Czech University of Life Sciences Prague

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Bachelor Thesis

Agriculture of the Post-Soviet countries: Kazakhstan

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BACHELOR THESIS ASSIGNMENT

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Business Administration

Thesis title

Agriculture of the post-soviet countries: Kazakhstan

Objectives of thesis

The primary goal of the thesis is to analyze the rural sector of the economy of agrarian-oriented country of the former Soviet Union, assess the growth of economies, and identify factors that influence its growth or fall. To achieve the main goal, it is necessary to disclose sub-objectives.

Methodology

This thesis will be divided into three parts.

The first part is a theoretical one and will be based on literature search. It will define the current state of knowledge in the field of agriculture of Kazakhstan with the overlap to its history and development.

The second part will rely on the theoretical part and it is the key component of the thesis. The author will use method of quantitative research such as statistical and mathematical methods. The researcher will use secondary sources of information (FAOSTAT, CIS database, etc.).

The final part will conclude the results of the previous parts and discuss it with another author. The most important part will consist of partial conclusions outcome and finding

The proposed extent of the thesis

30 – 40 pages

Keywords

Agriculture, eocnomy, development, trade, plant production

Recommended information sources

Anderson, K. and Swinnen, J. 2008. Distortions to Agricultural Incentives in Europe's Transition Economies. Washington, DC : World Bank. https://openknowledge.worldbank.org/handle/10986/6502

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Declaration

I declare that I have worked on my bachelor thesis titled "Agriculture of the Post-Soviet countries: Kazakhstan" by myself and I have used only the sources mentioned at the end of the thesis. As the author of the bachelor thesis, I declare that the thesis does not break copyrights of any their person.

In Prague on _____

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Zemědělství post-sovětských zemí: Kazachstán

Souhrn

Hlavním úkolem bakalářské práce je ekonomická analýza agrární ekonomiky ve vlastní zemi ze seznamu zemí bývalého SSSR, bližší pohled na agrární ekonomiky, její ekonomický růst a popis faktorů, které ji ovlivňují. Tato práce se skládá ze tří hlavních částí. První část je teoretická; obsahuje zeměpisný a historický popis regionu, současný stav ekonomiky zemědělství v zemi. Druhá část je hlavní částí práce. Praktická část se bude opírat o teoretickou část, v této části bude proveden kvantitativní výzkum s matematickými a statistickými metodami. Třetí část je dokončením předchozích dvou dílů. Tato část bude zahrnovat nové nápady pro rozvoj a využití inovativních technologií v zemědělství země.

Klíčová slova: Zemědělství, Kazachstán, rozvoj, rostlinná výroba, ekonomika, obchod

Agriculture of the Post-Soviet countries: Kazakhstan

Summary

The main task of the thesis is a detailed examination of the agrarian economy of a country from the list of former Soviet countries, their economic growth and a description of the factors affecting it. The first part is theoretical; it contains the geographical and historical characteristics of the region, the current state of the agricultural economy. Research in the second part will be based on the theoretical part, in this part will be carried out quantitative research using mathematical and statistical methods. The last part is the conclusion of the two previous parts. This part will contain new ideas on the development and use of innovative technologies in the country's agriculture.

Keywords: Agriculture, Kazakhstan, development, trade, plant production, economy

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1 INTRODUCTION

Agriculture - the sector of the economy, due to objective factors, is very dependent on the weather, the area of land suitable for agriculture and other climatic and geographical variables. Agriculture has always been an essential part of the Soviet economy, despite the fact that he lost the foremost place in the industrial sector. After gaining independence, the countries of the commonwealth could not reach the heights in this sector of the economy for a long time. Over the years, they were part of a huge mechanism, and were not ready to develop their own economy. At present, the agriculture of the countries of the former union does not encounter the problems it faced in the first years of independence, new difficulties have replaced them. The subject of research is agriculture in one of the former Soviet state, in Kazakhstan. That country has significant agricultural potential. One of the foremost aims of the thesis is to describe the development of agriculture economy in the republic, its difficulties and opportunities.

2 OBJECTIVES AND METHODOLOGY

2.1 Objectives

The primary goal of the thesis is to analyze the rural sector of the economy of agrarian-oriented country of the former Soviet Union, assess the growth of economies, and identify factors that influence its growth or fall. To achieve the main goal, it is necessary to disclose sub-objectives of analysis such as:

1. Expand the history of the development of agriculture in the country after gaining independence. The economy of the USSR developed as a highly integrated complex where separate parts were closely linked, although the intra-union division of labor was not always justified from the point of view of developing productive forces. The breakthrough of the existing ties after the collapse of the Soviet Union was very painful, it is estimated that from one-third to one-half of the decline in the economy in the CIS member countries in 1992-1995 accounted for the consequences of the destruction of these ties.

2. To consider the features of the agricultural sector from the economic side and to characterize the processes of agricultural production, this assessment of the agricultural sector will be important for developing a potential strategy for the growth of the agrarian economy. These studies will help assess the situation in the industry, the definition priorities and goals of achievement in this field. The countries of the former union have reached different levels of economic growth, but united by a common history, are states that have passed the way from ruin to prosperity, with a difference in vision of prospects and opportunities, build a market economy and democratic states.

2.2 Methodology

This thesis consists three main parts. Theoretical part focus on factors that had impact on agriculture in the past, and factors which influence the current state of agriculture in Kazakhstan. This part represents literature review, search and summarization of available literature in a chosen topic.

Practical part is the most valuable part of the thesis, it relies on knowledge obtained in the previous theoretical part. The practical part of the thesis is devoted to the analysis of the impact of the agricultural sector on the national economy. As the agricultural sector, due to its nature, dependent on natural factors and a seasonal, cyclic type of production, is unable to participate equally in the market in inter-industry competition and yields a lower return on invested capital and the contribution to the gross domestic product of the country. To achieve this goal, data analysis methods such as dynamic analysis of the country's agricultural yields are used, and the analysis of export forecasts for the next three years is also carried out in practice. Also, at the end of the analysis the regression analysis is used to find the dependence between the gross domestic product and production of wheat, as the export of wheat is the most exported and currency-bringing agriculture product of Kazakhstan.

Growth rate

Growth rates refer to the percentage change of a specific variable within a certain period, given a determined context.

The percent change from one period to another is calculated from the formula:

$$PR = (V_{past} - V_{present}) * 100/V_{past} \ (6)$$

Where:

PR = Percent Rate

$V_{present}$ = Present or Future Value

V_{Past} = Past or Present Value

Linear Regression analysis and Hypothesis testing

This method is defined by Regression: Linear Models in Statistics (Bingham, Fry; 2013) as follows:

"Linear regression is a basic and commonly used type of predictive analysis. The overall idea of regression is to examine two things:

(1) does a set of predictor variables do a good job in predicting an outcome (dependent) variable?

(2) Which variables in particular are significant predictors of the outcome variable, and in what way do they–indicated by the magnitude and sign of the beta estimates–impact the outcome variable?"

These regression estimates are used to explain the relationship between one dependent variable and one or more independent variables. The simplest form of the regression equation with one dependent and one independent variable is defined by the next equation:

$$Y' = bX + a \quad (1)$$

Where,

Y' – predicted score

b – slope of the line

a – Y intercept

The statesment for hypothesis tests:

$$H_0: \beta_1 = \beta_{1,0} \quad (2)$$
$$H_1: \beta_1 \neq \beta_{1,0}$$

T- test used to implement hypothesis tests on the regression coefficients obtained in simple linear regression:

$$T_0 = \beta'_1 - \beta_{1,0} / SE(\beta'_1) \quad (3)$$

Where,

β'_1 – least square estimate of β_1

$SE(\beta'_1)$ – standard error

$$se(\hat{\beta}_1) = \sqrt{\frac{\frac{\sum_{i=1}^{n} e_i^2}{n-2}}{\sum_{i=1}^{n}(x_i - \bar{x})^2}} \quad (4)$$

Source: reliawiki.org

Forecast analysis

To make a prediction of the development of the country's economy forecast analysis, was also used. To create a forecast function (corporatefinanceinstitute.com; 2017) and to find next y-value, where y is predicted value of export or GDP, next equations were used:

$$y=a+bx \ (5)$$

Where:

a= ȳ -b x̄

and:

b= Σ (x- x̄)(y-ȳ)/ Σ(x-x̄)^2

where, **x** and **y** are the sample means (the averages), of the known **x** and the known **y** values.

Dynamic analysis

Under dynamic analysis is meant an analysis that links quantities concerning to different points of the theoretical time. Dynamic models are built to study cycles, predict, model alternative policies, and generally understand the structure of complex systems. For such analysis, mathematical, statistical and numerical methods are used

SAS Enterprise guide and Excel programs were used for the analysis in practical part

3 LITERATURE REVIEW

The theoretical part represents the geographical and economic description of the Kazakhstan. Then the theoretical part describes historical changes in Kazakhstan and influence of different periods of time on development of agriculture in a country. At the end of the part modern state of agricultural sector of economy and its issues are depicted.

3.1 Geographic description

Kazakhstan is in the center of the Eurasian continent (figure1) and in two parts of the world: the smallest part in Europe and the larger one in Asia. The country shares borders with Russia to the north, China to the east, Kyrgyzstan, Turkmenistan and Uzbekistan to the south and adjoins the Caspian Sea to the west. Kazakhstan is the second largest state after Russia in the former Soviet Union, area of the republic is 2724.9 thousand square kilometers.

Figure 1 - Map of Kazakhstan

Source: Central Asia Atlas of Natural Resources 2010; p.31

Geographically, Kazakhstan has always played a key role in trade relations connecting Europe and Asia. In the middle century, the great silk road passed through the Kazakh land, later with

emergence of Soviet power in Kazakhstan began to carryout railway links. (Laumulin and Lumulin,2009) The territory of Kazakhstan extends 3000 km from the Caspian lowland in the west to the Altai Mountains in the east and 1700 km from the West Siberian Plain in the north to the Kyzylkum desert and the Tien Shan mountain system in the south. The highest point in the country is Khan Tengri Shingi, the peak at 6398 m in Tien Shan. The lowest point is the bottom of the Karagiye depression, which is located in the southwestern region, and descends to 132 m below sea level. The longest river to pass through Kazakhstan is the Irtysh River, it has length 1700 km out of 4248 kilometers of the entire length. Two of the world's largest lakes are shared by Kazakhstan: The Caspian Sea (the world's largest lake) and the Aral Sea (the fourth largest in the world).

The population of Kazakhstan in 2017 is 18.4 million people. Kazakhstan is a polyethnic state, in addition to Kazakhs, reside Russians(23.7%), Ukrainians(2.1%), Uzbeks(2.9%), Tatars(1.3%), Uighurs(1.4%), Germans(1.1%) and representatives of other nationalities (4.4%). Kazakhstan is divided into five regions (northern, western, central, eastern and southern), which number 87 towns and cities. The capital city is Astana. The country has abundant natural resources, natural minerals are represented almost all elements of the periodic table. Among the countries of the former Soviet Union, Kazakhstan accounts for 90% of the total chromite reserves, 60% of tungsten, 50% of lead, 40% of zinc and copper, 30% of bauxite, 25% phosphorites, 15% of iron ore, more than 10% of coal Significant reserves of oil and gas are concentrated in the western region of the country. It also has a large agricultural sector featuring livestock and grain. Major part of country is occupied by plains that give more opportunities for the development of human economic activity. (Lewis, 1992; cia.gov,2017)

3.1 Land use

The Kazakh steppes always been used as habitation for Nomadic people and for feeding their livestock. With the advent of the Tsarist government in Kazakhstan, a resettlement policy has been pursued to eliminate the ethnic population and use of lands as raw materials source. (Tasilova,2016) The administrative and territorial system of the country includes 14 regions, 2 cities of republican significance, 161 administrative districts, 209 cities of regional significance and settlements, and 6.6 thousand rural settlements. According to 2016 the land fund of Kazakhstan in conformity with its intended purpose is divided as follows(table1):

39.3% of the total area is allocated for agricultural land; 9.1% of the whole area is occupied by the land of settlements; other non-agricultural land (industrial land, transport, etc.) is allocated 1.1% of the total area; lands of specially-protected territories (lands of recreational, historical and cultural significance) - 2.6%; 8.8% and 1.6% were allocated to the lands of forest and water resources; the remaining 37.5% (figure 2) are reserve lands. (mgov.kz, 2017)

Figure 2 - Percentage of main use of lands
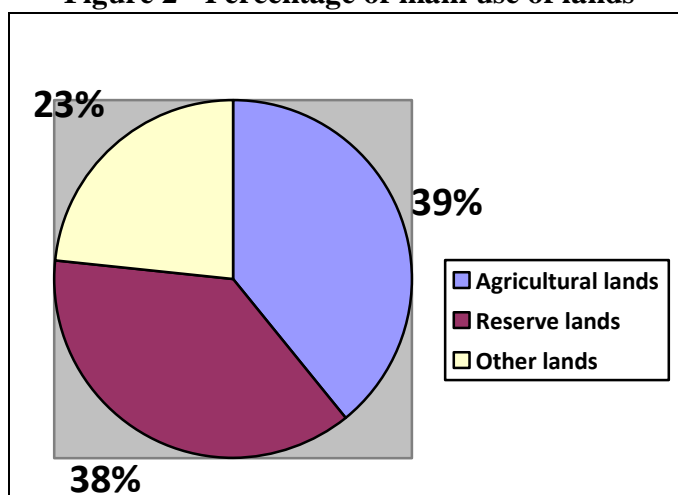
Source: Own elaboration based on data from mgov.kz (2017)

In 1991 Supreme Court of the Kzakh SSR took a course went for denationalization and privatization of state property in the republic. Under these definitions law meant the act of transfer of state property to the responsibility for individuals and non-state lawful entities. Initially, the law adopted in the same 1991, meant only the leasing of state-owned enterprises to labor collectives with subsequent redemption, but later the law on privatization was amended, abolishing the transfer of pablic facilities for temporary use, and the right to purchase property by individualsor private legal entities, including foreign (Amagel'diyev;2001).

In 1992 Kazakstan's economy started to change with regards to a deep crisis emergency related with the infringement of the structure of ware cash relations, low competitiveness, lack of strategies of monetary and custom polycies. At the stage of initiative privatization, 4,770 objects including territories related to that objects and 470 state farms were withdrawn from state ownership. The privatization of of state farms involved the method of personification of property shares to each employee.

Tools such as auctions, competition, and corporatization were used as forms of denationalization and privatization. As well as previously mentioed tools, voucher privatization program was designed for transfer of state-owned objects to individuals,

Kazakhstan' citizens received non-transferable individualized coupons which could be used for contribution to the investmentprivatization funds. (Lorch and Karlova;1997)

Table 1- Dynamics of land use for 1991-2016

Name of land categories, million hectares	1991	2016	Changes +/- (from 2016 to 1991)
Agricultural lands	218.4	102.6	-115.8
Lands of settlements	3.7	23.7	+20
Lands for non-agricultural purposes	18.8	2.9	-15.9
Specially preserved natural territories	0.7	6.7	+6
Lands for the forest fund	10.8	22.9	+12.1
Lands for the water fund	0.8	4.1	+3.3
Reserve lands	18.9	98.4	+79.5
Total	272.1	261.3	-10.8
Lands used in territory of other states	1.4	0.9	-0.5
Lands used by other states	9.9	11.3	+1.4
Total territory of the state	283.4	273.5	-9.9

Source: Own elaboration, based on data from the World Bank, FAO and knoema.com

3.2 Soviet Period in Kazakhstan

The Soviet Union for the period of its existence was the largest country in the world, and it included fifteen republics: Armenia, Azerbaijan, Belorussia (now Belarus), Estonia, Georgia, Kazakhstan, Kirgiziya (now Kyrgyzstan), Latvia, Lithuania, Moldavia (now Moldova), Russia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan, and more than 100 nationalities. (britannica.com; online 2017)

The 20th century for Kazakhstan was marked by liberation from the tsarist regime. In February 1917, after the victory of revolutionaries in large cities and railway stations, workers rallied in support of the overthrow of the tsarist power. After the mass rallies, the provisional government began to form throughout the country. December 1, 1917 at a meeting of the Bolsheviks in the Khan's rate (Orda) was decided to disperse the counter-revolutionary Central Committee of the Bukey Orde and the establishment of Soviet power. For the Kazakh people, this era was a period of transition to socialism and communism, bypassing the capitalist stage of development. (Spulber, 2003, pp. 153-284) With the victory of Soviet power in front of Kazakhstan, as well as in front of other regions of the former Russian empire became the main task of switching from semi-nomadic farming to tilled farming and a developed industry.

The political system was authoritarian and centralized, which also was related to the economic system. The main of the Soviet government was accelerate industrialization, the only profitable source of the country was the agricultural sector of the economy, so in the late 1920's was taken on the course of collectivization- creation of collective farms. Rural peasants were forced to join collective farms. Those that owned land or livestock were devoid of their holdings. Hundreds of thousands of higher-income farmers, called kulaks, were rounded up and executed, their property confiscated. Amid a mess and resistance to collectivization in the countryside, agricultural productivity dropped. The sown area reached 3 million hectares by 1925, the gross grain harvest doubled. Rich natural resources provided for the establishment of a large industrial base here, but the labor force had to be moved here from central regions of Russia and Ukraine. Kazakhs, as nomadic people and pastoralists, did not fit into the future system of Kazakhs, as nomadic people and pastoralists, did not fit into the future system of «socialist Kazakhstan», therefore, with the consent of the country's leadership, the method of large-scale genocide was chosen- "the Kazakh Holodomor". As a result, during the 1931-33 years, about 2 million Kazakhs and 200-500 thousand of people of other nationalities died. Several hundred thousand Kazakhs migrated to China, Mongolia, Iraq and Afghanistan. The number of ethnic groups halved. Animal husbandry suffered huge losses, from 1928 to 1932 the number of cattle decreased from 6,5 million to 965 thousand heads; sheep- from 18,5 million to 1,4 million heads; horses- from 3,6 million to 416 heads; camels- from 1 million to 63 thousand heads. Despite the catastrophic consequences of collectivization, it created the necessary conditions for the industrialization of the country. The result of collectivization was the centralization of all internal sources, acceleration of the growth rates of heavy industry. (BBC, 2012; Conquest;1986)

After Stalin's death in 1953, Nikita Khrushchev came to power. Khrushchev's tenure covered the tensest years of the Cold War. During the years of his rule, Nikita Khrushchev conducted a series of reforms that made Soviet society less repressive. As a developed industrial country, by the 1970's the Soviet Union was finding it increasingly difficult to maintain the high growth rates in the industrial sector that it had enjoyed in previous years(figure3). (Davies,2004)

Figure 3 - Employment in the Economy's Sector in 1928-87 years

NATIONAL ECONOMY AND ITS SECTOR	1928 IN MLN.	1940 IN MLN.	1987 IN MLN.	1928 IN %	1940 IN %	1987 IN%
TOTAL NATIONAL ECONOMY	63.7	62.9	130.8	100.0	100.0	100.0
INDUSTRY	4.3	13.1	38.1	6.8	20.8	29.1
AGRICULTURE AND FORESTRY	54.6	32.0	24.6	85.7	50.9	18.8
TRANSPORT & COMMUNICATION	1.4	4.0	12.0	2.2	6.4	9.2
CONSTRUCTION	0.8	2.0	12.0	0.9	5.6	9.2
TRADE&RELATED ACTIVITIES	0.6	3.5	12.0	0.9	5.6	9.2
MUNICIPAL ECONOMY	0.1	1.5	5.0	0.2	2.4	3.8
HEALTH,EDUCATION,CULTURE	1.2	5.0	24.5	1.9	7.9	18.7
STATE APPARATUS	0.7	1.8	2.6	1.1	2.8	2.0

Source: Spulber; 2003 p.161

For growth, more and more large investments and labor resources were required, but these receipts became more difficult to obtain. Agricultural development continued to lag in the Brezhnev years. Despite steadily higher investments in agriculture, growth under Brezhnev fell below that attained under Khrushchev. Droughts occurring intermittently throughout the 1970's forced the Soviet Union to import large quantities of grain from Western countries, including the United States. In the 1970's and 1980's, interethnic conflicts began to emerge in different corners of the union, such as the December events of 1986 in Kazakhstan, the riots in 1972 in Kaunas, the mass demonstrations of 1978 in Georgia, the events of 1980 in Minsk. These events did not constitute a significant obstacle in the work a huge mechanism, but already were a signal to the rapid disintegration of a great country. The collapse of the USSR took place against the background of a purposefully created general economic, foreign policy and demographic crisis. In 1989, for the first time officially announced the beginning of the economic crisis in the USSR, economic growth was replaced by a fall. (Satter,1996)

3.2.1 The development of virgin and fallow lands

It is worth noting such an event as the development of virgin and fallow lands in Kazakhstan held in the fifties. From 1954 to 1955, 18 million hectares of land were raised in Kazakhstan. In huge quantities, agricultural machinery, machinery and equipment were transported to the republic; the local enterprises for the production of spare parts also rose. The communication network of Kazakhstan has also improved; house building was going on at a fast pace, new buildings were being built quickly; whole cities appeared almost in the bare steppe. (Siegelbaum, 2012) Agriculture in 1953 - 1958 grew with a giant speed: the sown areas expanded from 9.7 to 28.7 million hectares, the gross grain harvest from 332 million to 1 343 million poods. In March 1954 arrived in Kazakhstan is 250 thousand young Komsomol members, as well as 23 thousand people from the ranks of former Soviet Army soldiers. (BBC, 2018)

3.2.2 Agriculture in the 70-80s

Despite large investments, the 70's-80's were a period of crisis for the agriculture of not only the republic, but the whole country, it is enough to cite the fact that in the period from 1981 to 1985 there was virtually no growth in gross agricultural output. With huge crop areas, more than 25 million hectares were sown. In livestock production, with the exception of poultry, was unprofitable. Whereas in 1970 the share of unprofitable state farms and collective farms was 15%, in 1985 it was 51%. At the beginning of the 1980s, the country's agriculture was in a state of crisis, by the mid-1980s, a standardized supply of several foods had been introduced almost universally. (Dyker, 1991)

3.3 Independent Kazakhstan

December 16, 1991 was adopted the constitutional law "on state independence of the Republic of Kazakhstan", and came into force on the same day. After the collapse of the USSR, Kazakhstan, like other CIS countries, tried to experiment with the policy of shock therapy, for many years the country was the main supplier of natural resources for manufacturing enterprises and did not have such enterprises inside the country, the conduct of such a policy affected negatively. (Hays, 2008)

3.3.1 Economic Changes after gaining independence

During the period of sovereignty, the development of Kazakhstan is characterized by large-scale and radical changes in the socio-economic country. The progress of Kazakhstan's economy can be divided into several stages. The first stage in the period from 1992 to 1997 was marked by a series of reforms aimed at stabilizing the financial sector of the state, the exchange rate of the national currency, stability and liquidity of the banking system and others. Despite the results achieved, the first stage of reforms in the economic sphere was ambiguous, and no tangible results were attained. Kazakhstan had to go through a number of crises, crisis of economic growth and inflationary crisis, payment crisis, investment crisis. (Vakulchuk, 2014)

At the second stage, from 1999 to 2006, the strategy "Kazakhstan 2030" was adopted. The adopted policy was aimed at ensuring the economic security of the country through the effective use of the already existing fuel and energy base, the creation of a new modern transport and telecommunications infrastructure, the modernization and creation of new manufactures in the manufacturing industry, the creation of a favorable investment environment with the aim of attracting foreign investors to various sectors of the economy, development of foreign trade policy and integration processes in order to gain a place in the world howl trade. At the second stage, the state's policy to improve the structure of the economy, diversify and ensure its competitiveness, coupled with a favorable investment climate and increasing demand for raw materials, provided a high rate of growth of the economy of Kazakhstan. The average annual growth rate of Kazakhstan's GDP in this period has exceeded 10 %. The dynamic development of the economy of Kazakhstan during the years of independence has allowed improving the quality of life of the population.

Figure 4 represents the rise and fall of GDP per capita in the range of 1993-2016 years. GDP per capita in Kazakhstan since 1993, has a stable growth trend, while in 1993 this figure was 696.2 U.S. dollars, in 2013 the growth of GDP reached its peak, this mark was achieved due to the following factors: significant progress in the manufacturing sector, the growth of gross crop production from 2011, due to a record grain harvest of 26.9 million tones over the years of independence, wholesale and retail trade, information and communication and provision of other services, which can also be explained by large government expenditures of the state into

the financial sphere and further development and support of small and medium businesses. (cia.gov, 2017; Hays, 2008; Shinkeyeva,2016. Almaty)

Figure 4 – GDP per capita of Kazakhstan (USD)
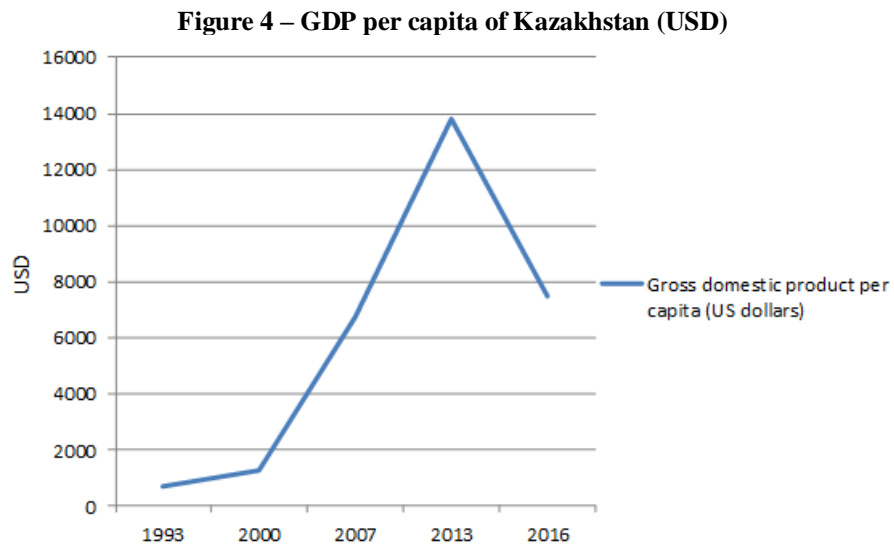
Source: Own elaboration, based on data from cia.giv 2017

3.4 Agriculture

The following chapter describes the natural conditions (climate, soil and water), the current state of agriculture, describes the most developed sectors of agriculture and crops grown in the territory of the Republic, as well as the topic of environmental problems of agriculture.

3.4.1 Agricultural development

Agriculture in Kazakhstan is the sphere of vital activity of the main part of the population. To date, 43.1% of the population lives in rural areas, and the degree of development of agricultural production largely depends not only on the standard of living, but also the welfare of most citizens of Kazakhstan. At the end of 2016, the number of employees in the crop sector and livestock, hunting and provision of services in these areas is more than 83.1 thousand people. The share of agriculture in the agro-industrial complex of the country is 50 %. During the years of independence in the agricultural sector there have been significant changes, now most of the land is transferred to private owners, the industry operates quite

large number of small businesses – 94.7% or 6.885 of the total number of enterprises. (Statistics, 2017)

Crop and livestock production in the Republic include two main types of activities: production of crops and products of animal origin, also including forms of basic agriculture, cultivation of cultivated crops and crossed breeds of cattle, catching of animals and birds and hunting. Cultivation of crops is made as in the open fields and in greenhouses.

To date, due to the rapid growth of the mining and service industries, the share of agriculture has fallen to less than 5% of GDP. While agriculture experienced the most prolonged decline among all sectors after the crisis of 90s. In the future, the agricultural sector also will be lagged behind in growth. Against the backdrop of a significant reduction in the economic importance of the agricultural sector, there has been little change in the allocation of human resources. Due to the minimal change in the dynamics of urbanization, which fluctuates at the level below 60%, the rural population continues to be a significant source of labor resources, which also holds back the growth of productivity in agriculture. The activity of households is most likely seen as a form of self-employment, and as a source of additional income primarily in-kind form. For example, the slaughter weight of cattle livestock in households 20% lower than the same indicator of agricultural enterprises, egg production is lower by 80%, milk yield is less than twice. This explains the low performance of agriculture in General. While households have no incentive (producing mainly for own consumption), no possibility (there are no agricultural machinery, finance) to improve productivity. (Sutton, 2008; Finkelshtain, 2009)

3.5 NATURAL CONDITIONS

3.5.1 Climate

The territory of Kazakhstan is characterized by a dry and sharply continental climate, due to a wide range of elevations in the country there are large fluctuations in temperature and precipitation. The average annual air temperature in the whole low-lying part of the Republic is positive. In the North, the temperature is + 0.4° C, in the extreme South reaches + 13.7° C. in high-altitude areas with a rise up the average temperature drops. The coldest month in Kazakhstan is January. Its average temperature in the North (Petropavlovsk) – 18.7° C, in the South-1.5° C. Sometimes in the North of the Republic frosts reach-54 ° C, and in the South the temperature rarely falls below-30° C. According to World Bank gathering of developed

indicators, average precipitation in depth (mm per year) in Kazakhstan was reported at 250 mm in 2015. The annual distribution of atmospheric precipitation in the territory of Kazakhstan is uneven and according to the seasons of the year. In the northern part of 70-80% of annual precipitation falls on the warm season, most of them in July. In the southern desert zone and at the foot of the mountains in the east and southeast, a minimum of summer precipitation is observed. (climate-data.org, 2018)

The climate has a great impact on the development of agriculture. The climate of Kazakhstan is characterized by aridity. It is especially hot in summer in the south. The sand surface sometimes heats up to 60 - 70 ° C. The formation of dry wind is associated with the predominance of strongly warm dry tropical air masses. The dangerous atmospheric phenomena also include ice, mainly ice is formed in: in the steppe zone - 5-10 days a year, semi-desert zone-40, in the desert zone-100 days. Kazakhstan is also characterized by such a natural phenomenon as dust storms. With this phenomenon, the grain of soil is blown out exposing the roots of plants, thus causing a significant damage to agriculture. The Northern and Central regions of the country are characterized by frost, usually observed in late spring, early autumn, in the North sometimes in the summer as a result of the invasion of Arctic air masses. In winter, the air temperature drops sharply below zero, which leads to freezing of the upper layers of the soil. Frosts cause great harm to crop and fruit trees. To prevent the negative impact of these natural phenomena on agriculture, such agrotechnical measures as snow retention, plantation, irrigation, etc. are carried out. (The world bank group, 2016)

3.5.2 Soil

Kazakhstan for the most part has fertile land, in the South of the country is widespread chestnut-colored soil, in the North is dominated by black soil and in desert regions is a mixture of red-brown, grey-brown and sandy soils. The Central Asian steppe doesn't receive very much rain. The soil is dry and dusty. For the most part the steppe and desert are not suitable for agriculture unless expensively irrigated. Much of the steppe lies on humus-rich black soul that is ideal for growing grains such as wheat, rye and barley (which are kinds of grass). Chernozem - black earth is common in northernmost parts of the country, and includes Kostanay province, and the northern parts of Akmolinsk, Pavlodar, Aktubinsk, West-Kazakhstan provinces. This area covers 25.5 million hectares, or 9.5 percent of the country.

The black earth areas are situated mostly on good watered steppe plains and are the main wheat-growing regions of the country.

The black earth is divided into three sub-types:

1)Leach black earth in the forest-steppe area; almost black and obtain large amounts of humus (6-8%)

2) normal black earth; also obtain huge amount of humus (6-8%)

3) southern black earth that is typical for steppe area, has a lower percentage of humus (4 - 6%).

Chestnut-colored soils occupy the big part of central Kazakhstan, the north Caspian lowlands and the East-Kazakhstan province plains. These soils are natural for mostly in dry-steppe and semi-desert regions. They occupy 90.6 million hectares, or 34% of the country.

The chestnut soils in Kazakhstan are divided into 3 sub-zones:

1) the dark-chestnut-colored soils of the dry steppes and 2) the chestnut-colored soils of dry steppes both of that type of soil contain 4,5-3,0% of humus

3) the light-chestnut-colored soils of semi-desert zones have a low content of humus - 3-2%.

Dark chestnut and chestnut soils of the dry steppe are suitable for rain-fed (i.e. non-irrigated) agriculture and animal husbandry, and light chestnut soils of the semi-desert are mainly used as pastures.

Brown and gray-brown soils are located to the South of chestnut and cover the southern part of Kazakhstan. They occupy 120 million hectares, or 44% of the territory of the Republic. Humus content in these soils is 2.0-1.0%. In General, it is a livestock area, agriculture is possible only with irrigation. (Hays, 2008); (IUSS, 2015)

Figure 5 - Map of soils in Kazakhstan
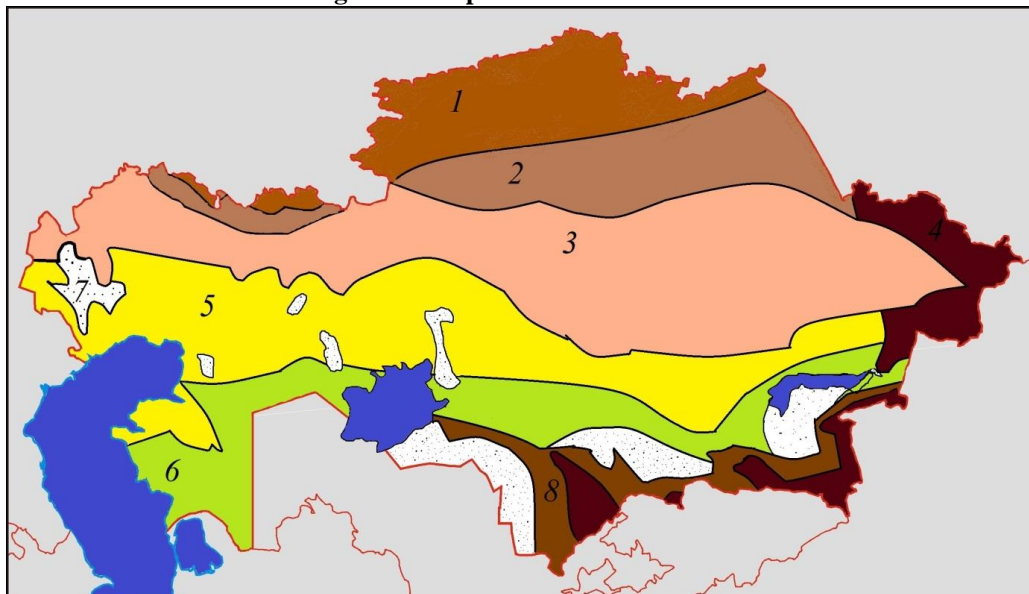
Source: Own elaboration based on FAO stat data

The map (figure 5) shows the distribution of soils by region:

1. Chernozem (black earth soil) – North and part of West Kazakhstan

2. Dark-chestnut soils – East Kazakhstan and small part of West region of the Republic

3. Chestnut soils – Central Kazakhstan and part of West region of Kazakhstan

4. Mountain soils (granite, semi-hard clay) – South and part of Eastern Kazakhstan

5. Light-chestnut soils – Main part of Central Kazakhstan, the North of the Caspian lowland, and the plains of the East Kazakhstan region.

6. Grey-brown, brown desert soils – South and part of West region of Kazakhstan

7. Sands – Partly in Eastern, Southern and Central regions of country

8. Sierozem – Southern part of Kazakhstan

3.5.3 Soil degradation

The technological backwardness of industry and agriculture, extensive use of natural resources has led to significant degradation of soils in Kazakhstan. The problem of soil degradation is particularly acute in Northern Kazakhstan – the zone of grain farming. During the period of long-term plowing of virgin lands humus content decreased by 5-20% or more. Of the 4.3 billion tons of humus reserves of the arable layer, 0-25 cm was irretrievably lost due to mineralization of organic matter, removal from the crop, with water and wind erosion of 1.2 billion tons or 28.3 %. At the same time, soil fertility is reduced due to deterioration of its agrophysical properties, mainly due to soil compaction machines.

In the Northern regions of the country 17.8 million hectares are potentially subject to deflation and 2.6 million hectares suffer from severe wind erosion. According to the latest inventory of irrigated lands, half of them need reclamation improvement or restoration of fertility. In industrial areas, the tense environmental situation is due to pollution of the environment with toxic waste. In the Caspian oil producing region, more than 4.3 million hectares of disturbed land, including 1.5 million hectares of man - made zones, 1.9 - degraded pastures, 0.6-contaminated with petroleum products and 0.3 million hectares of land with radioactive contamination. On the territory of the former Semipalatinsk nuclear test site about 2 million hectares of agricultural land were exposed to radioactive contamination. In Kazakhstan, soil pollution is observed in all industrial regions. In General, in rain-fed areas and irrigation areas, a large proportion of land is depleted, degraded, saline or polluted by toxic waste. More than half of the country's lands are subject to desertification processes of varying intensity. (OECD, 2013; Issanova & Abuduwaili, 2017)

3.5.4 Water

In 2014, agricultural water withdrawal as a share of internal resources for Kazakhstan was 66.23 %. Agricultural water withdrawal as a share of internal resources of Kazakhstan fell gradually from 81.41 % in 1997 to 66.23 % in 2014. Until the mid-1980s, the water withdrawal increased regularly. Over the past two decades, seizures have declined slightly in the agricultural sector, mainly as a result of the introduction of water conservation techniques, as well as in industry, as a result of the sector's decline since independence.

Kazakhstan is not a country which rich in fresh water, most of the land is arid. The Republic has some internal water resources, even though most of the reserves come from neighboring

countries. Kazakhstan has 8,500 small and large rivers, 48,000 lakes and a number of freshwater and salty steppe lakes. However, poor water management keeps the country from using its natural resources, ground waters are used mainly for domestic and utility purposes and comprise an insignificant part of the total volume of water consumption; only 3-5% of the total volume. Water resources are also replenished due to precipitation, snow provides part of the country's resources, but only at certain times of the year with enough snowy winters. Rivers in plains of the country are fed by melted snow in the spring, with a large discharge occurs during April-may. In summer, rain does not play a significant role in the supply of rivers. In the mountains, the largest discharge occurs in the summer months of June and July, when snow melts from the mountains and glaciers filling the river. (Takenov, 2004); (FAOSTAT, 2011)

4 PRACTICAL PART

Agriculture always played an important role in an economy development in general, in Kazakhstan's economy agriculture sector plays key role but diminishing one. Since 2010, the share of agriculture in the economy does not exceed 5%, which is below 6.4% in 2005 and 8.2% in 2000. Figure 6 below shows the decline in the role of agriculture in the economy. The agriculture sector contributes a third of 1% of GDP growth in 2016.

Figure 6 - Share of agriculture in GDP %
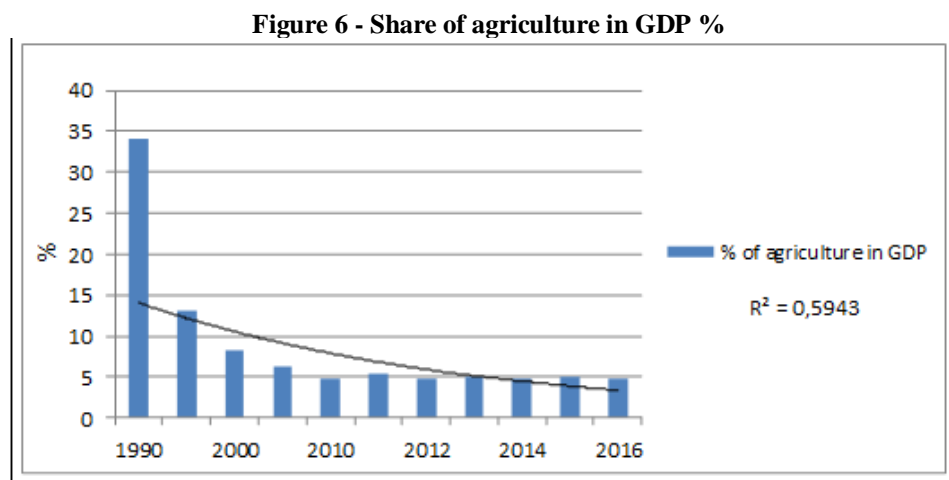
Source: Own elaboration, based on data from unece.org; 2017

4.1 Factors influencing agricultural production

4.1.1 Fertilizers

Long – term agricultural use of soils leads to a decrease in humus content, affecting the basis of soil fertility-organic matter. Plowing and long-term agricultural use of fertile soils is accompanied by a significant decrease in humus reserves, the total loss of this substance since the development of virgin lands amounted to 1.2 billion tons of organic matter. The agricultural business of the agricultural sector is one of the main consumers of chemical products. To ensure sown areas of agricultural crops of the country annually requires about 2.6 million tons of mineral fertilizers in physical weight (including: nitrogen – 1.3 million tons, phosphate – 1.2 million tons and potash – 0.03 million tons). Nevertheless, about 200-270 thousand tons of mineral fertilizers in physical weight or 8-11% of demand are introduced annually, which negatively affects soil fertility and productivity of fields. (FAOSTAT, 2016) All the main types of soils of Northern Kazakhstan are characterized by

low phosphorus content, the deficiency of which has a particularly negative impact on the development of plants and the subsequent formation of a crop with reduced moisture content in the sowing horizon. This is especially true in the cultivation of grain crops using traditional technology. In the period from 2000 to 2016(figure 6), the growth of mineral fertilization increased significantly. In 2000, the total amount of mineral fertilizers was 46.1 thousand tons, in 2016, the total amount of mineral fertilizers amounted to 402.76 thousand tons, at the same time there was a decline in organic fertilizers. As seen in figure 8, over the years, the consumption of mineral fertilizers increases, while the usage of organic fertilizers decreases, due to the high content of nutrients in mineral fertilizers.

Figure 7 - Annual usage of fertilizers
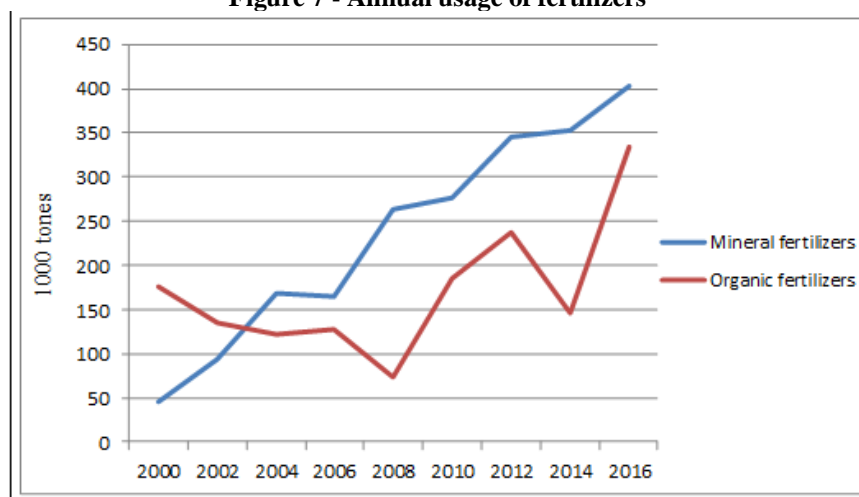
Source: Own elaboration, based on data from the World Bank, 2017.

4.1.2 Pesticides

Many harmful organisms causing damage to agricultural production are spread on the territory of Kazakhstan. In various regions, crops are affected by about 50 species of multi-row pests and over 100 species of specialized pests, more than 70 types of diseases and 300 species of weeds. Some of them (locusts, gray grain scoop, bug-bug, Hessian fly, grain beetle, bollworm and spider mites, Colorado potato beetle, squirrels and rodents, rust and Septoria disease of cereals) are particularly dangerous, capable of periodic mass reproduction and distribution, cause economic, environmental harm. The spread of particularly dangerous harmful organisms with populations above the economic threshold every year leads to the loss of 10-15% of the harvest of agricultural crops. Main exporters of pesticides on the

Kazakhstan's market are China, Russia and Germany. Demand of foreign pesticides on the market declined a lot since 2010 due to growth of pesticides industry in Kazakhstan. (OECD,2014)

**Figure 8 – Annual usage of pesticides**
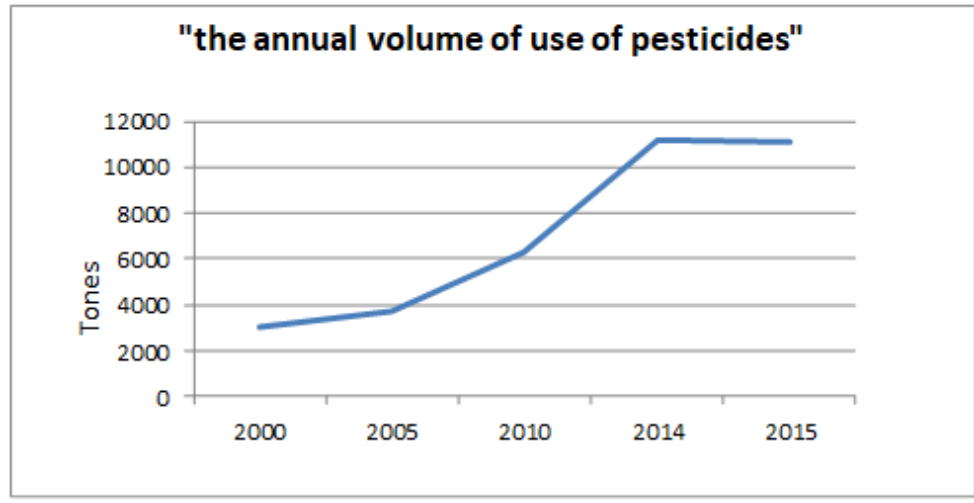
Source: Own elaboration, based on data from FAO, 2017

Annually, about 7-9 million dollars is allocated from the national budget for plant protection, due to which the fight against particularly dangerous pests of agricultural crops, as well as quarantine objects on an area of 3.5-5 million hectares is carried out with annual usage of pesticides in average point of 11 thousand tones since 2013(figure 7). For carrying out phytosanitary measures' pesticides of different phytosanitary function — insecticides, fungicides, herbicides, seed protectants and other disinfectants are used. (FAO, 2017)

4.1.3 Machinery

Provision of agricultural machinery is one of the main challenges to the sustainable development and competitiveness of the country's agriculture. Kazakhstan has a small local production of agricultural machinery and equipment. As of 2016, the sector of agricultural machinery and equipment of the country was estimated at $ 500 million, of which $ 300 million was imported. The leader among the importing countries of agricultural machinery and equipment is Russia with a market share of 40%, other major suppliers are Germany, Sweden, Netherlands, Belarus and China (figure 8).

Figure 9 – Major exporters of agricultural equipment
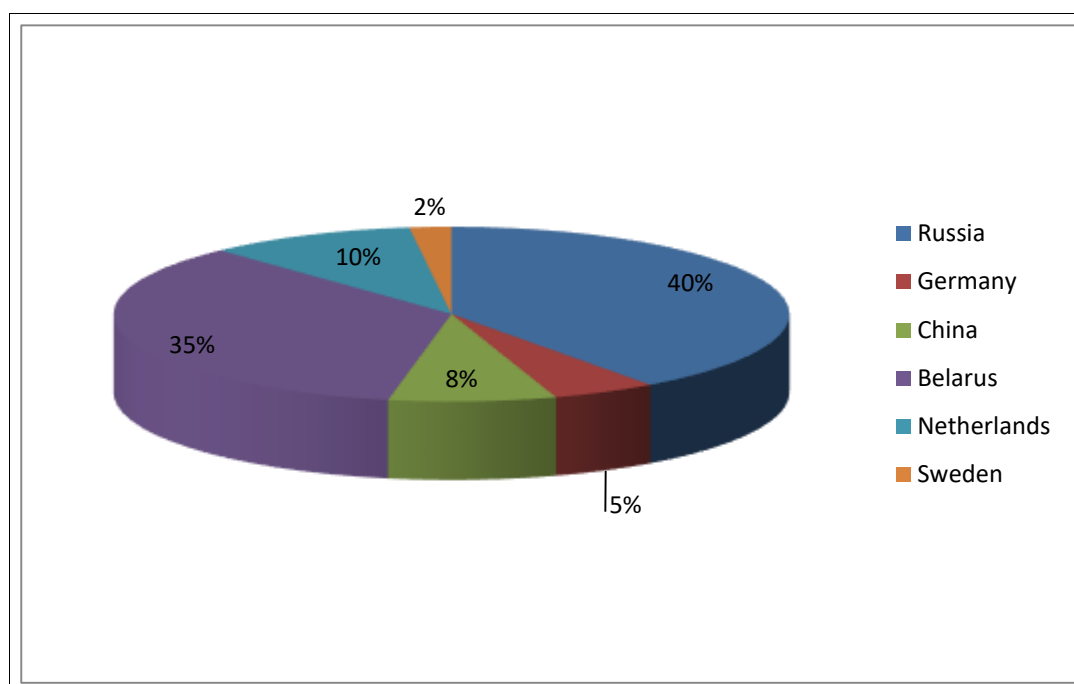
Source: Own elaboration, based on data from stat.gov.kz, 2016

Enterprises for production of combine harvesters in Kazakhstan placed in 3 areas: Kostanay, Kokchetau and North Kazakhstan regions. Stable production can be observed in Kostanay region, which accounts for 80% of the total production of combines in Kazakhstan. In the other two areas, the production of combines does not have a stable level and depends on the volatility of demand. About 80 percent of the agricultural equipment currently in use is obsolete and needs to be replaced (figure 8). Tractors used for more than 10 years make up 94% of the total Park, while harvesters in the same condition make up 77%.

Figure 10 - Availability of agricultural machinery in the agricultural enterprises
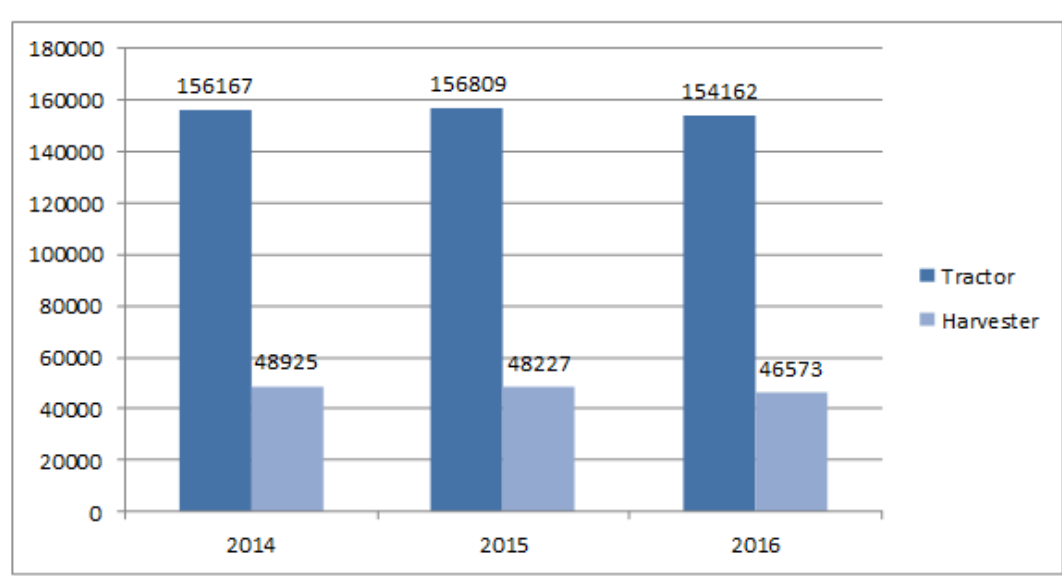
4.2 Crop production

Over the past 10 years, the total cultivated area of crops has a constant trend of about 22 million hectares. By the end of 2016 to the revised sown area amounted to 21 thousand hectares. 660,6 the most part still makes up the grain crops, despite the fact that since 2010, the government aims to reduce these crops, an average of 2.4%, in compliance with the policy of diversification of crop production aimed at avoiding the monoculture of wheat and the expansion of alternative crops (forage, oilseeds, cereals and melons). Climatic conditions in the Republic are favorable for crop production, so in the North of the country grow spring wheat, oats, barley and other crops, at the same time, it should be noted that most of the territory of Kazakhstan is in the zone of risky agriculture, there is degradation and soil erosion. More than 80% of agricultural land falls on pastures, about 12% is arable land, the rest is represented by hayfields and other lands. For the production of grain Kazakhstan takes the third place in CIS countries after Russia and Ukraine. The climatic conditions of the country also allow developing vegetable farming, melon growing, to cultivate such technical crops as sunflower, flax, tobacco, etc. In the South of the country give high yields of cotton, sugar beet, yellow tobacco, rice, orchards and vineyards.

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4.2.1 Dynamics of indicators of productivity of basic crops

In general, the gross production output of crop production in farms of all categories over the years under review has a stable trend and an increase. As table 2 shows, since 1990's the gross harvest of most of the crops presented in the table has increased significantly, except for the cultivation of sugar beet (production decreased). Since 2010, there has been a decline in the production of grain crops and the growth of oil and melon crops, due to the departure from the monoculture of wheat and the expansion of alternative crops. Every year oil crops become more priority among Kazakhstan's agricultural producers.

Table 2 – Gross harvest of main crops (thousand tones)

	1990	1995	2000	2005	2010	2011	2012	2013	2014	2015	2016
CEREALS AND LEGUMES	28487,7	9505,5	11565	13781,4	12185,2	26960,5	12864,8	18231	17162,2	18672,8	20634,4
OIL CROPS	229.8	162	140.1	439.7	775.4	1141.9	976.8	1498	1574.6	1574.5	1902.4
POTATO	2324.3	1719.7	1692.6	2520.8	2554.6	3076.1	3126.4	3343.6	3410.5	3521	3545.7
VEGETABLES	1136.4	779.7	1543.6	2168.7	2576.9	2877.7	3061.5	3241.5	3469.9	3564.9	3795.2
MELON FIELDS	301.5	162.3	421.6	683.8	1118.2	1248	1649.9	1713	1928	2087.6	2070.9
SUGAR BEET	1043.7	371	272.7	310.8	152	200.4	151.6	64.6	23.9	174.1	345

Source: Own elaboration, based on data from FAO 2017, stat.gov.kz 2017

The record crop was harvested in 2011 – 26960.5, comparable to the yield obtained in 1992 – 28487.7 thousand tons. The lowest yields were recorded between 1993 and 1995 because of the economic downturn. The period of introduction of the national currency in Kazakhstan was characterized by a collapse in production and galloping inflation, which adversely affected the overall yield of crops (figure 11).

Figure 11 - Gross harvest of main crops (thousand tones)
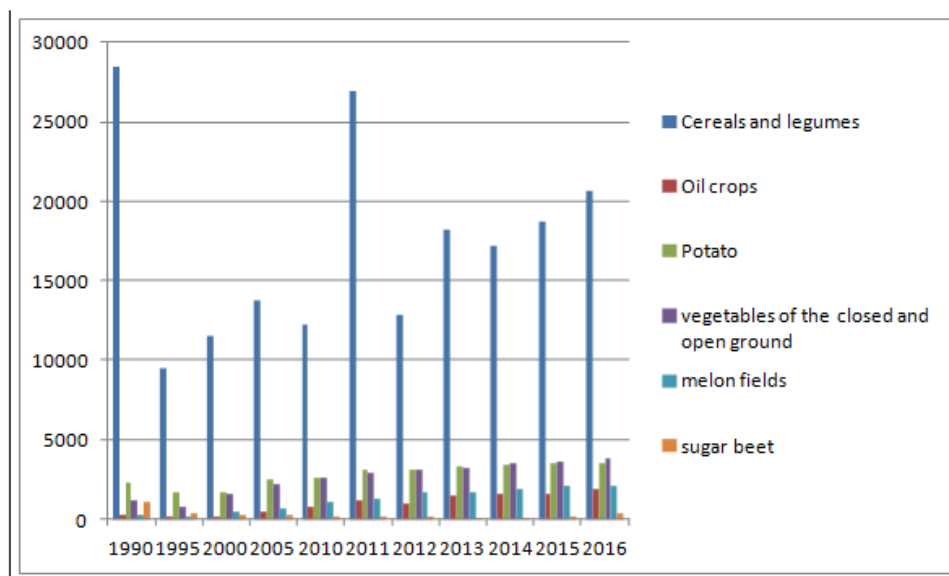
The share of agriculture in Kazakhstan's GDP in the period 2010-2015 changes barely and was about 7%, the share of agriculture in total exports was fairly stable and averaged 17.4% in the period 2010-2014. The growth of the gross output of the product observed in 2013 due to the share of agricultural production in the GDP of Kazakhstan was 5%, the indicator of labor productivity in the agricultural sector in the period from 2005 to 2012 increased from 304.2 thousand tons per employee to 498 thousand tons. In 2015 there was a significant increase in the share of agriculture in GDP, through a sharp decrease in exports in nominal terms due to the depreciation of the national currency (figure 12).

Figure 12 - The annual gross output of agricultural products
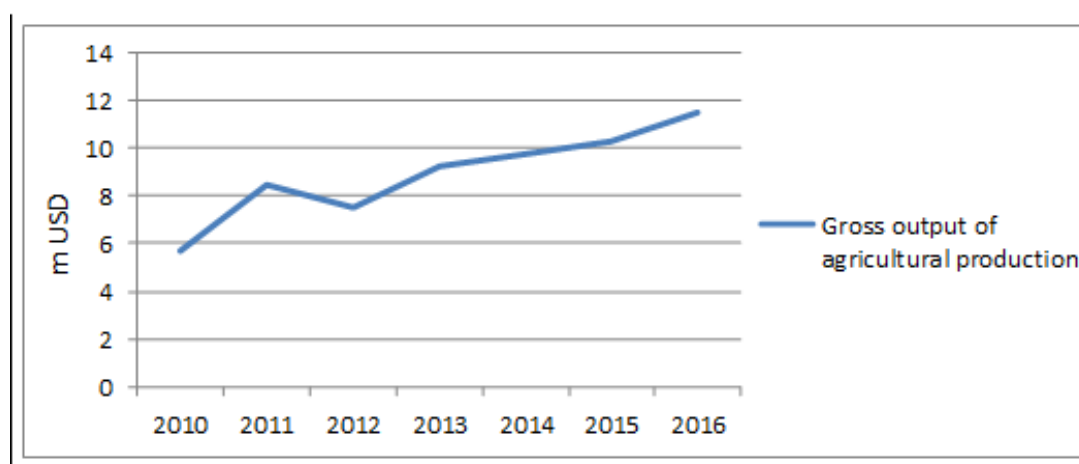
4.3 Grain production

The most important task of the grain industry is to improve the efficiency of production. The efficiency of the grain industry strengthens cross-sectoral ties not only in agriculture, but also in the national economy as a whole. Grain provides up to a third of revenue in agricultural organizations. In Kazakhstan, about 35 million hectares are occupied by crops, including 23 million under grain crops. From 2010 to 2016, the average annual harvest of grain crops increased by 8449.4 thousand tons from 12185 to 20634.4 thousand tons.

4.3.1 Wheat

Wheat is in first place for the cultivation of grain crops in Kazakhstan. About 75 percent of the country's wheat is produced in the country is in three regions in North-Central Kazakhstan: Kostanay, Akmola and Northern Kazakhstan. Only in region of Kostanay is grown about 4 million hectares of wheat. Domestic consumption of wheat in Kazakhstan in 2016, is 6.9 million tons (table 3). There is a reduction in the use of grain for seeds on the background of a decrease in acreage, while the consumption of culture in the food industry will increase after an increase in the population of the country.

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Table 3 – Annual wheat production and Growth rate

Year	Production (th. tons)	Growth rate %
2010	9638	-43.48
2011	22732	135.86
2012	9841	-56.71
2013	13941	41.66
2014	12996	-6.78
2015	13748	5.79
2016	14985	9.00

Source: FAO Stat 2017, own constructed

4.3.2 Barley

Kazakhstan is also one of the 10 leading countries in the production of this crop in the world. Barley sown area in 2016 amounted to 1.9 million hectares; it is 7% less than in previous years (table 4). This reduction in acreage is due to the low level of productivity in the aftermath of the climatic conditions and the abolition of per-hectare subsidy programs. Domestic consumption of barley in the country in 2016 amounted to 2.2 million tons, which is 10% higher than in previous years, despite the reduction of cultivated land in favor of oilseeds. There has been some decline in the use of grain for feed purposes.

Table 4 – Annual barley production and Growth rate

| Year	Production (th. tons)	Growth rate %
2010	1313	-47.88
2011	2593	97.49
2012	1500	-42.15
2013	2539	69.27
2014	2412	-5.00
2015	2675	10.90
2016	3231	20.79

Source: FAO Stat 2017, own constructed

4.4 The influence of weather factors

Agriculture is the most unpredictable type of human activity, because it largely depends on the climate and weather conditions in the places of cultivation of a culture. The graph shows the decline in production in 2010 and 2012 as a result of adverse weather conditions, in particular, the drought observed in these years (figure 13). The trend in wheat yield over the past 6 years shows a trend of growth from an average of 1.0 tons per one hectare to 1.2 tons per hectare, the sharp volatility of wheat yields depends on the sharply continental climate in the North of Kazakhstan.

Under the influence of weather factors in 2010 and 2012 there was a decrease in grain production, which led to an increase in its value on the market. Drought in 2010 has led to an increase in prices for crops by more than 2 times, after drought in 2012 – prices rose by more than 60 %.

Figure 13 –average yield of grain crops (thousand tones)
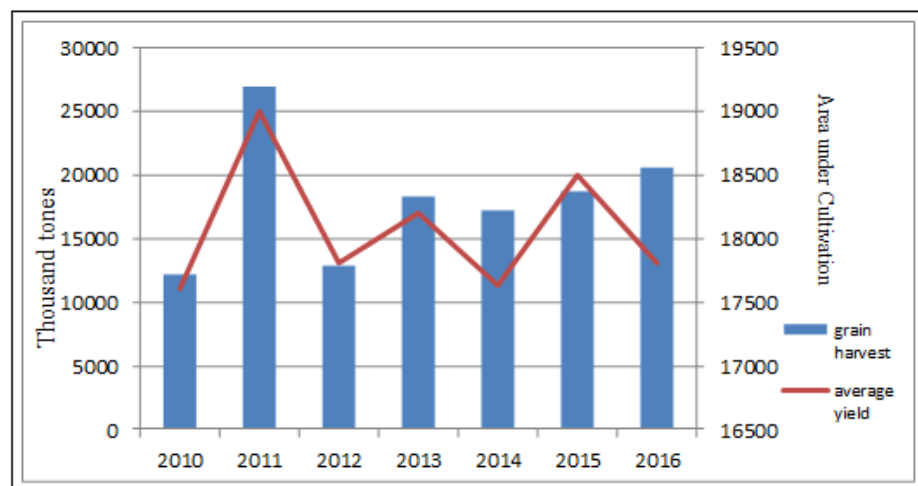
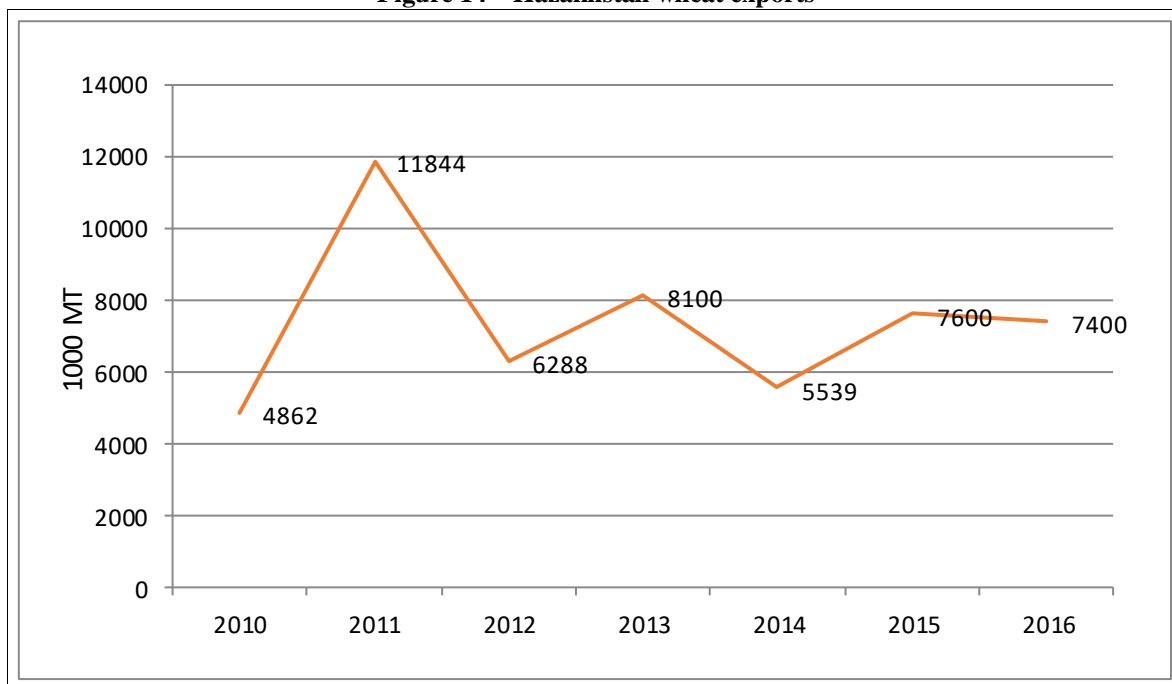*Source: Own elaboration, based on data from FAO Stat, 2016*

4.5 Foreign trade

Export of agro-food products of Kazakhstan had its peak in 2012 ($3.4 billion), due to a very high harvest in 2011, after which it steadily decreased to $ 2.1 billion in 2016(figure 14). The share of agricultural exports in the country's total exports amounted to 5.8%, compared to GDP –only 1.6%. The cost of agricultural products is subject to significant fluctuations due to close reference to world prices. Thus, the index of grain prices in the period 2010-2012 increased by more than 42%, but all subsequent years until last year rapidly decreased, while the total fall exceeded 50%.

The main products of exports of agricultural food products are cereals, the export of which brings more than $1 billion a year, together with flour exports, the share of these products exceeds 60% of total exports. The gradual decrease in grain exports has led to the fact that, since 2015, Kazakhstan fell out of the top ten world grain exporters. Exports of flour are also moderately reduced. Most of the exports of grain and flour account for the Central Asia and CIS countries, followed by countries in the Middle East, Europe and North Africa. Most of the exports of grain and flour account for the Central Asia and CIS countries, followed by countries in the Middle East, Europe and North Africa. The largest importers in 2016 were Uzbekistan – 1.6 million tons, Tajikistan – 1 million tons, Chine imported 281.1 thousand tons.

Since Kazakhstan can provide itself with grain in full, the share of imports of grain is insignificant. Anyway, the republic does not refuse to import grain, good example of import of grain on Kazakhstan's market is 2014 when Russian ruble was depreciated against the other world currencies, for Kazakhstan it was profitable for domestic consumption to import Russian grain, purchase of which was very cheap for economy.

Figure 14 – Kazakhstan wheat exports

Source: Own elaboration, based on data from indexmundi.com

The low level of grain export is associated with the low quality of the crop, which in turn depends on climatic conditions. Another factor is the geographical location of the country. Delivery of products to foreign markets is unprofitable for Kazakhstan. Most of the exports of grain and flour account for the Central Asia and CIS countries, followed by countries in the Middle East, Europe and North Africa. The largest importers in 2016 were Uzbekistan – 1.6 million tons, Tajikistan – 1 million tons, Chine imported 281.1 thousand tons. In smaller volumes Kazakhstan supplies Afghanistan (253.8 thousand tons), Italy (156.1 thousand tons), Iran (227.7 thousand tons), Turkey (61.4 thousand tons) and Azerbaijan (47.5 thousand tons) (figure 15).The increasing volume of production of local agricultural products is not yet able to meet the needs of the local market in such parameters as: volume, range, quality. There is a high proportion of dependence on imports of processed products: cheeses, sausages, canned meat, butter, where imports cover about 40-50% of consumption. Products of processing of plant products minimally dependent on cereals, but significant dependence of the sum on oil – 30%, fruit and vegetable maintain – more than 80%, the almost complete dependence on sugar.

Figure 15 - Largest importers of wheat 2016
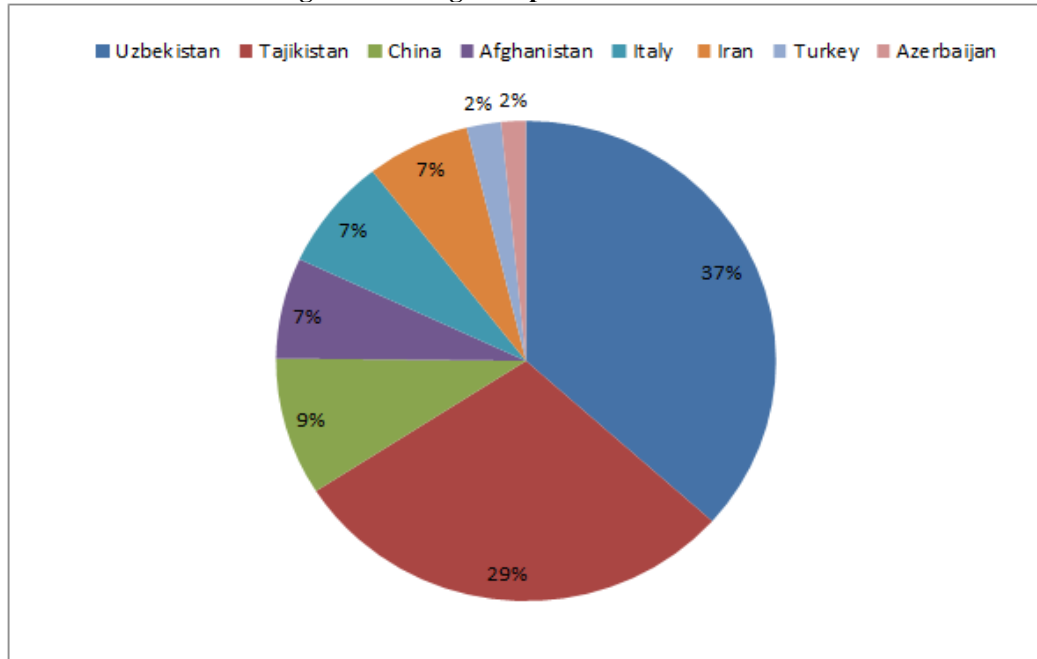
Source: own elaboration, based on data from World bank.org; 2017

4.6 LINEAR REGRESSION ANALYSIS

Based on the results of the analysis, it is proved that there is a relationship between the gross domestic product and wheat production (table 4). Taking wheat production as one of the variables, the theory proves that, despite a small percentage of the agricultural sector in total GDP, agricultural products affect the volume of GDP. Agriculture plays an important but decreasing role in the economy of Kazakhstan. Despite the significant potential, the rate of development of agricultural production lags behind the average growth rate of the economy, growth in the domestic agricultural sector is achieved through a quantitative increase in production, rather than the widespread use of effective technologies. The graph shows the stagnation of the agricultural sector of the economy since 2010, the share of agriculture in the economy does not exceed 5%, which is below 6.4% in 2005 and 8.2% in 2000. (figure 6)

Linear Regression Results

The REG Procedure
Model: Linear_Regression_Model
Dependent Variable: GDP

Number of Observations Read	22
Number of Observations Used	7
Number of Observations with Missing Values	15

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	30070	30070	93.20	0.0002
Error	5	1613.13562	322.62712		
Corrected Total	6	31683			

Root MSE	17.96182	R-Square	0.9491
Dependent Mean	144.71429	Adj R-Sq	0.9389
Coeff Var	12.41192		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	-163.15642	32.60458	-5.00	0.0041
Production of wheat	1	48.75780	5.05045	9.65	0.0002

Source:SAS, own constructed

Quantitative research method named Regression analysis was used in practical part to test existence of relationship between one dependent variable (y) and one independent variable (x). In this case, the dependent variable is the country's GDP, the independent variable is wheat production.

The formula for a regression line is:

$$Y' = bX + a \ (3)$$

Where,

Y' – predicted score

b – slope of the line

a – Y intercept

The statesment for hypothesis tests:

$$H_0: \beta_1 = \beta_{1,0} \ (4)$$
$$H_1: \beta_1 \neq \beta_{1,0}$$

T- test used to implement hypothesis tests on the regression coefficients obtained in simple linear regression:

$$T_0 = \beta'_1 - \beta_{1,0} / SE \ (\beta'_1) \ (5)$$

Where,

β'_1 – least square estimate of β_1

$SE(\beta'_1)$ – standard error

$$se(\hat{\beta}_1) = \sqrt{\frac{\dfrac{\sum\limits_{i=1}^{n} e_i^2}{n-2}}{\sum\limits_{i=1}^{n}(x_i - \bar{x})^2}}$$

(6)

Source: reliawiki.org

y- GDP

x- Production of wheat

H_0: B=0 (there is no relationship between GDP and Production of wheat)

H_1: B≠1 (there is relationship between GDP and Production of wheat)

R= 0.9389

[t]= b/St.Error; [t]=48.75780/5.05045=9.65

P=0.0002; α=0.05

P<α; we accept H_1; there is relationship between parameters

Regression report

Simple linear regression was carried out to investigate the statistical relationship between "production of wheat" as independent variable and "state's GDP" as dependent variable. As results of regression analysis show, there is a low **p**-value = 0.0002 with the value of **α** = 0.05, a small p-value characterize strong proof against H_0, so H_0 can be rejected in favor of H_1. Correlation coefficient (R) with value of 0.9389 indicates strong positive relationship between variables.

4.7 Forecast analysis

On the basis of annual data, it is possible to determine the average yield and other indicators for a long time to determine the overall trend tendencies. For this purpose, the term of the next 3 years was used. The average yield of the current year was measured by the indicators of the current and four previous years on the basis of data of the Agency for statistics. Based on the data, the forecast for agricultural exports and GDP for the next three years was obtained. The obtained results reflect the trend towards a decline in grain exports and, accordingly, a decrease in the gross product indicator in Kazakhstan (figure 16). Kazakhstan's agri-food exports peaked in 2012 ($3.4 billion), associated with a very high harvest in 2011, after which

they fell steadily to $ 2.1 billion in 2016 (table 6). The share of agricultural exports in the country's total exports was 6%. Main agricultural exports are cereals, the export of which brings in over $1 billion in 2015 Kazakhstan fell out of the top ten world exporters of grain, a gradual decrease in grain exports. This is happening for various reasons, one of which is the diversification of the plant sector of the country's agriculture; the government has embarked on the development of oilseeds and other crops. Also affect prices in the world market, where there was a decline in prices for plant products.

Figure 16 – Forecast graph of exports
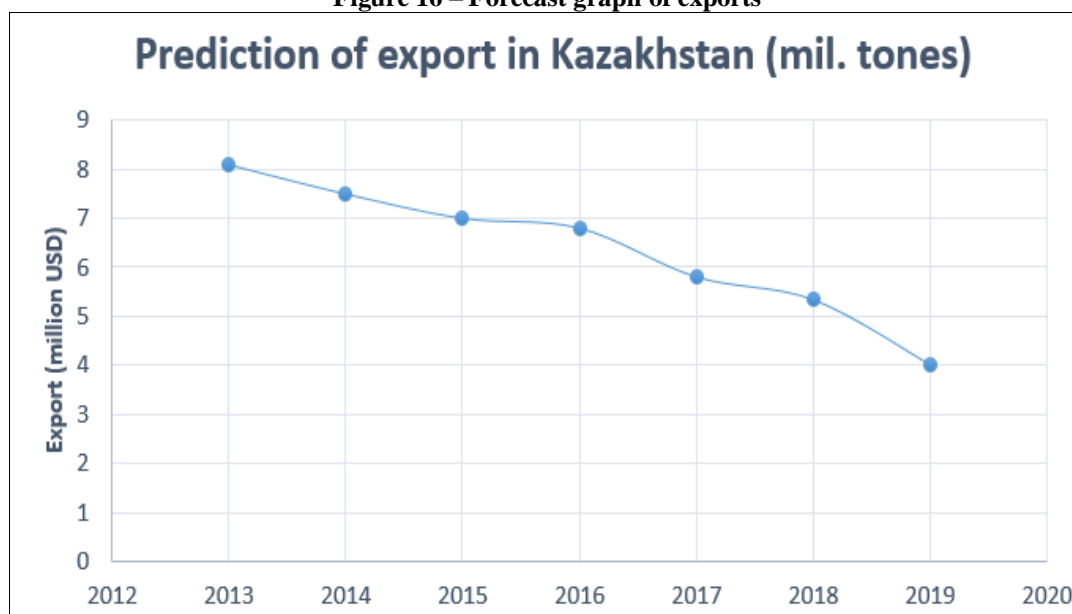
Source: own constructed 2018

Table 6 – Predicted values of exports

Year	2017*	2018*	2019*
Export (in mil. tones)	5.8	5	4

Source: own constructed 2018

As the graph shows (figure 17), in the next three years is projected decline in the indicator of gross domestic product of the country. As shown in table 7, the forecast for each subsequent

year is expected to drop significantly in the country's GDP, which is facilitated by external factors. The increasing volatility of external factors that have a direct impact on the country's economic growth, the slowdown in the world economy and the imbalance in the energy market, the oil price jumps are also worth noting the impact of exports on the country's economy.

Figure 17 – Forecast graph of GDP
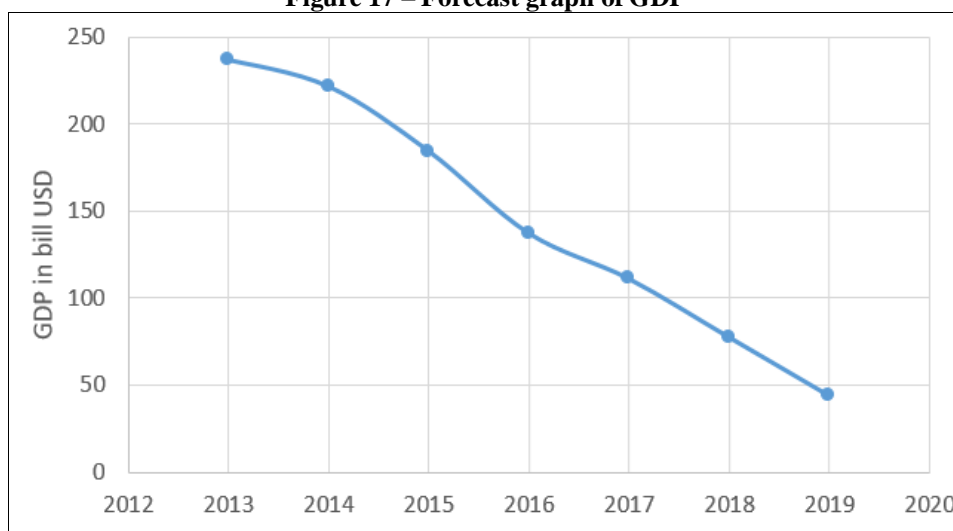
Source: own constructed 2018

Table 7 – Predicted values of GDP in bln. USD

Year	2017*	2018*	2019*
GDP	111,5	77,64	44,13

Source: own constructed 2018

The graph indicates that the achieved peak of GDP falls in 2012-13, due to the harvest in 2011. The global crisis has significantly affected the economy of Kazakhstan. The factors influencing the country's economy can be distinguished: the first negative factor is the decline in oil prices.

The oil and gas complex occupies a fundamental share in the structure of the national economy of Kazakhstan and is a real impetus for the development of the country's economy. Consequently, there is a dependence of the economy of Kazakhstan on the external factor-the

world oil price. The oil and gas complex involves enterprises engaged in the extraction, transportation and processing of oil and gas, as part of the oil and gas complex should include enterprises producing oil and gas equipment, and wholesale and retail networks of oil and gas trade. The factor that also reduces the level of economic development is the falling world prices for the main export goods - metals, fertilizers and so on. The second important factor is the economic crisis, depreciation of the Russian ruble, recession in Russia. The devaluation of the ruble had a negative impact on the economy of Kazakhstan, the budgets of which depend largely on exports to Russia.

4.8 Results and Discussion

With the research conducted in the practical part, it can be concluded that the place of agriculture in the economy of Kazakhstan always was a source of replenishment of national welfare and still plays an important role, despite the fact that the state has a policy aimed at the development of other sectors of the economy such as the oil sector and engineering.

Since 2014, the Ministry of Agriculture of the republic of Kazakhstan presented and started to actively promote the concept of new program of broadening of agro-industrial sector of economy. One of the innovations of this program is the reduce of acreage of cereals in favour of increasing the sown area of oilseeds.

Another obstacle to the development of the agro-industrial complex of the country is the lack of funds for the renewal of equipment and infrastructure of agricultural organizations, as well the lack of personnel in areas of increased agricultural production. The gross production of agricultural products ultimately depends on the level of development and provision of the industry with basic production assets, machinery, equipment, working capital and human resources.

"The path to land reform has left a legacy of weak land markets and difficulty in using land as collateral. The institutional arrangements are inadequate for coherent agricultural and rural development. While farm output has increased, interventionist policies and distrust of market mechanisms lead to resource misallocation and hamper productivity growth. In times of plenty, resource misallocation can seem a minor problem, but if a goal of diversification is to make the non-oil sector more resilient, then inefficient policies that promote an output mix determined by officials will not succeed in achieving the goal." (Petrick and Pomfret,2016)

If to consider many times the increased number of farms that appeared with the use of land reforms as a positive factor, in fact, the reforms led to the collapse of large functioning agricultural enterprises into a mosaic of small farms. Despite the statistics pointing to the stable development of agriculture in the country, a large part of the farms not adapted to market conditions, is unable to provide itself with new technology and the failure of the obstacle of land degradation, in view of the lack of funding. Another point concerns the inefficiency of reforms is the reduction of crop acreage affects crops and livestock production which in turn reduces national ability to provide itself in full and increases import costs.

In order to unlock the potential of the agricultural sector of the economy, the state should pay more attention to the allocation of the state budget, for example, programs for the restoration of degraded lands, construction of infrastructure, upgrading of equipment, etc. And mainly the

state should invest in new technologies, education and create favorable conditions for competition.

5 Conclusion

The main purpose of the thesis was the analysis of the agricultural sector of the economy of the agrarian-oriented country of the former Soviet Union, assessment of economic growth, identification of factors affecting its growth or decline.

The data about Kazakhstan's agriculture was obtained from several public sources and databases such national statistical database of Kazakhstan - Committee on statistics of Republic of Kazakhstan. Also, in the research secondary sources and databases – FAOSTAT, World Bank, CIA were used.

The quantitative methods mainly used in research, particularly linear regression model, forecast analysis and the dynamic analysis of crops production. One of the main objectives of the study was the question of the impact of agriculture, especially wheat export on the level of GDP, the answer to which was found directly by linear regression and hypothesis testing.

Despite the consequences after the crisis in the world economy, which negatively affected the country, Kazakhstan continues to keep its place as one of the largest producers and exporters of wheat, but the interest in the cultivation of this crop from local farmers is constrained by the state policy, which stimulates the cultivation of oilseeds. Through the analysis (detailed description and explanation was described in the analytical and theoretical parts of the thesis) it was found that the economy is experiencing a decline in growth under the influence of a series of crises. The situation will improve if the state abandons the raw material policy, but the government is not ready to abandon the raw material orientation. The anti-crisis plans of the Government and the national Bank to ensure the economic and social stability of the country should be the salvation of the domestic economy. Today in rural areas live a little more than 40 % of the population of Kazakhstan, the level of o development of agriculture affects not only the welfare of the country, but also directly on the standard of living of these 40 % of people.

Summing up, it is important to note that the Republic of Kazakhstan with its impressive territory for the cultivation of various crops and livestock, has great potential for the development and growth of the agricultural sector of the economy, but for reasons of backward technologies and the lack of interest in such throws agriculture of Kazakhstan far back.

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7 Appendix

Table 1- Dynamics of land use for 1991-2016

Name of land categories, million hectares	1991	2016	Changes +/- (from 2016 to 1991)
Agricultural lands	218.4	102.6	-115.8
Lands of settlements	3.7	23.7	+20
Lands for non-agricultural purposes	18.8	2.9	-15.9
Specially preserved natural territories	0.7	6.7	+6
Lands for the forest fund	10.8	22.9	+12.1
Lands for the water fund	0.8	4.1	+3.3
Reserve lands	18.9	98.4	+79.5
Total	272.1	261.3	-10.8
Lands used in territory of other states	1.4	0.9	-0.5
Lands used by other states	9.9	11.3	+1.4
Total territory of the state	283.4	273.5	-9.9

Source: Own elaboration, based on data from the World Bank, FAO and knoema.com

Figure 2 - Percentage of main use of lands
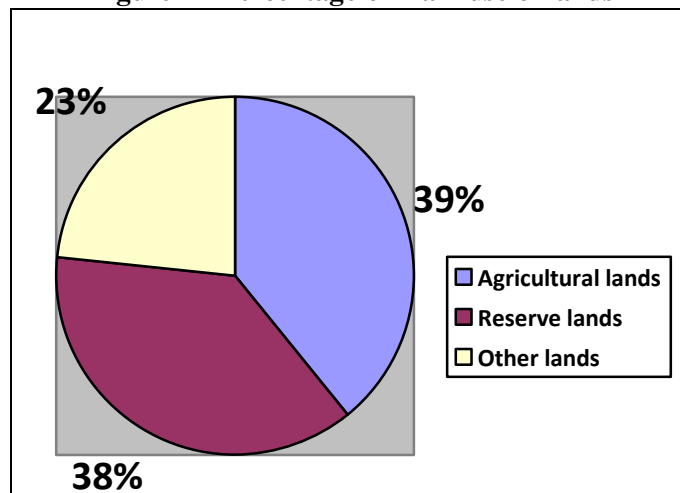
Source: Own elaboration based on data from mgov.kz (2017)
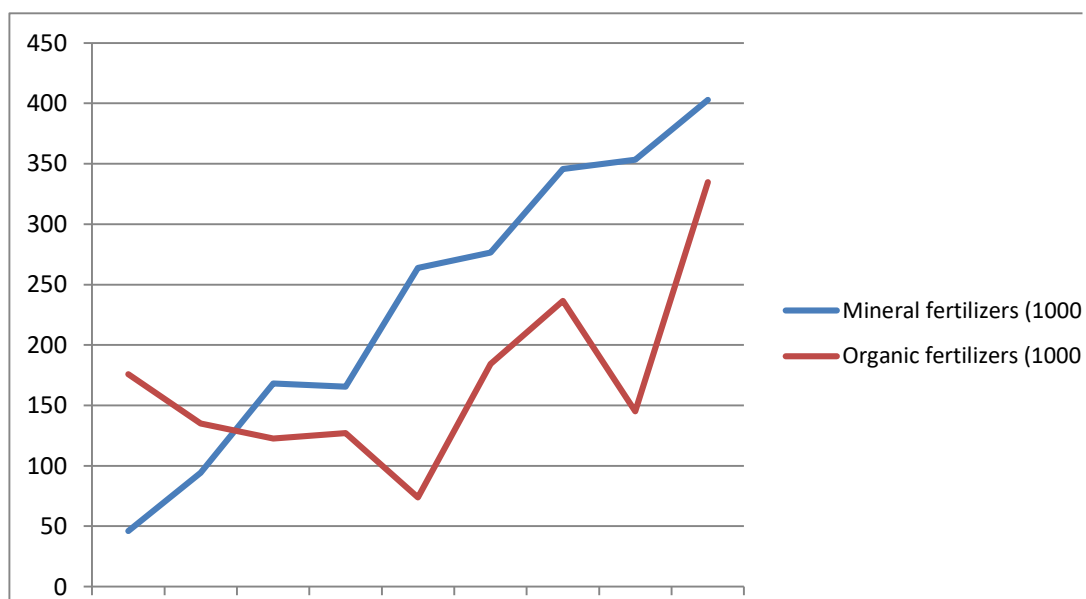
Figure 4 – GDP per capita of Kazakhstan
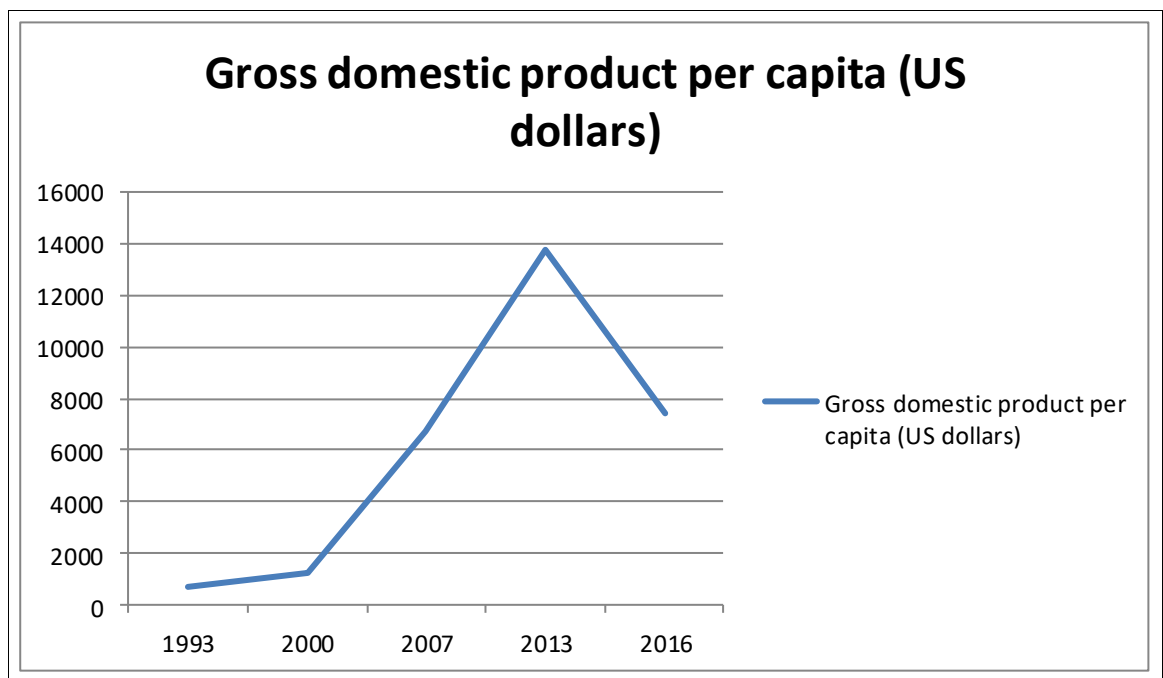
Source: Own elaboration, based on data from cia.giv 2017;knoema.com 2017
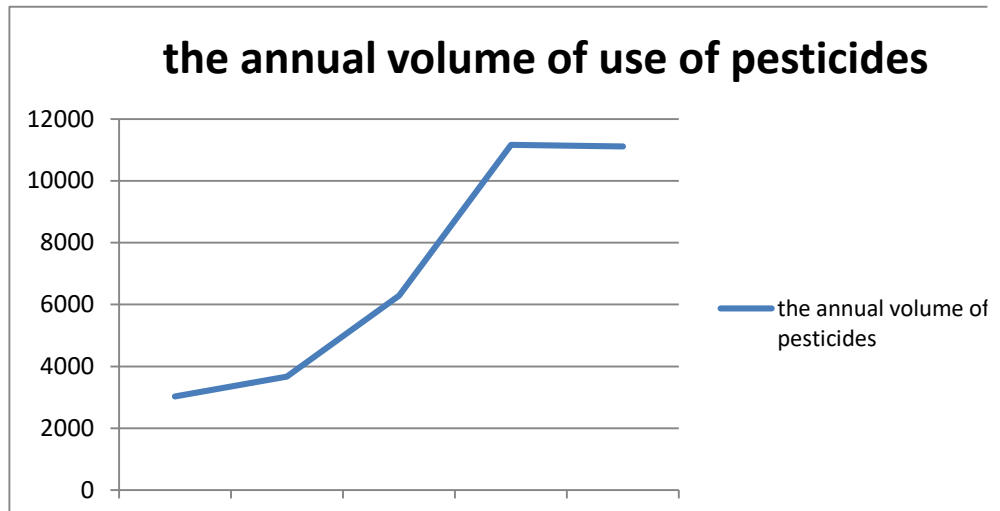
Figure 6 - Share of agriculture in GDP %
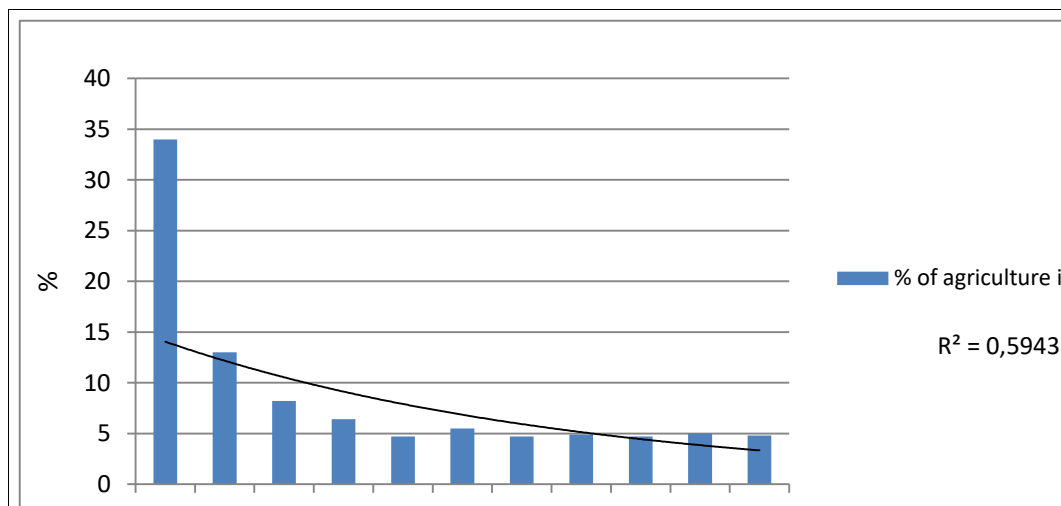
Figure 7 - Annual usage of fertilizers

Figure 8 – Annual usage of pesticides

the annual volume of use of pesticides

the annual volume of pesticides

Source: Own elaboration, based on data from FAO, 2017

**Figure 10 - agricultural machinery in the agricultural enterprises**
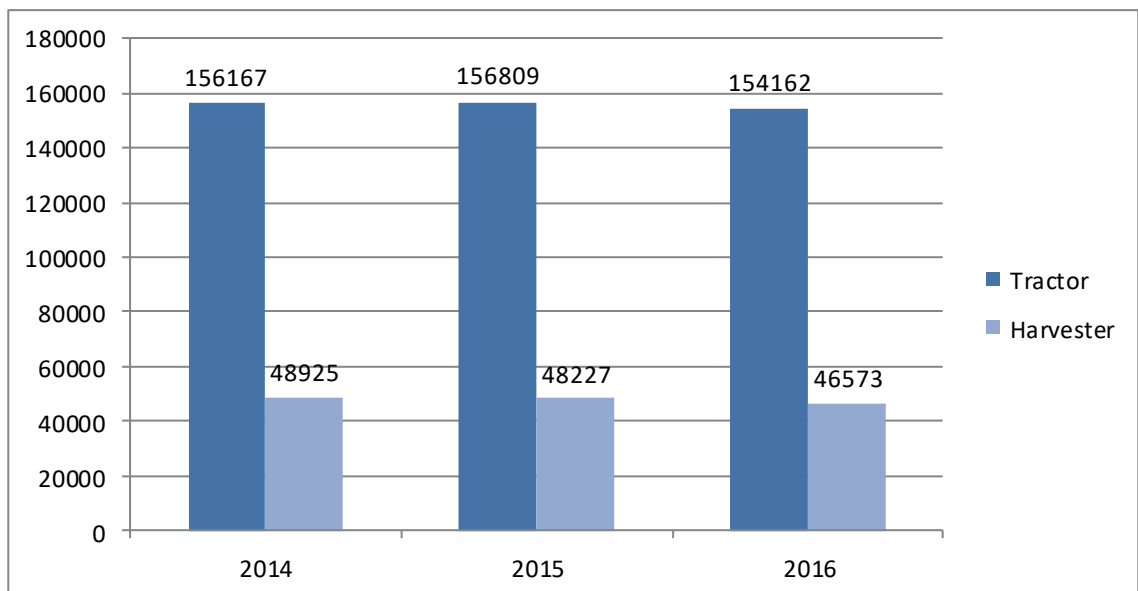
Source: own elaboration, based on data from stat.gov.kz 2017

Table 2 – Gross harvest of main crops (thousand tones)

|	1990	1995	2000	2005	2010	2011	2012	2013	2014	2015	2016
CEREALS AND LEGUMES	28487,7	9505,5	11565	13781,4	12185,2	26960,5	12864,8	18231	17162,2	18672,8	20634,4
OIL CROPS	229.8	162	140.1	439.7	775.4	1141.9	976.8	1498	1574.6	1574.5	1902.4
POTATO	2324.3	1719.7	1692.6	2520.8	2554.6	3076.1	3126.4	3343.6	3410.5	3521	3545.7
VEGETABLES	1136.4	779.7	1543.6	2168.7	2576.9	2877.7	3061.5	3241.5	3469.9	3564.9	3795.2
MELON FIELDS	301.5	162.3	421.6	683.8	1118.2	1248	1649.9	1713	1928	2087.6	2070.9
SUGAR BEET	1043.7	371	272.7	310.8	152	200.4	151.6	64.6	23.9	174.1	345

Source: Own elaboration, based on data from FAO 2017, stat.gov.kz 2017

Figure 11 - Gross harvest of main crops (thousand tones)
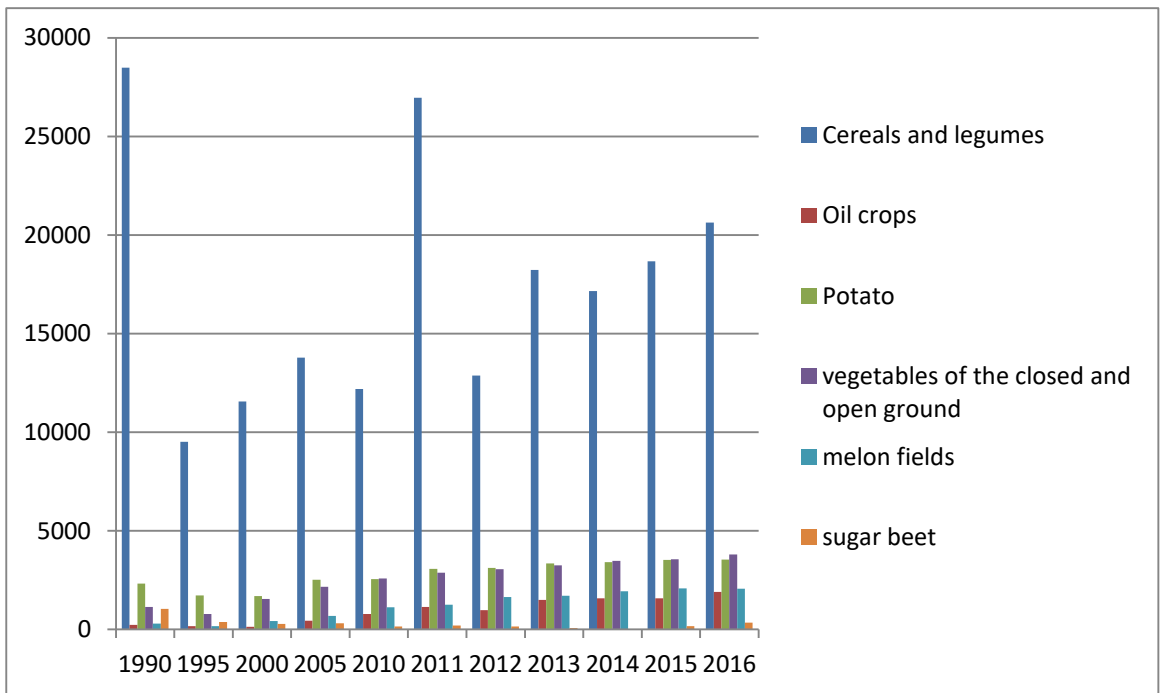
Figure 12 - gross output of agricultural products
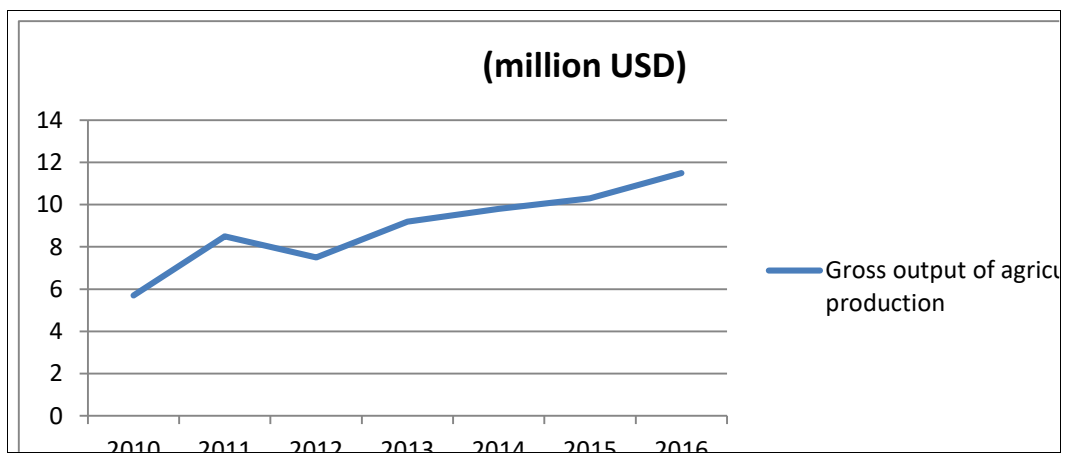
Table 3 – Annual wheat production and Gross rate (thousand tones)

| Year	Production	Growth rate
2010	9638	-43.48 %
2011	22732	135.86 %
2012	9841	-56.71 %
2013	13941	41.66 %
2014	12996	-6.78 %
2015	13748	5.79 %
2016	14985	9.00 %

Source: MS Excel, based on data from indexmundi.com 2017, own constructed

Table 4 – Annual barley production and Gross rate (thousand tones)

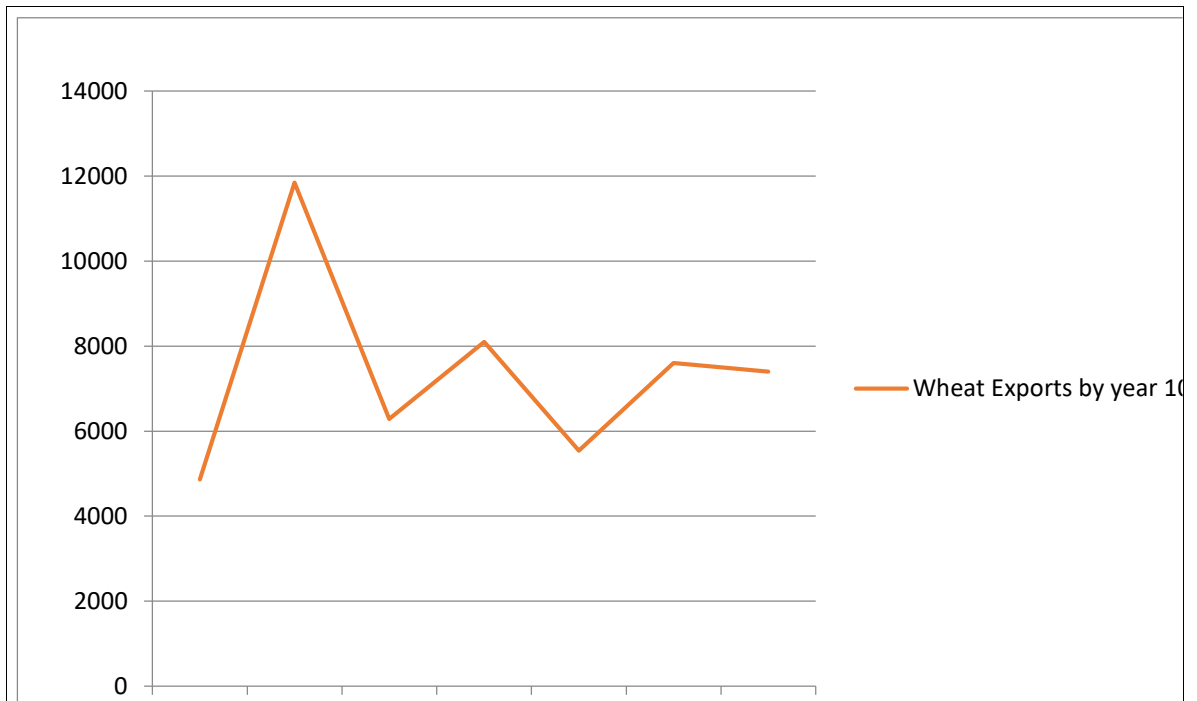| Year	Production	Growth rate
2010	1313	-47.88 %
2011	2593	97.49 %
2012	1500	-42.15 %
2013	2539	69.27 %
2014	2412	-5.00 %
2015	2675	10.90 %
2016	3231	20.79 %

Source:MS Excel, based on data from indexmundi.com 2017, own constructed

Figure 13 –average yield of grain crops (thousand tones)
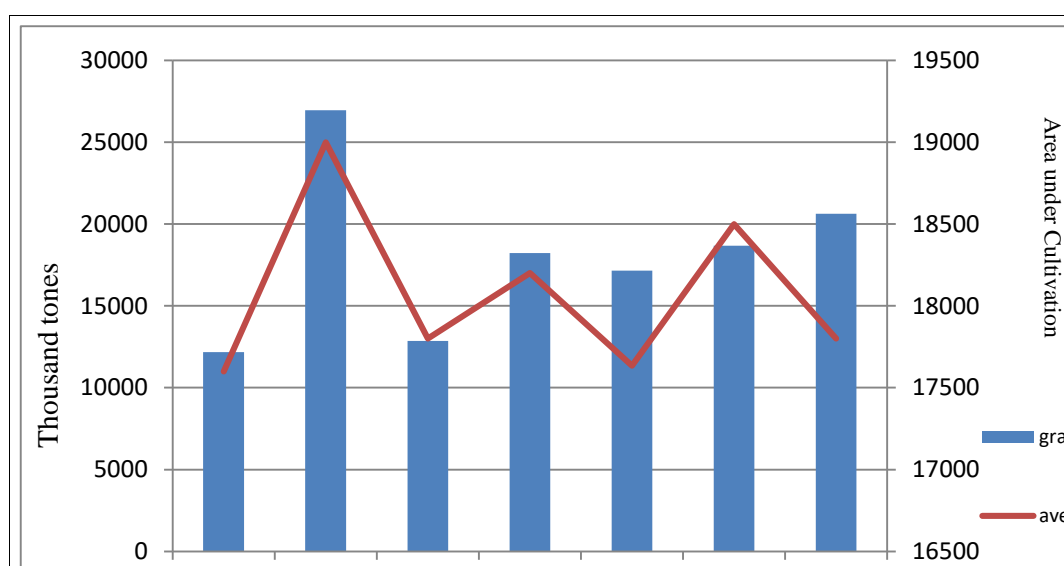
Source: Own elaboration, based on data from FAO Stat, 2016

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Figure 14 – Kazakhstan wheat exports by year

Table 5 – Linear regression results

Linear Regression Results

The REG Procedure
Model: Linear_Regression_Model
Dependent Variable: GDP

Number of Observations Read	22
Number of Observations Used	7
Number of Observations with Missing Values	15

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	30070	30070	93.20	0.0002
Error	5	1613.13562	322.62712		
Corrected Total	6	31683			

Root MSE	17.96182	R-Square	0.9491
Dependent Mean	144.71429	Adj R-Sq	0.9389
Coeff Var	12.41192		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	-163.15642	32.60458	-5.00	0.0041
Production of wheat	1	48.75780	5.05045	9.65	0.0002

Figure 16 – Forecast graph of exports

Prediction of export in Kazakhstan (mil. tones)

Table 6 – Predicted values of exports

Year	2017*	2018*	2019*
Export (in mil. tones)	5.8	5	4

Figure 17 – Forecast graph of GDP

Table 7 – Predicted values of GDP in bln. USD

Year	2017*	2018*	2019*
GDP	111,5	77,64	44,13

Source: own constructed 2018