started, which was about 4% in 2019 (HCSO, 2020). The decreasing rate of the agricultural industry could be explained by the decreasing rate of the total country area cultivated by 2%. In spite that this decreasing rate was not so big, this could contribute to the negative result of agricultural production. Also, in spite that the increase was not so at the highest level, this negative trend of the area cultivated could lead to the decreasing trends of the highly developed economies. The GDP rate was going on the negative trend and also it was the same for the agricultural production and value-added. The decrease in GDP growth rate was sharply declined until the end of 2010, so the average decrease of GDP seems that it was decreased, in spite that the increase has started since 2012. The GDP growth rate has started its increase because of the ambition activity of the FDI in several economic sectors, for example, infrastructure, whole trade network, mechanization, car-factory, and light industry, as the food sector. The activity of the foreign large transnational corporations stimulated mechanization of the agricultural industry and food-manufacturing industry in Hungary, which were accompanied by the modernization of the water channel and supply for irrigation and animal husbandry.

In Hungary the little increase of the total renewable water resources and dam capacity per capita could have increased by about 1,5% and 2% for the researched period, which could make the possibility for less decrease of the total area cultivated. The total renewable water resources per capita could increase because the water-yield of the rivers coming from the neighbouring countries of Hungary provided more amount of water. Also, the "domestic-national" or internal water resources per capita could increase based on the more efficient Hungarian water management at the national level. Hungary faced a large number of soil damages resulted from considerable water and wind degradation. Also, Hungary, because this country is the transit country, has to crate to reserve a system for keeping back a large amount of water coming from neighbouring countries and not to go away from Hungary.
In spite of this negative trend of GDP and decreasing rate of the total country, the area cultivated the HDI value could reach the level of 0,6. This last one as HDI increase mainly could not mention as at a low level, because this value was at a level of over half.

There is an important issue for the Hungarian water supply that the total internal renewable water resources per capita have a very little share and portion comparably to the total renewable water resources, namely 5,8% as the second-lowest level per capita within 15 selected countries. In the international compare for example in Egypt, this share was only 1,7% based on the desert weather, while in Turkey this share was the highest level, namely 107% per capita. But also, it should be mentioned that the measure of the water in the field of the total internal renewable water resources per capita was 3,7 times more in Hungary than in Turkey, therefore the water supply per capita in Hungary was more favourable than in Turkey. Also, in Turkey, the population has increased by 8,2%, while in Hungary it decreased by 1,5%. This population number change stimulated to create an unfavourable condition in Turkey comparably to Hungarian one.

In several countries there is a high level of share of total internal renewable water resources per capita in the total renewable water resources, namely about 100% or very closed to 100%, which are as follows: Czechia, Spain, Finland, Bulgaria, and UK, between 95,3% - 99,6%. In cases of some other countries, for example, Portugal, Serbia, and Greece this share was more than 50% to 85%. In other countries like Romania and Croatia, this share was between 20% and 35%. The share of the total internal renewable water resources per capita compared to the total one was completely different from each other, which depending

on the weather conditions and the measure of the water channel and water irrigation investments.

In Spain, given that the area of the country are mostly deserts or sub-desert regions, the water supply per capita could have increased at a very low level, namely about one percent since 2008. The total internal renewable water resources per capita increased by 1,1%, while the total renewable water resources per capita increased by 1%, mostly the same as the first one. The low-level increase of water resources led to the low-level increase in the field of the dam capacity per capita, which this last one essentially means that the water resources are reserved in a pond or lake form in the riverbed behind the dam. The drought-desert weather conditions naturally resulted in a less favourable yield of the agricultural industry, therefore the less agricultural value-added and less contribution of this sector to the GDP, which also, can decrease, because of the weak production of the agricultural sector. Naturally, the GDP has decreased by 10% for this period, which was resulted in less input productivity of the industry additionally to the agricultural industry, therefore the unemployment rate could increase and also, the unemployment rate could increase the furthermore decline of the GDP and generally the Spanish economy.

In Spain the large distances and therefore the low-level density of the population, which also presses the transnational corporations not to increase their investments within the FDI scheme. This negative unfavourable economic condition also can accumulate the earlier economic difficulties, for example, the unemployment rate and emigration of the rural population to the urban areas, which can also increase the local unemployment, which even can be higher level than the national average level.
In Spain, Bulgaria, Croatia, Bosnia-Herzegovina, Serbia, Hungary, Czechia, Romania, in n cases of these countries in this session the decrease of the GDP growth rate and agricultural industry including the agricultural value-added, while the total internal water resources and total water resources accompanying with dam capacity per capita little increased. But the geographic conditions don’t make better conditions create a better background for agricultural production, which led to increasing backwardness.

The UK, where the total renewable water resources considerably decreased by 3% and the other two kinds of the water resources also decreased by the same rate within the selected 15 countries of the world economy. In the UK, the total country area cultivated could

increase by 3%, which could not lead to an increase in agricultural value-added because of the considerable decreasing trend of the total renewable water resources and dam capacity per capita. Therefore, the value-added decreased by 0,3%, which opposed to the considerable increasing trends of the GDP, namely by 8,4%.

In case of the UK, the water lost can have also been experienced in the field of decreasing trends in agricultural value-added for the last decade. Naturally, the subsidies structure of the EU-28 influenced the decreasing yield, agricultural value-added, and price incomes of the farming households. The decline of the agricultural profitability and a decrease in agricultural production did not make considerable influences on the GDP growth rate.
The UK is a highly developed economy, which could be proofed by increase in the GDP and not a considerable decrease in the agricultural value-added. Before the British excite process from EU-28, the foreign direct investments and performance of the large multinational corporations were very consequently to develop the economic development, even as a continuous process.
In UK since the beginning of 2018, the GDP growth rate can be expected to decrease because the FDI outflow has started to go out of UK and the largest foreign transnational corporations determined to discontinue their activities in this country because the British government started the withdrawal from the EU. These companies are afraid that the EU will increase the duties against products - even these are produced by these companies - which makes their products to be very expensive in the EU, therefore the imported products from UK in the EU will lose their competitiveness in its EU single market. This duty system makes imported products to be impossible for selling in the EU.

The GDP rate made the possibility to create the value of the HDI at the level of 0,6, which can be seen as adequate accepted by the international demands, while the total country area increased. The healthy life was at an adequate level accompanying with the developed and innovative knowledge for the prosperity of national economic performance in the UK. The standard of living in UK was accepted by the population of this country. Therefore, the measure of the human development index cannot increase and the actual level of the value of HDI cannot be at a high level, because the previously developed level of HDI was quietly at a high level. Also, it can be said that the keeping of healthy-life, knowledgeable, and standard of living at the continuous high level could be very costly, which could increase

even the negative balance of payment and central government debt (state debt) for the future.

In Albania, Kosovo, UK, and Austria the Total internal renewable water resources per capita (m3/inhab/year), Total renewable water resources per capita (m3/inhab/year) and Dam capacity per capita (m3/inhab/year) decreased or little increased, while also the agricultural value-added decreased or little increased, but in the same time the GDP growth can be increased or little decreased in these countries. This means that almost all of the economic variances decreased or sometimes these can little increase, while only one economic variance, namely the GDP can increase or little decrease. This shows the contradiction correlation of GDP growth with other economic variances, which can be seen in the Table 1 and the coordinate systems.

Table 1: The economic growth and the water use and supply in selected 15 countries in percent between 2008-2017

Countries	**HDI ndex 4**	**Inter WR Cap 5**	**TRene wWR Cap6**	**DamC apita7**	**TAreaCu lt1**	**GDPGro wth2**	**AgrVaAd 3**
Line	**X**				**Y**		**Y**
Variances	**4**	**5**	**6**	**7**	**1**	**2**	**3**
Albania-1	***0,5***	***-0,3***	***-0,3***	***-0,4***	***0,8***	***-6,5***	***1,6***
Kosovo	0,6	-0,5	-0,5	-0,5	1,4	3	6
UK	0,6	-3	-3	-3	3	8,4	-0,3
Austria-2	*0,1*	*-2,5*	*-2,5*	*-2,5*	*-0,7*	*-8,1*	*-13*
Finland	0,1	-2	-2	-2	-0,2	-10	-0,3
Bosnia-He-3	***0,8***	***3,1***	***3,9***	***4***	***2***	***-5,9***	***-5,4***
Bulgaria	0,5	3,2	3,2	3,2	4,8	-8,6	-3,4
Croatia	1,2	2,6	2,6	2,7	-4,2	-13,8	-4
Romania	0,6	2,5	2,9	2,6	-3	3,5	-10,6
Serbia	1,2	2,2	2	2	1,4	-10	5,3
Czechia-4	***0,3***	***0,3***	***0,3***	***0,3***	***-22***	***-11,7***	***-9,2***
Greece-5	*0,1*	*2*	*2*	*2*	*-11*	*-20*	*10*
Hungary	0,6	1,5	2	1,5	-2	-4,7	-3
Portugal	0,4	2,5	2,5	2,5	-6,4	-8	8
Spain	0,3	1,1	1	1	-3	-10	1
Average	*0,53*	*0,85*	*0,94*	*0,89*	*-2,6*	*-6,8*	*-1,15*
Line	**X**				**Y**		**Y**
Variances	**4**	**5**	**6**	**7**	**1**	**2**	**3**

Source: Own calculation based on the SPSS statistical analyses from secondary data and FAO, 2018a.

The selected 15 countries show very different economic trends concerning the differences among countries from several continents and economic variances according to the water supply, as total renewable water resources and dam capacity per capita and also, the possible results of water resource use, as agricultural value-added in the researched period. Mostly in those countries, where the damages of the renewable water resources per capita were less the agricultural value-added could increase, or the damages were more, the agricultural value-added could decrease or probably only little increase could occur. But the GDP growth rate and agricultural value-added in all the time were opposite to each other. Because in any case if the GDP growth increased, the agricultural value-added decreased, or if the GDP growth rate decreased, the agricultural value-added increased, as it can be seen in Figure 1.

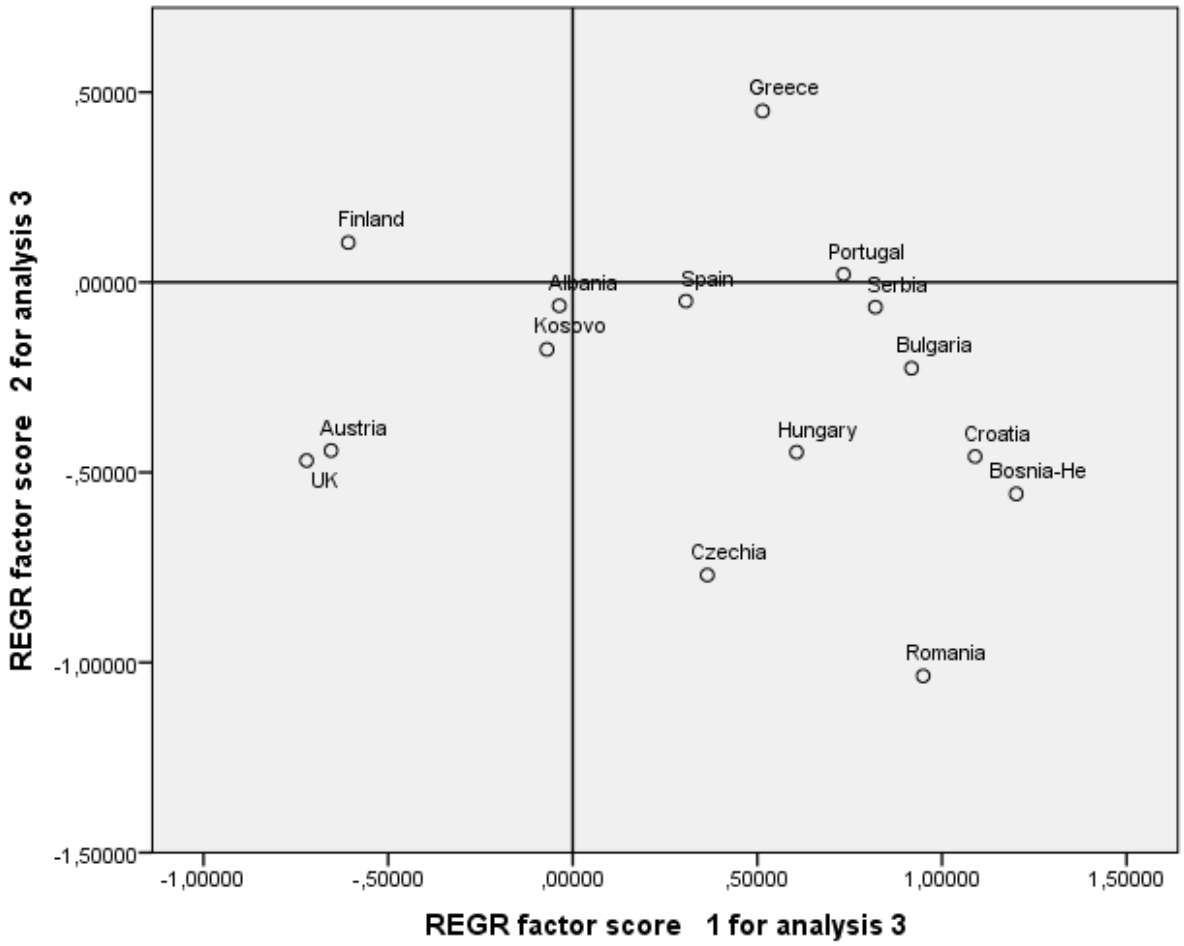

Figure 1: Factor analyses for economic variables of Component-1 and Component-2 in the coordinate system

Source: Own calculation based on the SPSS statistical analyses from secondary data.

HDI means as it was mentioned before, a summary measure of average achievement in key dimensions of human development: a long and healthy life, being knowledgeable, and have a decent standard of living. The HDI is the geometric mean of normalized indices for each of the three dimensions. Based on the meaning of the HDI, the middle strong can be with increasing cultivated areas, because of if the human resources as farmers and members of the farming households are ready to continue or extend their performance on more cultivated areas. If the knowledge is wider for the farmers, they also can extend their agricultural performance for more areas accompanying with other agricultural branches, as new kinds of animal pieces or crops for production. If the standard of living for farmers is satisfactory good, their power purchase parity increases, they will be ready more to buy or rent or by their selves extend the cultivated areas for those one which were not cultivated before. This last one means that the cultivated areas extend at the national economic level. But probably when the farmer buys any cultivated lands from others the whole amount of the cultivated lands does not change at the national level, also can be seen in Figure 2.

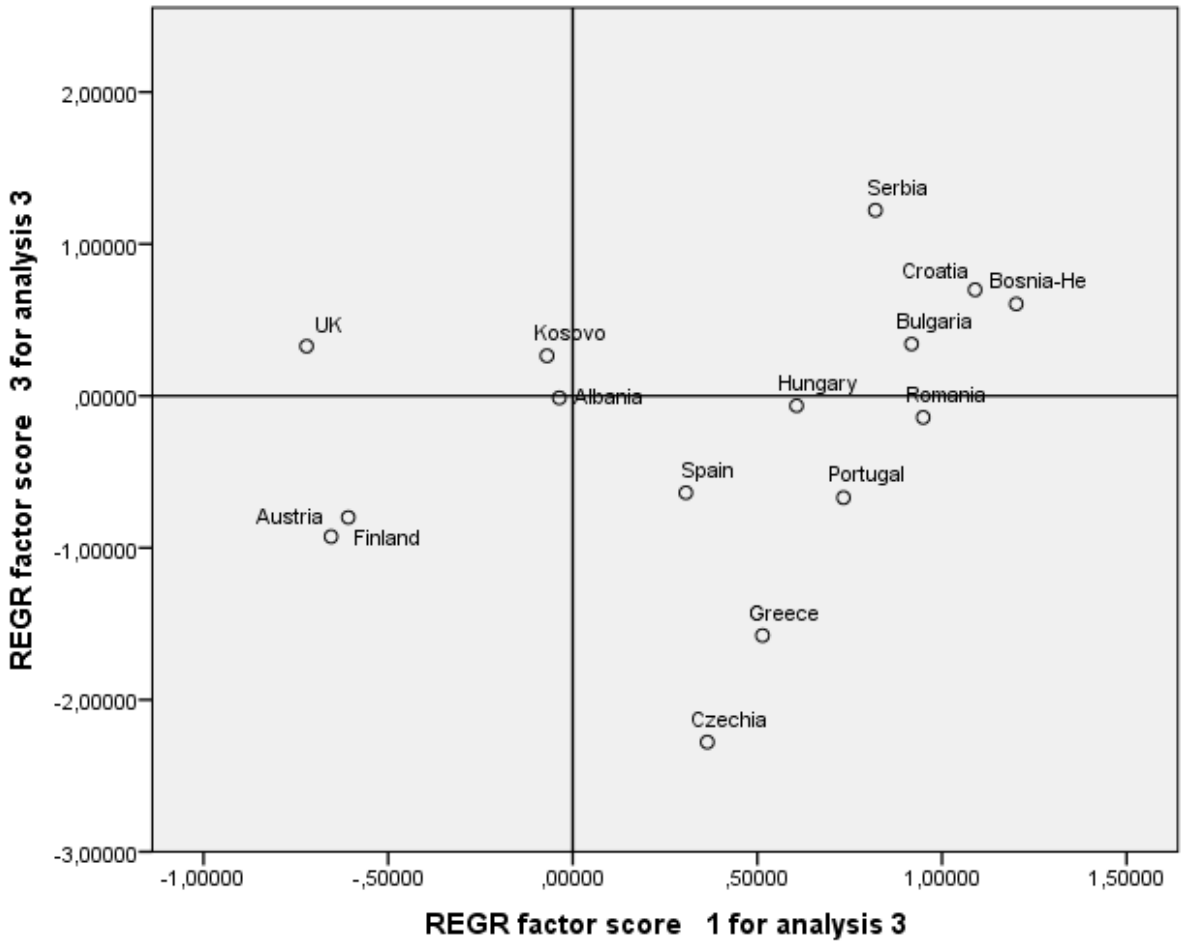

Figure 2: Factor analyses for economic variables of Component-1 and Component-3 in the coordinate system

Source: Own calculation based on the SPSS statistical analyses from secondary data.

At the principal line "X" = Component-1: HDIndex4, InterWRCap5, TRenewWRCap6, DamCapita7

At the principal line "Y" = Component-3: AgrVaAd3

It can be said that in Croatia in spite that the HDI very sharply increased by 1,2 value more rate than the average rate of 15 selected countries by 0,53 value, in this country the GDP declined considerably and the agricultural value-added less decreased than the GDP growth rate. This means that the elements of the HDI, namely long-healthy life and the knowledge based on improving education level comparably to the international standard alone cannot have enough impact on the increase of the GDP growth and the agricultural value-added. Therefore, the economic growth and development also can be determined by the standard of living, as the third element of HDI including the power purchase parity, which shows the measure of the consumers to be ready for buying more products. This last one shows the measure of the domestic single market of Croatia for extending the production and therefore the growth of the economy. The measure of the domestic single market can stimulate the companies to increase their production, which added to the economic growth and improvement. This basic essence is for free market conditions. These economic conditions show that probably in Croatia the standard of life and power purchase parity were weak for successful developing trends in economic growth. The tourism sector cannot make alone enough influence on the whole economic growth.

Also, the 8% decrease of GDP rate in Portugal less by two percent than the level of 10% GDP in Spain could probably enough for eight times more increase of agricultural value-added in Portugal than in Spain. The increase of the total renewable water resources and agricultural value-added opposite to the decrease of the total country area cultivated shows that the land use concentrated should be realised in order to keep the high-level increase of value-added at the considerable level of the decreasing of the total area cultivated in Portugal.

Additionally, to the land use concentration, mechanization and irrigation improvement should be needed for the favourable value added in the agricultural industry. Finally, the

general declining trend of the economic development in Portugal resulted in the low level of the HDI by the value of 0,4, which can be titled as unfavourable conditions for the future possible economic-social prosperity. In fact, mostly the rural poverty could be extending in the wide-side of Portugal, and because of the industrial development trend was not strong in Portugal therefore, the real deep economic prosperity would be late or later future period.

The land-use is quietly well-concentrated even the most concentrated in all of the EU-28, which could have made the most or more efficient the Czech agricultural industry based on the input productivity by increasing price incomes and factor incomes for farming households if the industrial development and the mechanization processes had helped the increase of the agricultural value-added. This last one also decreased by 9%, while the total areas cultivated decreased by 22% based on the GDP rate decreasing by 11,7%. It is clear that the less amount of water reserves and renewable water resources per capita led to a decrease in the irrigation capacity and a decrease in the field of the total area cultivated, while the HDI was at a moderately level low. The decreasing trends of the GDP growth rate resulted in the decline of the modernization and improvement of the agricultural industry and therefore agricultural value-added accompanying with less water resources per capita resulted in mostly natural changes. Both of two sides, namely economic and natural one, all together contributed to creating the unfavourable economic and agricultural conditions.

Austria, which has decreasing trends in fields of all economic variances except the HDI, which mostly negative by 0,1 value, just only over zero line. All of the total renewable water resources and dam capacity per capita have decreased by 2,5% since 2008. The less amount of water resources per capita consequently led to the decreasing trend of the total country area cultivated by 0,7%, which was a little decrease. In cases of the highly developed economies, including Austria, the number of populations generally doesn’t increase therefore, the global warming effect can make influences on the decreasing trends of the total renewable water resources per capita instead of changing the number of populations. In case of the decreasing trend in the field of the agricultural value added by 13%, the less decrease of the water resources and total area cultivated, more decrease of the GDP rate by 8,1% stimulated to decrease the trends of the agricultural industry and agricultural value-added. This last one has been the biggest decrease in the agricultural production and agricultural value-added at the top level, more than the decrease of GDP growth rate within the selected 15 countries of this research since 2008.

Additionally, to the above-mentioned results for the decreasing trend in the agricultural sector, the other reason should be for its decrease, namely the over-production issue of agriculture and therefore the decrease or less increase in the subsidies provided by the EU for the farmers and agricultural producers including the farming households. The less subsidies for farmers resulted in a less competitive possibility for them either on the world market or single market of the EU.

It is similar to the one of Finland, but this is quietly different from the level of the developing economies, where the highest level of figure value even could be higher than the level of the highly developed economies. The general increase trend is not equal to the developed level. Either in Austria or Finland, the same level of the HDI is a value 0,1, while the total area cultivated also decreased. According to the HDI three elements of this index changed based on the economic decline, therefore, one element namely the standard of living has decreased considerably since 2008. The reason that the price incomes at the firm level decreased, so, the salaries paid by the firms should also decrease for direction to the employees as consumers at a single market of EU including the national market in Austria and Finland. The employees or consumers lost their purchase power parity (PPP) therefore, the kinds of products sold by consumers decreased, so their standard of living decreased. Comparably fewer products could be bought by consumers than earlier. This means that the lifestyle of the populations of both countries has not changed, but the PPP, as well as the standard of living, declined. This explain is for the low level of the HDI, as economic variance in highly developed economies even in the selected 15 countries.

This country-group of the fourth session or quarter of the coordinate system, the countries, namely Finland, Austria, and Albania provided somehow weak economic conditions, which are mostly based on the industrial decline leading to the decreasing trend of the GDP concerning the relatively narrowing market positions and purchase power parity of the consuming populations in these countries. The loss of capital and missing the financial resources made an obstacle for the prosperity of investments. The low level of the investments reflects to the less incomes and salaries for the next capital accumulation in industry and the power parity of consumers will weak. Also, the geographical positions of the agricultural industry mostly based on the decreasing renewable water resources per capita resulted partly from global warming led to the moderately less decrease of the output and the agricultural value-added than the GDP growth rate during the period of the research.

Also, the total area cultivated has decreased accompanying by the low level of value of the HDI for the same period.

Kosovo had somehow little more unfavourable conditions of the agricultural industry concerning the renewable water resources in fields of its three kinds, because in spite that the water resources little more decreased by 0,5% less than the increasing average of the selected economies, which was between 0,85% and 0,94%, but better than the decrease trend of Austria, which was 2,5%, or one of Finland by 2,0%. But the agricultural value-added increased by 6% in Kosovo against a decreasing trend of 1,15% in the case of the average level of the 15 selected countries. This difference could be resulted by more extending agricultural production in Kosovo and with more favourable increased total arable land cultivated than the average level of selected 15 countries in this field. Also, in Kosovo, the GDP growth rate has increased by 3% for the researched period, which was in the inverse ratio to the average level of the selected countries by declining trend of 6,8%. In spite that the GDP was not quietly considerable, but this increase could ensure enough economic background to increase the agricultural industry including the agricultural gross value added based on the increasing total area cultivated.

Kosovo in this statistical analyse the total area cultivated increase by 1,4% could make influences on the increase of the HDI to the level of the value of 0,6 and mutually this last one also can make influences on the increase of the total area cultivated. This last one can lead to increase price income of the farming household, which could lead to the increase of the healthy-life and standard of living included in HDI based on the increasing trend in the field of the purchase power parity of the consumption of farmers and annual working units. In Kosovo mostly the lack of capital and skills of farmers, and the less investment in the field of the consumption of fixed capital. In Kosovo, the measures of the Class 2 (76-85, Good), Class 4 (56-65, Average), Class 5 (46-55, Under average) in km2 of Drini i Bardhë river basin increased by the top level in shares of the total areas of the six classes of this river basin, mostly by the end of 2017, but in the following years also, the measured fields in km2 could not increase more or no any considerable change. In the other words, the Drini i Bardhë river basin has the biggest share of the Class 2, Class 4, and Class 5 qualified agricultural lands.

Also, the Class 1 agricultural land qualified by the more favourable water supply than the other classes qualified agricultural land. The main strategic aim for the agricultural irrigation system should be the best way to increase the irrigating water supply in Drini i Bardhë and Ibri river basins, because here originally the irrigating water supply is at the top level at present comparably with other two less favourable river basins Morava e Binces and Lepenci river basins. Therefore, the measure of the Class 1 in km2 should be to increase from 38,8% of 2833 km2. Also, the other aim can be realised, namely Class 4 and Class 5 can be increased to the higher or highest qualified level of Class 1, because Drini i Bardhe has a considerable share of these qualified agricultural lands, namely by 72% and 71% in these two Classes 4 and 5. By realising the above-mentioned aims, the irrigating water capacity of river basins, mostly in cases of Drini i Bardhë and Ibri can stimulate to increase the yields or results and price-incomes for farmers and more favourable food supply for the domestic market in Kosovo. Class 6 is important for keeping forestry and meadows instead of more using arable land in this land category. But these lands also need more irrigation and water supply.

In Kosovo the GDP per capita in purchase power parity (PPP) has increased by 6,9% for the period of 2015-2017 in 2016 US dollars. Definition: This entry shows GDP on a purchasing power parity basis divided by population as of 1 July for the same year. (CIA, 2019). The difficulty for the farmers was that the GDP in PPP per capita was mostly favourable for the traders and not for farmers, because of prices pressed by traders against the interest of farmers. The pressed price level does not ensure enough price income for improving agricultural production. Also, the subsidies provided for farmers has decreased by 29% for the period between 2012 and 2017. Additionally, to the above-mentioned difficulties the farmers of Kosovo have other unfavourable conditions concerning the decreasing subsidies by mostly 30% between 2012 and 2017, also, considerable backwardness of mechanization level, decreasing the yield of cereal production by its amount of 51 million euro within one last year, only a few fertilizers and pesticides used by farmers. In the neighbouring countries close to Kosovo, the agricultural conditions could be a little more favourable for example in Albania and Bosnia-Herzegovina than in Kosovo.

Some conclusions state that in Kosovo the employment in agriculture is a very high level accompanying with less developed machinery level, in spite that the inflation rate is at a low level with a high portion of the agricultural land of total land area than the cases of the

other neighbouring countries. The international competitiveness of farmers is needed for developing the mechanization accompanying with increasing subsidies for farmers. In Kosovo, the lack of capital, the less educated, and skilled employees in the agricultural industry result in some economic difficulties for the further prosperity of the sector. The possible solutions for the agricultural industry in Kosovo, for example, to develop the mechanization, common selling-purchasing of farmers, develop vertically integrated product channel, more activities in agricultural services, secondary activities, increasing the subsidies for farmers, obtaining of farmers in food manufacturing industries, extent the maintenance-network for the agricultural machines, extending the agricultural advisory network and also, create the better credit conditions for farmers. The more international subsidies provided by the EU-28 are needed for the agricultural industry of Kosovo. The ratio of employed people is a very high level in agriculture, which should be decreased by industrializations in other economic sectors to withdraw more employees of agriculture to the other industrial sectors.

4. CONCLUSIONS AND RECOMMENDATIONS

The analyses emerged some issues concerning the renewable water resources accompanying with some economic issues, which sometimes can be difficult for solutions to the emerging problems of the performance of the economies of this study.

The main conclusions are that the economic prosperity of the countries needs for water cleaning and efficient allocation of the renewable water resources for economic sectors and fragments of the water consumers for family and farming households and municipal consuming institutions.

The other conclusion is that the depending measure of the agricultural value-added on the total country area cultivated from sides of extensive development issues and intensive technological development and somehow the innovative conditions concerning the HDI, mostly the knowledgeable. Also, the extensive development issue depends mostly on the irrigation system as a part of the intensive technology. Sometimes the measure of the total country area cultivated can be extended by irrigation improvement as an intensive method for increasing the cultivated areas. The yield per hectare can be increased by the irrigation system. Therefore, these correlations among economic variances can deem the economic conditions very complexly.

I suggest policymakers to improve the agriculture in Kosovo, which can also be useful generally for the agricultural sector of the other countries as well.

There is an important missing element, namely the vertically integrated product channel among different levels of the product channel from the soil of farmers to tables of consumers. Also, horizontal integration is a cooperation among farmers producing basic materials in the agricultural sector. The two missing elements also show that the farmers have less possibility to obtain their competitiveness against the other producers in national and international markets.

In Kosovo, the income tax decrease is a form of central support based on the agricultural policy, which cannot be successful for farmers, because this support system does not aim at exactly supported investment for improving agricultural production. Therefore, the tax-subsidies are only additional income-support, which all of the farmers can obtain who have income from the

agricultural production without implementing any demands for the improving technology and increasing yield, as output in this sector.

The agricultural policy in Kosovo can follow those priorities for supports relevant to EU agricultural policy, which are as follows:

- improvement of mechanisation and irrigation system;
- supports for farmers producing fruits, vegetables, which have favourable conditions;
- concentration for the arable land use and ownership for crop production to increase the profitability of the production;
- developing the animal husbandry, with accompanying with feed-crop production within the same farm, if it is possible;
- create a unified water supply channel system supported by the central governmental investment for drinking and irrigating water supply, and also to withdraw dirty water from farms;
- support farmers to achieve the book-keeping, accountancy, and financial plans accompanying with submitting of farmers for application obtaining financial supports either from EU or government;
- set up the unified supervising system for farmers at the country-wide-side level within a unified system, where each same supervisor cooperates with the same farmer-group consisting of 10-15 farmers specialized in fields of either crop production or animal husbandry according to each kind of crop-product or animal.

5. NOVEL FINDINGS OF THE DISSERTATION

1 The correlations among the renewable water resource use and dam capacity per capita in selected countries are not important. Generally, water uses for dam capacity per capita are not considerable. The renewable water resources are only the protentional water supply for agricultural production, which need for setting up the network to transfer the water to the farms.

2 The opposed correlations are not strong or only weak among the renewable water resources and the GDP growth rate at the level of the selected countries. There are opposed correlations between the GDP growth rate and agricultural value-added at the level of the 15 selected countries based on improving mechanization in agricultural production. The GDP is in inverse ratio to the economic variable as agricultural value-added. This means that if the GDP increases in any country, the agricultural value-added decreases in % of GDP, or opposite to these conditions. If the GDP decreases the agricultural value-added of countries can mostly increase in % of GDP. If the agricultural value-added increases in % of GDP, because of increasing yields based on the more using water resources and increasing the investment and consumption of fixed capital, therefore, the other economic sectors provide fewer results, which can lead to a decreasing trend or less increasing trend of the GDP, because the other industrial sectors have less development trend.

3 The HDI does not have any considerable correlations with the total country area cultivated, because this last one is depending on the developed level of the mechanization, self-financial resources of farmers and the possible central governmental support for the innovation of farms in cases of 15 countries.

4 There are middle strong correlations between the total country area cultivated and the agricultural value added at the level of the selected countries. Adequate qualified agricultural lands are very few and scarcity in Kosovo, which also is resulted in a less favourable water supply and longer period drought, therefore, the total country area cultivated will be less and also agricultural value added will decrease.

5 There are strong correlations among innovation knowledge, educated level, and skills of farmers and using advanced irrigation systems in Kosovo. The population has strong

correlations with the changes of the GDP growth, personal remittances received fertilizer consumption, and arable land measure in the share of the land area within 5 neighbouring countries, Serbia, Kosovo, Albania, Bosnia-Herzegovina, North Macedonia. GDP growth increases the personal remittances received, fertilizer consumption increases, but the agriculture value-added in the share of GDP, employment in agriculture in the share of total employment, and the agricultural land in the share of land area decrease. The inflation increases by the increasing purchasing the agricultural machines, the mechanization process decreases the level of employment in the agricultural sector.

6. SUMMARY

The study focuses on the most important objectives, namely economic background for water management in several selected countries, mostly neighbouring countries including Kosovo in Balkans regions and other EU regions and other important countries out of the EU. The international comparison is needed for analysing the possible future trends for improving the technological development in the agricultural industry emphasizing water management.

The main aims of the research focusing on how water management can influence the production technology and production efficiency in countries researched in the study. The water issue and the water use are very important for the economic development and growth, for the agricultural industry and also drinking water consumption of the populations either in Europe or other continents. Therefore, the international cooperation should be established in order to solve the very sensitive water difficulty appearing at the worldwide side. No any country can withdraw itself from this very dangerous problem, therefore the international solution is needed.

Based on the scientific results, the agricultural production can be integrated into the wholly regional and rural development programs of the government relevant to the EU strategy in fields of similar policies. The support for farmers should focus on improving mechanization and production technology in agricultural production, mostly on the consumption of fixed capital, which is relevant to the agricultural policy of the European Union.

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