

**Czech University of Life Sciences Prague**

**Faculty of Economics and Management**

**Department of Economics**



**Bachelor Thesis**

**The impact of oil industry on the economy of  
Kazakhstan**

**Aziza Akhmetova**

# CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE

Faculty of Economics and Management

## BACHELOR THESIS ASSIGNMENT

Aziza Akhmetova

Business Administration

Thesis title

**The impact of oil industry on the economy of Kazakhstan**

---

### Objectives of thesis

The aim of thesis is to explore and analyse the impact of the oil industry on the economic growth of Kazakhstan. Kazakhstan is rich with crude oil.

Today, oil is important and risky question. There are many countries, where crude oil plays the significant role and presents the main determinant in the growth of country's economics. Kazakhstan is one of these countries. Objective is to determine the impact of crude oil on GDP through scientific analyses and values methods to reach purposeful complete results.

The purpose of theoretical part is to understand the key characteristics of crude oil, the role of crude oil in the international trade and define the main determinants, which drive the world oil prices. The purpose of practical part is to evaluate the Kazakhstan's position in global oil market and determine the relationship between the oil and gas industry and GDP of Kazakhstan.

### Methodology

The thesis will be divided into 2 parts: theoretical and practical one. For the theoretical part will be used the different types of resources, such are books, articles, scientific publications, annual reports of companies and found information from Internet sources.

The practical part will contain the information about the economy of Kazakhstan, the country's oil and gas industry, particularly the role of oil and gas industry in the national economy of Kazakhstan and the country's position on the international market, the information about the largest oil fields and the difficulties of Kazakhstan in oil sector. To achieve the aims, in this thesis will be used time series analysis, comparative and descriptive methods. To understand the profitability of Kazakhstan's oil sector, the PEST and SWOT analysis's will be used in the thesis.

**The proposed extent of the thesis**

40 – 60 pages

**Keywords**

Crude oil, Kazakhstan, oil market, oil price, oil field, gas, oil and gas industry

---

**Recommended information sources**

British Petroleum (BP) (2016) Statistical Review of World Energy 2016

Francisco Parra: "Oil Politics – A Modern History of Petroleum." 2009. ISBN 1848851294

Chervinsky O: "The Black blood of Kazakhstan. The oil history of independence." 2017- ISBN:  
978-601-06-4488-5

International Energy Agency (IEA) Oil market report, 2017

Mill, John Stuart. The fundamentals of political economy. In 2 t. T. 2. – Eksmo, 2007. – p. 156 – ISBN:  
978-5-699-19313-4

Norman J. Hyne (1984) Geology for petroleum exploration, drilling, and production. ISBN 0070316597

---

**Expected date of thesis defence**

2017/18 SS – FEM

**The Bachelor Thesis Supervisor**

doc. Ing. Mansoor Maitah, Ph.D. et Ph.D.

**Supervising department**

Department of Economics

Electronic approval: 7. 3. 2018

prof. Ing. Miroslav Svatoš, CSc.

Head of department

Electronic approval: 8. 3. 2018

Ing. Martin Pelikán, Ph.D.

Dean

Prague on 12. 03. 2018

---

## **Declaration**

I declare that I have worked on my bachelor thesis titled "**The impact of oil industry on the economy of 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 13.03.2018

---

## **Acknowledgment**

I would like to express my gratitude to **Assoc. Prof. Ing. Mansoor Maitah, Ph.D. et Ph.D.** for his useful lectures during my study process, that motivated me to write my bachelor thesis on this topic, for his practical comments and supporting me during my work on it. Furthermore, I would like to thank my parents and friends for helping and supporting me.

# The impact of oil industry on the economy of Kazakhstan.

**Summary:** Crude oil plays the key role in the economic development of many countries. Kazakhstan is one of these countries. After the collapse of Soviet Union, Kazakhstan achieved the fast development of an economy with a help of oil and gas industry. Now the economy of Kazakhstan is based on the revenues from oil and gas industry. It means that any fluctuations in oil price or oil production will affect not only the national GDP but also, the position of Kazakhstan on the international market. Kazakhstan is one of the largest crude oil producers with a great number of oil reserves. The Republic of Kazakhstan has a raw material orientation, which, for its part, can bring a certain advantage, but it is also a disadvantage from country's vulnerability point of view. The main objective of the thesis is to analyse the impact of oil price and production volatility of the economic development of Kazakhstan. To achieve the aim, the time series analysis, comparative and descriptive methods will be used. The Linear regression model, used in the thesis, show the relationship between GDP of Kazakhstan, the average annual oil price of Brent and annual national production. SWOT and PEST analyses define the profitability of oil sector in Kazakhstan.

**Keywords:** Crude oil, Kazakhstan, oil market, oil price, oil field, gas, oil and gas industry

# Vliv ropného průmyslu na ekonomiku Kazachstánu.

**Abstrakt:** Ropa hraje klíčovou roli v hospodářském rozvoji mnoha zemí. Kazachstán je jednou z těchto zemí. Po zhroutilí Sovětského svazu dosáhl Kazachstán rychlého rozvoje ekonomiky pomocí ropného a plynárenského průmyslu. Nyní je ekonomika Kazachstánu založena na příjmech z ropného a plynárenského průmyslu. To znamená, že jakékoliv klesání cen ropy ovlivní nejen národní HDP, ale i pozici Kazachstánu na mezinárodním trhu. Kazachstán je jeden z největších výrobců ropy s velkým množstvím rezerv. Republika Kazachstán má surovinovou orientaci což pro ni může znamenat určitou výhodu ale zároveň nevýhodu z hlediska zranitelnosti země. Hlavním cílem bakalářské práce je analyzovat vliv volatility cen ropy na ekonomický vývoj Kazachstánu. K dosažení tohoto cíle bude použita analýza časových řad, srovnávací a popisné metody. Lineární regresní model, který byl použit v diplomové práci, ukazuje vztah mezi HDP Kazachstánu, průměrnou roční cenou ropy Brent a roční národní produkcí. Analýzy SWOT a PEST definují ziskovost ropného sektoru v Kazachstánu.

**Klíčová slova:** Ropa, Kazachstán, ropný trh, cena ropy, ropné pole, plyn, ropný a plynárenský průmysl.

## Table of content

1. Introduction .....	11
2.Objectives and Methodology .....	12
2.1 Objectives.....	12
2.2 Methodology .....	12
3.Theoretical part .....	13
3.1. Main characteristics of crude oil .....	13
3.1.1. The history of crude oil .....	13
3.1.2. Crude Oil Formation .....	15
3.1.3. The density of crude oil .....	15
3.1.4. The Content of sulfur in crude oil .....	16
3.1.5. Benchmarks.....	17
3.1.6. The dimension of crude oil .....	18
3.1.7. The Crude Oil Recovery .....	19
3.1.7.1. Primary recovery stage (Kareem stage) .....	19
3.1.7.2. Secondary recovery stage.....	19
3.1.7.3. Tertiary recovery stage.....	19
3.2. Production, Consumption, and Reserves of crude oil.....	20
3.2.1. The Production of crude oil .....	20
3.2.2. Crude Oil Consumption .....	22
3.2.3. The World Oil Reserves.....	23
3.3. The World Crude Oil Trade .....	26
3.3.1. Export and Import .....	27
3.4. Determinants of crude oil price.....	29
3.4.1. OPEC .....	29



3.4.1.1. OPEC Policies.....	30
3.4.1.2. OPEC and non-OPEC Ministerial Meeting 2016 .....	31
3.4.1.3. OPEC basket price. ....	31
3.4.2. Demand and Supply .....	32
3.4.3. Other factors.....	34
3.4.3.1. US dollar exchange rate .....	34
3.4.3.2. The growth of world economy.....	34
3.4.3.3. Geopolitical events:.....	34
3.4.3.4. Fiscal and Monetary policies: .....	34
3.4.3.5. Production cost:.....	34
4. Practical Part. ....	35
4.1 The Economy of Kazakhstan. ....	35
4.2. Crude Oil in Kazakhstan .....	39
4.2.1. The largest oil fields.....	39
4.2.1.1. Tengiz.....	40
4.2.1.2. Kashagan .....	40
4.2.1.3. Karachaganak .....	42
4.2.2. Crude oil Production and Consumption.....	43
4.2.3. Crude oil export and import. ....	44
4.2.5. Crude oil reserves in Kazakhstan.....	46
4.2.6. Problems, Kazakhstan faced with the oil industry.....	46
4.2.6.1. The Tengiz accident. ....	47
4.2.6.2. Kashagan oil field problems. ....	48
4.2.6.3. Petroleum deficit. ....	49
4.3. Analysis of oil industry in Kazakhstan .....	50
4.3.1. PEST analysis. ....	50

4.3.1.1. Political environment .....	50
4.3.1.2. Economic environment. ....	51
4.3.1.3. Social environment. ....	52
4.3.1.4. Technological environment.....	54
4.3.2. SWOT Analysis .....	55
4.3.3. The relationship between the oil industry and GDP of Kazakhstan .....	58
4.3.3.1. A regression model using SAS. ....	58
5. Conclusion. ....	63
References:.....	65
List of figures .....	70
List of Tables .....	70
List of Abbreviations .....	71

# 1. Introduction

Crude oil is non-renewable raw material, which has yellow-to-black color and contains the liquid and gaseous hydrocarbons. Nowadays, the crude oil is the most demanded source of energy. The main oil product is a liquid fuel, that is used as gasoline, diesel fuel, and aviation kerosene. Also, crude oil is used in a production of plastic materials synthetic fabrics, medicine, cosmetology and constructing. It is hard to imagine nowadays world without crude oil, so the oil is the most traded commodity in the world. Year to year, the world oil consumption is increasing, it may lead to the economic growth of oil-producing countries.

The daily global oil consumption in 2016 was 96 558 000 barrels per day. One of the largest oil producers in the World is Kazakhstan, which accounts more than 200 oil fields in its territory. It is the second largest oil producer in the Post-Soviet countries. Crude oil plays the key role in the economy of many countries, it is the strategic energy resource, because it influences not only the economy of a separate country but the politics between the states generally. Politics, in its term, as well as currency exchange rate, the level of demand and supply and other factors, influence the world crude oil price.

The economy of Kazakhstan, like many economies, is based on the oil industry. The oil price can determine the economic situation of the state, its budget and trade balance, impact on the government revenues and oil and gas industry and other sectors of an economy. That's why it is important to follow and predict the global oil prices.

In this bachelor thesis, we will understand what drives the crude oil prices and what is the relationship between the crude oil industry and Kazakhstan's GDP. Also, in this work will be noticed other aspects as an amount of national oil production, export, reserves and the problems in the oil industry of the Republic of Kazakhstan. To understand the profitability of oil sector, SWOT and PEST analysis will be used.

## 2.Objectives and Methodology

### 2.1 Objectives

The aim of the thesis is to explore and analyse the impact of oil industry on the economic growth of Kazakhstan. Kazakhstan is rich in crude oil. Today, oil is an important and risky question. There are many countries, where crude oil plays the significant role and presents the main determinant in the growth of country's economics. Kazakhstan is one of these countries. The objective is to determine the impact of crude oil on GDP through scientific analyses and values methods to reach purposeful complete results. The purpose of theoretical part is to understand the key characteristics of crude oil, the role of crude oil in the international trade and define the main determinants, which drive the world oil prices. The purpose of a practical part is to evaluate Kazakhstan's position in the global oil market and determine the relationship between the oil industry and GDP of Kazakhstan.

### 2.2 Methodology

The thesis will be divided into 2 parts: theoretical and practical one. For the theoretical part will be used the several types of resources, such are books, articles, scientific publications, annual reports of companies and found information from Internet sources. The practical part will contain the information about the economy of Kazakhstan, the country's oil and gas industry, particularly the role of oil and gas industry in the national economy of Kazakhstan and the country's position on the international market, the information about the largest oil fields and the difficulties of Kazakhstan in oil sector. To achieve the aims, in this thesis will be used time series analysis, comparative and descriptive methods. To understand the profitability of Kazakhstan's oil sector, the PEST and SWOT analyses will be used in the thesis. PEST analysis contains the political, economic, social and technological aspects in the crude oil industry of Kazakhstan. SWOT analysis determines the strengths, weaknesses, opportunities, and threats of Kazakhstan's oil and gas sector. The linear regression model will be used to determine the dependence of the national GDP on annual average Brent prices and annual oil production in Kazakhstan.

## 3.Theoretical part

### 3.1. Main characteristics of crude oil

Foremost, in my thesis, it is important to understand what the crude oil is, what it consists and what are its properties. There are several types of crude oil in the different part of our world, that's why these types of oil are divided into classifications.

Crude oil, commonly known as petroleum, is a natural resource which is nonrenewable. It is an inflammable, often black oily liquid, which consists of hydrocarbon with an admixture of various compounds like oxygen, nitrogen, sulfur and metals<sup>1</sup>. The color and smell of oil depend on its composition. In the different regions of the world exist black, brown, yellow, transparent, green and even cherry colors of crude oil, which are determined by the content of resin and asphalt substances. Also, there is a dependency between a color of crude oil and its density – the darker is oil, the higher its density is.<sup>2</sup>

#### 3.1.1. The history of crude oil

Crude oil has been known to people since ancient times. It was collected from the surface of open reservoirs and used in construction, medicine, as a fuel, for luminaries and making the weapon. Approximately 6000 BC. On the banks of Euphrates river, people found petroleum bitumen, which was used in construction and as a waterproof material. The Egyptians used crude oil as embalming. According to the Herodotus testimony, petroleum bitumen was used in constructing of Babylon. Also, he described the ancient way of petroleum production: *“To the well, whence men bring up asphalt and salt and oil. This is the manner of their doing it: - A windlass is used in the drawing, with half a skin made fast to it in place of a bucket; therewith he that draws dips into the well, and then pours into a tank, whence what is drawn is poured into another tank, and goes three ways: the asphalt*

---

<sup>1</sup> Václav Cílek: “Nejistý plamen - Průvodce ropným světem.” 2007. ISBN 978-80-7363-122-2. p. 20

<sup>2</sup> Oil Price Com [online]: What is crude oil? A detailed Explanation of this Essential Fossil Fuel. 2009. WWW <<https://oilprice.com/Energy/Crude-Oil/What-Is-Crude-Oil-A-Detailed-Explanation-On-This-Essential-Fossil-Fuel.html>>

*and the salt forthwith grow solid, the oil (petroleum), which the Persians call “rhadinace” is dark and evil-smelling.”*<sup>3</sup>

Crude oil was known to the Greeks and Romans. Ancient Greek doctor Hippocrates left many recipes, that concluded this combustible liquid. The Romans gave it the name, which then passed in many languages – oleum petrae, “the stone oil”. The heirs of the Greeks, the Byzantines created with a help of the petroleum a superweapon of the early Middle Ages – “The Greek fire”.

Another strongest ancient civilization first used petroleum for military purposes. Chinese soldiers threw into the ranks of opponents the pots with burning oil for many centuries before the invention of the famous “Greek fire”. In the 4<sup>th</sup> century, AD. in China was drilled the first oil well using hollow bamboo trunks. Crude oil was used as a fuel – it was burned to boil the brine from natural sources, evaporate the water and get a salt in this way. The deepest wells reached 240 meters.

Moreover, the Chinese have created entire pipelines from bamboo pipes, leading from the place of extraction to salt springs. Furthermore, when building the Great Chinese Wall, the asphalt was used.

The beginning of petroleum trade was noted in 1264 and in 1500 in Poland, for the first time, the crude oil was used to illuminate the streets. Although petroleum was known to people for very long times, modern crude oil production started since 1848 in the Bibi-Heybat oil field, Azerbaijan. There, in 1847 the first exploration crude oil well was drilled with a depth of 21 meters. The first modern type oil well was bored in 1848.<sup>4</sup>

---

<sup>3</sup> Forbes R.J: “Studies in Ancient Technology, Vol. VI” 1964. Page 46

<sup>4</sup> The world of oil [online/RU]: Oil in Ancient and Medieval history.  
WWW <<http://www.mirnefti.ru/index.php?id=15>>

### 3.1.2. Crude Oil Formation

Formation of crude oil is a long process, which passes in several stages and takes 50-350 million years. Two concepts of the origin of crude oil got spread: organic (biogenic) and inorganic (abiogenic). The dominant world theory of crude oil origin is the biogenic theory, which assumes that the crude oil was formed from the remains of microorganisms that lived millions of years ago in extensive water basins. These organisms formed layers with a high content of organic matter in the bottom, because of biochemical processes occurring without access to oxygen, the organic matter was converted to hydrocarbons that could be in gaseous, solid or liquid states.<sup>5</sup> Gas and liquid hydrocarbons under the influence of pressure moved through the permeable rocks until they met impenetrable overlay, where these hydrocarbons had been accumulating and forming the crude oil.

Abiogenic theory of crude formation supposes that crude oil was formed due to several elements of inorganic origin, with reactions occurring at great depths under high pressures and temperatures.<sup>6</sup>

### 3.1.3. The density of crude oil

Crude oil solidity is measured within 0.730—1.040 g/m<sup>3</sup> but the common measurement of the density of crude oil is API gravity, which was created by American Petroleum Institute. API gravity measurement shows the relative density of crude oil towards water density at the same temperature. If the density in API is more than 10, then crude oil is lighter and floats on the water surface, and if it's less than 10, it drowns.<sup>7</sup> According to the density, there are several crude oil classifications:

---

<sup>5</sup> Petro Wiki [online]: Origin of petroleum WWW<[http://petrowiki.org/Origin\\_of\\_petroleum#cite\\_note-r2-3](http://petrowiki.org/Origin_of_petroleum#cite_note-r2-3)>

<sup>6</sup> C. J. R. Braithwaite, G. Rizzi, G. Darke: "The Geometry and Petrogenesis of Dolomite Hydrocarbon Reservoirs." 2004. ISBN 1-86239-166-1. p. 18

<sup>7</sup> Petro Industry New [online]: What is API gravity? 2015 WWW< <https://www.petro-online.com/news/fuel-for-thought/13/breaking-news/what-is-api-gravity/33309>>

**Table 1: Crude oil density**

Classification	API gravity	g/m <sup>3</sup>	Example of crude oil field
Super-light	>50	<0,78	In Amenas, Algeria
Extra-light	41,1-50	0,78-0,82	Tengiz, Kazakhstan
Light	31,1-41,1	0,82-0,87	Ghawar, Saudi Arabia
Medium	22,3-31,1	0,87-0,92	Kizomba, Angola
Heavy	10-22,3	0,92-1	Marlin, Espirito Santo
Extra Heavy	<10	>1	-

Source: Wikipedia [online/RU] Density of crude oil

For low-density petroleum, a high content of gasoline and kerosene is characteristic, whereas heavy crude oils have an increased concentration of tar-asphalt components.<sup>8</sup>

### 3.1.4. The Content of sulfur in crude oil

At early stages of development of petroleum industry in Pennsylvania, the crude oil was used to illuminate the lamps and if the kerosene fraction contained a lot of sulfur, then its combustion was accompanied by a nasty smell. To spot if the petroleum is suitable for shipping on the market, it was tasted- if it was sweet, crude oil was suitable.<sup>9</sup>

Sweet petroleum is considered as petroleum with a content of sulfur less than 0.5%. This type of crude oil is highly demanded, it contains the small amount of carbon dioxide and hydrogen sulfide and is used to produce the gasoline. Sweet crude oil is extracted in Saudi Arabia, China, Russia, Azerbaijan, England etc. Sour petroleum is containing more than 0.5% of sulfur.<sup>10</sup> This type of petroleum is lower-quality and its cost of processing is higher because the sulfur impurities must be removed before the producing of gasoline. Sour petroleum is extracted in Kuwait, Kazakhstan, Egypt, Columbia, Alberta, Mexico, Alaska etc.

<sup>8</sup> Václav Cílek: "Nejistý plamen - Průvodce ropným světem." 2007. ISBN 978-80-7363-122-2. p. 22

<sup>9</sup> Sonia Shah: "Crude - The Story of Oil." 2004. ISBN 1583226257. p. 34

<sup>10</sup> Petroleum.Co.Uk [online]: Sweet vs. Sour Crude oil. 2015

WWW<<http://www.petroleum.co.uk/sweet-vs-sour>>



### 3.1.5. Benchmarks

Because of the existence of many grades and varieties of petroleum, using crude oil benchmarks is more comfortable to set a price for the sale and purchase of crude oil. To simplify the export, many countries use benchmarks, which are classified in accordance with oil field, density and sulfur content. The most valuable crude oils are these, that have high API gravity (lightweight) and low content of sulfur (sweet) because they require less processing in refinery<sup>11</sup>. In the world, there are 3 main benchmarks: Brent Blend, West Texas Intermediate (WTI) and Dubai Crude

- Brent Blend, North Sea – 38.6-39 ° API, sulfur content 0.37%
- WTI, Texas. USA - 39.6 °API, sulfur content 0.4-0.5%
- Dubai Crude, Dubai. UAE - 31 °API, sulfur content 2%

Brent's price is using by about two-thirds of the oil traded around the world, North America is referencing by the WTI price and the crude oil from the Asian market is sold at a Dubai Crude's price.<sup>12</sup>

Another benchmark for the price of crude oil is OPEC Basket that represents a weighted average crude oil price produced by members of OPEC. Here is an example of some of it.

---

<sup>11</sup> Petroleum roughneck [online]: Know your crude 2017.  
WWW<<http://www.petroleumroughneck.com/2017/03/know-your-crude.html>>

<sup>12</sup> Tushar Ghosh: "Energy Resources and Systems - Fundamentals and Non-Renewable Resources." 2009. ISBN 9048123828. p. 401

**Table 2 OPEC benchmark examples**

Name of product	Location	API gravity	% of sulfur
Iran Heavy	Iran	30.2°	1.77%
Oriente	Ecuador	24.1°	1.51%
Qatar Marine	Qatar	35.8°	1.47%
Girassol	Angola	29.9°	0.32%
Murban	Abu Dhabi	40.2°	0.79%

**Source:** Capline System [online]: CRUDE OIL PROPERTIES AND QUALITY INDICATORS

### 3.1.6. The dimension of crude oil

Commonly the crude oil is measured in barrels, that is a measurement of liquids or and bulk solids. There is a myth that the abbreviation of the crude oil barrel is bbl (blue barrel), it comes from Standard Oil Company's antecedent practice of coloring the barrels into a blue color, but various documents accompanying the carriage of goods confirm that this abbreviation was used in the 18<sup>th</sup> century.<sup>13</sup> One barrel contains 42 gallons or 158,987 liters<sup>14</sup>.

Despite the barrel is used almost all over the world, in Russia, until 1917, the crude oil was measured by poods, which is the Russian measure of weight that is equal to 16.3 kilos. Since 1917 in Russia, as well as in Kazakhstan and the United Kingdom the measurement of petroleum is a ton. But in Canada and Norway as the dimension of petroleum is used m<sup>3</sup>.<sup>15</sup> For the export purposes, it's needed to convert tones and cubic

<sup>13</sup> American Oil and Gas Historical Society[online]: History of the 42-Gallon Oil Barrel. WWW <<https://aoghs.org/transportation/history-of-the-42-gallon-oil-barrel/>>

<sup>14</sup> John Husher: "Facts & Myths Facing Today's World - Paints a realistic picture on the key topics of today." 2008. ISBN 0595504795. p. 92

<sup>15</sup> Everything about crude oil[online/RU]: Crude oil recovery. WWW<<http://vseonefti.ru/upstream/>>

meters into barrels. For instance,  $1 \text{ m}^3 = 6,2898 \text{ bbl}$ , but the conversion must be provided based on several factors like the density of crude oil and its temperature.

### 3.1.7. The Crude Oil Recovery

Until the 2<sup>nd</sup> half of the 19<sup>th</sup> century, the crude oil was mainly used in the raw. In some places, the crude oil was collected from the water surface, but nowadays this natural phenomenon doesn't exist, so the crude oil is extracted with a help of boreholes (oil wells). This method was originated in the 19<sup>th</sup> century, the 1<sup>st</sup> oil well was built on the Apsheron Peninsula in Azerbaijan in 1848.

The development of oil fields is done through the construction of oil wells and the oil mine methods. By the ways of extraction of well fluid, modern techniques are divided into a fountain (the fluid output is due to the difference in pressure in the reservoir and the pressure of the oil wellhead), artificial lift (gas lift) and pumping.<sup>16</sup>

The crude oil recovery is made progressively in 3 stages:

#### 3.1.7.1. Primary recovery stage (Kareem stage)

At this stage, the crude oil is pushed up to the surface by the natural underground pressure or pumped by the artificial lift. At this step crude oil is extracted by 5-15% of the total amount available.

#### 3.1.7.2. Secondary recovery stage

Advanced secondary recovery or improved oil recovery (IOR) is used when the natural crude oil flow is not enough for extraction. For its increasing, it is necessary to increase the pressure of reservoirs by injection of water or natural gas. IOR allows obtaining 35-45% of crude oil extracted.

#### 3.1.7.3. Tertiary recovery stage

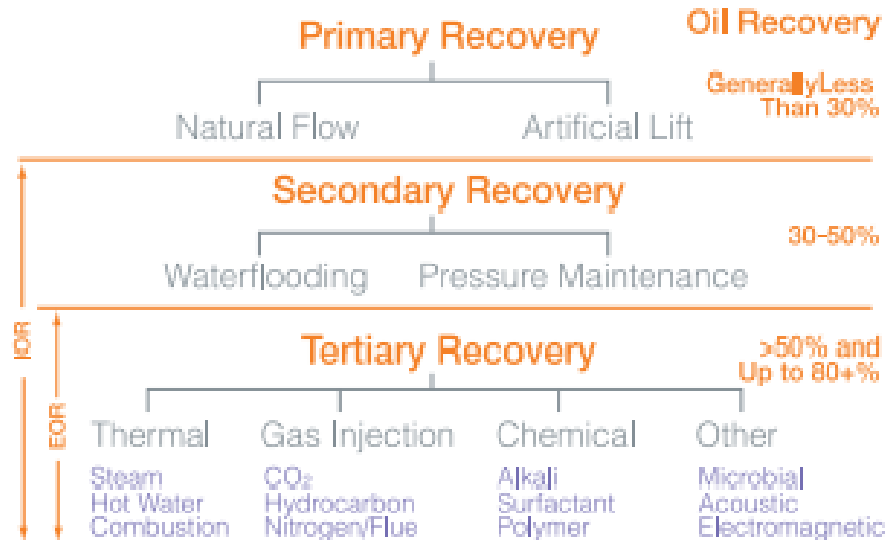
Tertiary stage or Enhanced Oil Recovery (EOR) can be applied when IOR is impossible, but extraction is still profitable, and the oil prices are high. To improve the crude

---

<sup>16</sup> Norman J. Hyne (1984) Geology for petroleum exploration, drilling, and production. ISBN 0070316597

oil flow, it's possible to use steam (to viscosity reduce), natural gas or chemical injections. When using EOR the extraction of crude oil increases by another 5-15%.<sup>17</sup>

**Figure 1 Oil recovery stages**



**Source:** World Petroleum [online]: Enhanced oil recovery: challenges & opportunities. WWW<[http://www.worldpetroleum.org/docs/docs/publications/2010yearbook/P64-69\\_Kokal-Al\\_Kaabi.pdf](http://www.worldpetroleum.org/docs/docs/publications/2010yearbook/P64-69_Kokal-Al_Kaabi.pdf)>

## 3.2. Production, Consumption, and Reserves of crude oil.

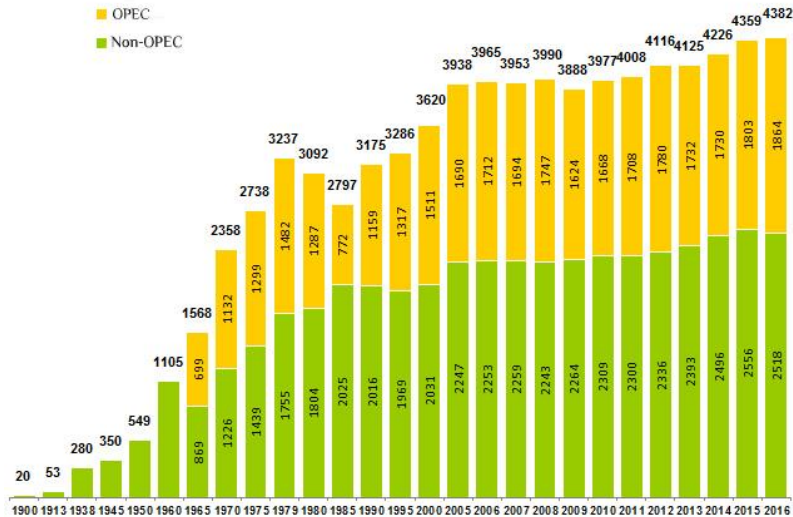
### 3.2.1. The Production of crude oil

Conditionally, the world crude oil production can be divided into 2 stages: from the very beginning until 1979 when the first relative maximum of petroleum production (3235 million tons) was reached, the second stage from 1979 to the present. From 1920 until 1970 the crude oil production was increasing year after year and increasing almost twice for every

<sup>17</sup> World Petroleum [online]: Enhanced oil recovery: challenges & opportunities, 2010. WWW<[http://www.worldpetroleum.org/docs/docs/publications/2010yearbook/P64-69\\_Kokal-Al\\_Kaabi.pdf](http://www.worldpetroleum.org/docs/docs/publications/2010yearbook/P64-69_Kokal-Al_Kaabi.pdf)>

10 years. Since 1979, the world oil production growth rate has slowed down and in 1980 there was a decline, but despite this, the oil production is growing steadily.

**Figure 2 Dynamics of oil production in the world, million tons**



**Source:** Crude oil production WWW <<http://vseonefti.ru/upstream>>

In 2016, the main world petroleum producers were Saudi Arabia with production share 13.4% (585.7 mln.t); Russia 12.6% (554.3 mln.t), United States with 12.4 (543.0 mln.t), Iraq, 5,0% (218,9 mln.t), Canada 5,0% (218,2 mln.t) and Iran 4,9% (216,4 mln.t) with growth rate per annum 2,9% in Saudi Arabia, 2,2% in Russia, (-4,2%) in U.S, 10,8% in Iraq, 0,9% in Canada, 18,9% in Iran.

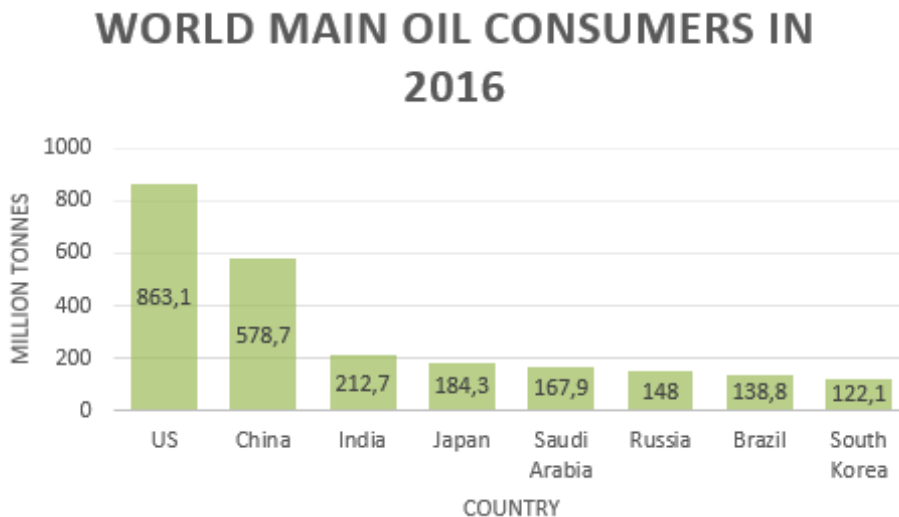
In general, in 2016, the world produced 4382.4 million tons of oil with growth rate 0.3%, which is the slowest growth since 2013.<sup>18</sup>

<sup>18</sup> BP [online] Statistical Review of World Energy, June 2017. WWW<<https://www.bp.com/content/dam/bp/en/corporate/pdf/energy-economics/statistical-review-2017/bp-statistical-review-of-world-energy-2017-full-report.pdf>>

### 3.2.2. Crude Oil Consumption

Global oil consumption in 2016 grew by 1.6%, which is 1,6 million barrels per day. It is the 2<sup>nd</sup> consecutive year of oil consumption growth for the last 10 years. In total, in 2016 the world consumed 4418.2 million tons of oil. The main consumers are the United States with consumption share 19.5%, China 13.1%, India 4.8%, Saudi Arabia 3.8%, Russia 3.3%, Brazil 3.1% and South Korea 2.8%.<sup>19</sup>

**Figure 3 World Main Oil Consumers 2016**



**Source:** BP: Statistical Review of World Energy, June 2017

<sup>19</sup> BP[online]: Statistical Review of World Energy, June 2017  
WWW<<https://www.bp.com/content/dam/bp/en/corporate/pdf/energy-economics/statistical-review-2017/bp-statistical-review-of-world-energy-2017-full-report.pdf>>

### 3.2.3. The World Oil Reserves.

Oil reserves are an estimated amount of oil, that can be economically feasible extracted in the future using developing technologies.<sup>20</sup> To the oil reserves belong natural gas liquids, field condensates, and crude oil. It is impossible to say exactly; how much crude oil is available under the surface of the earth and how much we will be able to extract in the future that's why all the numbers are estimated. Various statistics may have diverse numbers, it depends on the methodologies, that can be used during the calculations. Also, it is very hard to get truthful information, because the data can be modified for the different purposes. Within the conception of crude oil reserves, there are several classifications: ultimately recoverable resource, proved, probable and possible reserves.<sup>21</sup>

URR is the total quantity of crude oil that will ever be extracted and produced, that continue increasing as economics change, technology advances and knowledge grows. The ultimately recoverable resource is divided into three classifications: cumulative production, discovered reserves and undiscovered resource. Discovered reserves are defined as a distribution of probability and are divided into proved, probable and possible reserves.

Proved reserves are the reserves, which have 90% of probability, that the oil will be extracted. Since it is impossible to recover all the oil from its reservoir, proved, probable and possible reserves are and only proportion of oil in place. The proportion of oil to reserves for a given field is commonly named as the factor of recovery, which may change over the time based on several factors such as operating history, the economics of field and developing technologies. Also, the factor of recovery may increase using some investments in secondary recovery, that can help to enhance the pressure within the reservoir.<sup>22</sup> Probable reserves have the chance 50% of being technically and economically producible, and the probability of possible reserves is significant, but less than 50%. In the total oil reserves only, proven reserves are counted. Since the formation of crude oil is a very long process, we consume it faster than Nature creates new oil reserves, so why the amount of these reserves is finite, and we call crude oil as non-renewable material. We can often hear that

---

<sup>20</sup> Investopedia [online]: Oil Reserves. WWW < <https://www.investopedia.com/terms/o/oil-reserves.asp> >

<sup>21</sup> Charlotte J. Wright: "Fundamentals of Oil & Gas Accounting." 2008. p. 183

<sup>22</sup> BP[online]: Oil reserves definition. WWW < <https://www.bp.com/content/dam/bp/en/corporate/pdf/energy-economics/statistical-review-2017/bp-statistical-review-of-world-energy-2017-oil-reserve-definitions.pdf> >

there will be no oil soon in the world, but the crude oil will be too expensive to use long before it happens.<sup>23</sup>

In 2016 there was an increase in proven reserves by 0.9%, that is 15 billion barrels. Mainly the increase came from Iraq (10 billion barrels) and Russia (7 billion barrels). The amount of proven reserves in 2016 is 1707 billion barrels in total, which means that it's enough to ensure the World by the global production for 50,6 years at the 2016 level.<sup>24</sup>

In terms of oil reserves, the key role plays OPEC Member Countries, where 81.5% of the world's proven reserves are located, of which 65.5% of reserves are in the Middle East. It is realized by the developing technologies, such as, for example, enhanced recovery. Proven reserves in these countries make a mark of 1,216.78 billion barrels. At the end of 2016, the largest oil reserves have Venezuela 302.25 billion barrels, following by Saudi Arabia, which has 266.21 billion barrels, Iran with 157,20 billion barrels and Iraq, amounting 148,77 billion barrels.<sup>25</sup>

Non-OPEC member countries have 18.5% of the total oil reserves, it is 275,38 billion barrels. The largest reserves among them have Canada - 169,709 billion barrels, Russia with 80,000 billion barrels, United States, whose amount of reserves significantly increased from 20,68 billion barrels in 2013 and now make a mark of 39,230 billion barrels and Kazakhstan, which has 30,000 billion barrels.<sup>26</sup> It is interesting that in 2017, Qatar (25,244 billion barrels) was replaced by China, that has 25,620 billion barrels. The total proven reserves in Mexico are 7,640 billion barrels, that has decreased since 2014 when the total amount was 10, 07 billion barrels. Most of these countries produce more of crude oil than they use, so they can export so-called 'black golden'. Some of them are splitting to increase their power of negotiation, manage world supply and influence price. Since the World have the limited amount of crude oil, the exporters keep the prices high.

---

<sup>23</sup> The Balance [online]: Oil Reserves, Their Categories, And the World's Largest, 2017.  
WWW < <https://www.thebalance.com/oil-reserves-definition-categories-world-s-largest-3305873>>

<sup>24</sup> BP[online]: Statistical Review of World Energy, June 2017

<sup>26</sup> WWW <<https://www.bp.com/content/dam/bp/en/corporate/pdf/energy-economics/statistical-review-2017/bp-statistical-review-of-world-energy-2017-oil.pdf>>

<sup>25</sup> OPEC [online]: OPEC share of world crude oil reserves,2016.  
WWW < [http://www.opec.org/opec\\_web/en/data\\_graphs/330.htm](http://www.opec.org/opec_web/en/data_graphs/330.htm)>

<sup>26</sup> World Atlas [online]: The World's largest Oil Reserves by Country, 2017.  
WWW <<http://www.worldatlas.com/articles/the-world-s-largest-oil-reserves-by-country.html>>



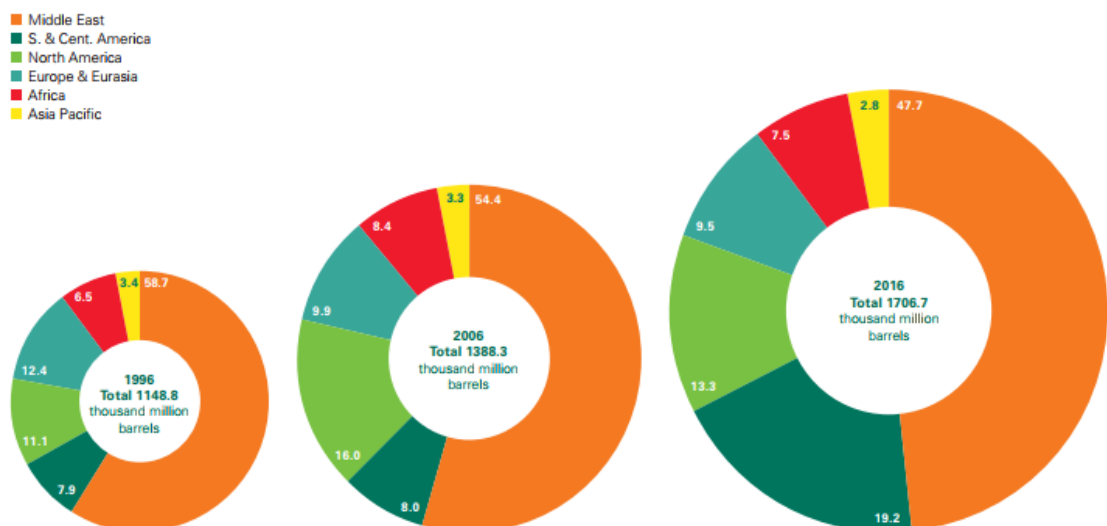
**Figure 4 World Top 10 Reserves Holders (in million barrels at 31st December)**

	2000	2005	2010	2011	2012	2013	2014	2015	Δ y/y (2015-2014)
Venezuela	76,848	80,012	296,501	297,571	297,735	298,350	299,953	300,878	0.3%
Saudi Arabia	262,766	264,211	264,516	265,405	265,850	265,789	266,578	266,455	0.0%
Canada	181,200	178,792	175,214	173,625	173,105	173,200	172,481	170,863	-0.9%
Iran	99,530	136,270	151,170	154,580	157,300	157,800	157,530	158,400	0.6%
Iraq	112,500	115,000	143,100	141,350	140,300	144,211	143,069	142,503	-0.4%
Kuwait	96,500	101,500	101,500	101,500	101,500	101,500	101,500	101,500	0.0%
United Arab Emirates	97,800	97,800	97,800	97,800	97,800	97,800	97,800	97,800	0.0%
Russia	48,573	60,000	60,000	60,000	80,000	80,000	80,000	80,000	0.0%
Libya	36,000	41,464	47,097	48,014	48,472	48,363	48,363	48,363	0.0%
United States	23,517	23,019	25,181	28,950	33,403	36,520	39,933	43,629	9.3%
<b>The World Top 10</b>	<b>1,035,234</b>	<b>1,098,068</b>	<b>1,362,079</b>	<b>1,368,795</b>	<b>1,395,465</b>	<b>1,403,533</b>	<b>1,407,207</b>	<b>1,410,391</b>	<b>0.2%</b>
Rest of the World	204,086	219,339	249,755	250,858	255,387	256,595	256,883	257,474	0.2%
<b>World</b>	<b>1,239,320</b>	<b>1,317,407</b>	<b>1,611,834</b>	<b>1,619,653</b>	<b>1,650,852</b>	<b>1,660,128</b>	<b>1,664,090</b>	<b>1,667,865</b>	<b>0.2%</b>

Source: Eni[online]: World Oil & Gas Review 2016.

WWW< [https://www.eni.com/docs/en\\_IT/enicom/company/fuel-cafe/WOGR-2016.pdf](https://www.eni.com/docs/en_IT/enicom/company/fuel-cafe/WOGR-2016.pdf)>

**Figure 5 Distribution of proved reserves in 1996, 2006 and 2016 (percentages)**



Source: BP[online]: BP Statistical Review of World Energy June 2017.

WWW< <https://www.bp.com/content/dam/bp/en/corporate/pdf/energy-economics/statistical-review-2017/bp-statistical-review-of-world-energy-2017-oil.pdf>>

### 3.3. The World Crude Oil Trade

The International trade is an economic concept of selling and purchasing goods and services. The international trade involves two interrelated processes: import and export. The process of buying the goods and services from foreign countries for using, selling or processing purposes calls import. Export is the process of selling the goods and services, producing in one country to another. International trade expands the markets, that otherwise may not have been available for a specific country. Thanks to international trade, a consumer can get a cheaper product because of greater competition and consequently, more competitive prices. On the international market, we can find every kind of a product or service, that helps the world economy to rise. In the international trade, the price of products and their demand and supply effect and can be affected by world events.<sup>27</sup> There is a possibility to exchange goods and services among the countries instead of paying in currency, this fact is called a countertrade. There are several types of purchase in countertrade: barter, counter purchase, buyback, offset (direct, indirect), switch trade and compensation (total, partial). Barter is the direct exchange of goods and services, which have the equivalent value, without paying in currency. A counter purchase is a relative agreement on buying goods and services, where a country buys goods or service back from a country to which the sale was made and each transaction is paid in cash. A buyback is a process when one company provides some services to a country and get a certain percentage of a country's output as a partial contract payment.<sup>28</sup> Crude oil can also be sold through the countertrade. For example, Russia and Iran signed the barter agreement, where Iran will export crude oil in Russia, in exchange for wheat and other products.

The crude oil market is one of the biggest markets in the world. Since the crude oil is the major source of energy, it is very important and the actively traded commodity, what is known to investors around the world. Because of it, the crude oil price affects the prices of other commodities and assets, like stocks, bonds, currency etc.<sup>29</sup> The transportation of the

---

<sup>27</sup> Investopedia [online]: What is international trade, 2015.

WWW< <https://www.investopedia.com/articles/03/112503.asp>>

<sup>28</sup> Maitah.com [online] Foreign Trade Operations, 2017 WWW< [http://www.maitah.com/TT/lecture\\_7.pdf](http://www.maitah.com/TT/lecture_7.pdf)>

<sup>29</sup> The Balance [online]: The Basics of trading crude oil futures, 2017.

WWW< <https://www.thebalance.com/trading-crude-oil-futures-809351>>

crude oil can be provided by tankers, pipelines, rail cars, and trucks. For long distances crude oil is exported by marine oil tankers, it is the cheapest and the most comfortable way of transportation. These tankers are carrying a lot of fuel, because of this the transportation cost is low. Also, a tanker is the only way to export the crude oil from one continent to another across the oceans.<sup>30</sup>

### 3.3.1. Export and Import

Crude oil is the 2<sup>nd</sup> most exported product, after the cars export. The share of oil exports is 4.3% of the all exported products' global value. In 2016, the crude oil shipments increased \$678 billion. The global crude oil export was 44 175 thsd. barrels/day, what is by 6% more than in 2015. The largest export region was The Middle East (19 211,1 thsd. barrels/day)<sup>31</sup>, amounted to 45.8% of world crude oil exports and \$310.6 billion. In 2016, the highest positive net export (Country's total export- Country's total import) for crude oil was in the following countries: Saudi Arabia (\$136.2 billion) with net export surplus -55.4% since 2012, Russia (\$73.6 billion) with NE surplus -59.3%, Iraq (\$46.3 billion), whose net export surplus fell by 24.3%. The highest negative net export was in China (-\$115.2 billion with the net export deficit -47.3% since 2012), United States (-\$99.8 billion and NE deficit -68.7%) and India (-\$60.9 billion with the deficit -59.1%). The highest surplus in the international crude oil trade has Saudi Arabia, that makes it the most competitive country for this specific product.<sup>32</sup> Since, in nowadays, our world depends on the energy, each country on the Earth imports the crude oil as one of the of the largest energy source. Oil is the most imported good in the world, its share of the global total imports is 16,7%.<sup>33</sup> In 2013,2014 there was a decline in world crude oil imports, but since 2015 the crude oil import has increased. The total world crude oil imports in 2016 have raised by 4.3% in comparison

---

<sup>30</sup> Student Energy [online]: Oil transport. WWW< <https://www.studentenergy.org/topics/ff-transport>>

<sup>31</sup> OPEC[online]: OPEC Statistical Bulletin 2017.

WWW<[http://www.opec.org/opec\\_web/static\\_files\\_project/media/downloads/publications/ASB2017\\_13062017.pdf](http://www.opec.org/opec_web/static_files_project/media/downloads/publications/ASB2017_13062017.pdf)>

<sup>32</sup> World Exports [online]: Crude oil exports by country, 2018.

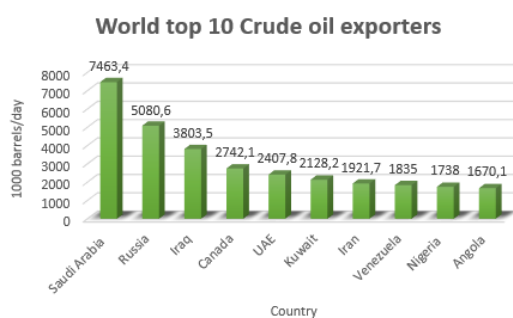
WWW< <http://www.worldstopexports.com/worlds-top-oil-exports-country/>>

<sup>33</sup> World's top exports[online]: World's top imports: Products and Countries,2015. WWW<

<http://www.worldstopexports.com/worlds-top-imports-products-countries/>>

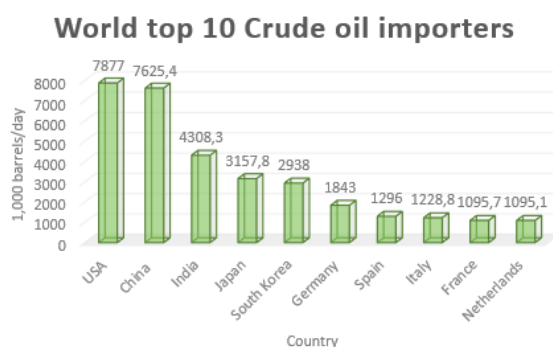
with the year 2015.<sup>34</sup> Global oil imports amounted 44 908,3 thsd. b/day in 2016. The biggest importers (with the share of dollar value out of the total oil imported cost) are the following countries: China (17.3%), USA (16.1%), India (9.1%), Japan (7.6%), South Korea (6.6%), Netherlands (4.4%), Germany (4.3%), Italy (2.8%), Spain (2.8%), France (2.7%). Year to year, some countries, that are the biggest crude oil importers are declining their oil import: United Kingdom (-70.1% since 2012), Japan (-66.8%), Italy (-66.8%), USA (-66.4%). The interesting fact is that from 2012 to 2016, no of the biggest importers experienced the boost in the value of crude oil.<sup>35</sup>

**Figure 6 World top 10 crude oil exporters**



**Source:** OPEC[online] Annual Statistical Bulletins 2017. WWW <[http://www.opec.org/opec\\_web/static\\_files\\_project/media/downloads/publications/ASB2017\\_13062017.pdf](http://www.opec.org/opec_web/static_files_project/media/downloads/publications/ASB2017_13062017.pdf)>

**Figure 7 World top 10 Crude oil importers**



**Source:** OPEC[online] Annual Statistical Bulletins 2017. WWW <[http://www.opec.org/opec\\_web/static\\_files\\_project/media/downloads/publications/ASB2017\\_13062017.pdf](http://www.opec.org/opec_web/static_files_project/media/downloads/publications/ASB2017_13062017.pdf)>

<sup>34</sup> OPEC[online] Annual Statistical Bulletins 2014-2017

<sup>35</sup> World's Top Exports [online]: Crude oil imports by country, 2017. WWW<<http://www.worldstopexports.com/crude-oil-imports-by-country/>>

## 3.4. Determinants of crude oil price

Crude oil is a one of the most widely traded commodity in the world. It is obvious, that the price of crude oil can't be the same all the time, there are several factors that affect the oil price fluctuations: the dynamic of demand and supply, that influence the price of all products in the world markets.<sup>36</sup> Since we live in a society, which we can't imagine without energy, the price of crude oil closely related to local and global economy growths. Based on this, the price of oil is also impacted by geopolitical events and monetary and fiscal policies of countries. As we know, the Middle East is the largest oil export region in the world, and significant impact on the crude oil price has the Organization of Petroleum Exporting Countries, which includes the main part of Middle East export leaders. Another important fact is a currency. Oil trade is done through the currency of benchmarks, which is a US dollar. Appreciation or depreciation of US dollar affects the crude oil price all over the world.

### 3.4.1. OPEC

Organization of Petroleum Exporting Countries is a multinational organization, that coordinates member petroleum policies and provides a technical and economic aid to its member states. OPEC was created in 1960 at the Baghdad Conference. The Founding members were: Iran, Iraq, Kuwait, Saudi Arabia and Venezuela. These members were later joined by 10 other member-states: Angola (2007), Algeria (1969), Ecuador (1973), Equatorial Guinea (2017), Gabon (1975), Indonesia (1962) Libya (1962), Nigeria (1971), Qatar (1961), and UAE (1967). Indonesia suspended its membership in 2009, reactivated it in January 2016, but suspended it once again in November 2016. In December Ecuador stopped its membership, but in October 2017 decided to rejoin. Because of disagreements in term of extraction limit, Gabon terminated in January 1995<sup>37</sup> and entered into Organization once again in July 2016. Nowadays OPEC includes 14 member-states. OPEC headquarters was in Geneva but was moved to Vienna. The mission of OPEC is *“to co-ordinate and unify petroleum policies among Member Countries, in order to secure fair and stable prices for*

---

<sup>36</sup> Francisco Parra: “Oil Politics - A Modern History of Petroleum.” 2009. ISBN 1848851294 p. 335

<sup>37</sup> Francisco Parra: “Oil Politics - A Modern History of Petroleum.” 2009. ISBN 1848851294. p. 44

*petroleum producers; an efficient, economic and regular supply of petroleum to consuming nations; and a fair return on capital to those investing in the industry.*"<sup>38</sup>

### 3.4.1.1. OPEC Policies

OPEC extracts 40% and controls almost half of the world's oil exports. OPEC oil reserves amounted ~80% of the global proven oil reserves (1,216.78 billion barrels), the most amounts of OPEC reserves are located in the Middle East (65.6% of the OPEC total). OPEC acts as a cartel, managing the oil supply in order to set the oil price on the global market. OPEC is trying to avoid the fluctuations, that might influence economies of producing and consuming countries. Member states set quotas for the amount of crude oil extracted in a certain period and this is a way how OPEC impacts the global oil market and the price of oil. In the interest of OPEC, as a cartel is to keep the oil prices as high as it's possible while retaining its share on the world market. It happens, that some member-states break the agreements and extract more than they supposed to extract according to the quotas, in this case, Saudi Arabia, as the most powerful member, which provides nearly 30% of total OPEC extraction, regulates the price of crude oil.<sup>39</sup> In the case of oil price decline due to over-limit extraction, Saudi Arabia reduces its production in order to keep the price at the desirable level. In 1983 and 1984 the oil extraction was reduced, despite the fact that production capacity was 3 times higher.

The development of innovating technologies has had a huge influence on the global price of crude oil and has diminished the OPEC's power on the world markets in consequence the global oil extraction has increased, and prices significantly have dropped, what left OPEC in a delicate situation. In June 2016, in order to push the higher-cost producers out of the market and retrieve the global market share, OPEC decided to keep the production at the high levels and hence low prices.

---

<sup>38</sup> Organization of Petroleum Exporting Countries [online]: Brief History,2018. WWW< [http://www.opec.org/opec\\_web/en/about\\_us/24.htm](http://www.opec.org/opec_web/en/about_us/24.htm)>

<sup>39</sup> Forbes [online]: OPEC's Trillion Dollar Miscalculation. 2016. WWW: <<http://www.forbes.com/sites/trapier/2016/01/08/opecs-trillion-dollar-miscalculation/#41e81e2273c1>>

### 3.4.1.2. OPEC and non-OPEC Ministerial Meeting 2016

In December 2016, 24 OPEC and non-OPEC countries agreed to reduce the oil production when the oil price fell to \$35-40 per barrel and there were no perspectives to improve this situation. The meeting was chaired by His Excellency Dr. Mohammed Bin Saleh Al-Sada, President of the OPEC Conference and Minister of Energy and Industry of the State of Qatar and His Excellency Alexander Novak, Minister of Energy of the Russian Federation. Before the conclusion of the agreement, the ministers of the OPEC and non-OPEC countries agreed that if within several months they will not increase oil production, the prices will rise to \$60-70 per barrel. The main risk for the agreement was that OPEC considered its own lack of discipline, and the main task, respectively, is to ensure the 100% implementation. In December 2016, Saudi Arabian oil minister Khalid al-Falikh, announced by the OPEC president in 2017, said he would personally control how each participant fulfilled the agreement. OPEC countries reduced the oil production by 1.2 million barrels/day. Azerbaijan, Kingdom of Bahrain, Brunei Darussalam, Equatorial Guinea, Kazakhstan, Malaysia, Mexico, Sultanate of Oman, the Russian Federation, Republic of Sudan, and The Republic of South Sudan commit to reduce their respective oil production by totally 558,000 barrels a day.<sup>40</sup>

### 3.4.1.3. OPEC basket price.

OPEC basket or OPEC Reference Basket (ORB) is a weighted average spot prices for main grades of oil, produced by members, including: Algerian Saharan Blend, Angolan Girassol, Ecuadorian Oriente, Equatorial Guinea's Zafiro, Rabi Light from Gabon, Iran Heavy (Islamic Republic of Iran), Iraqi Basra Light, Kuwait Export (Kuwait), Libyan Es Sider, Nigerian Bonny Light, Qatar Marine (Qatar), Arab Light from Saudi Arabia, UAE's Murban and Venezuela's Merey.<sup>41</sup> This average is defined according to the production and export of each country and is used as a benchmark to set the prices and monitor the global oil market conditions. From 1 January 1987 to 16 June 2005 the price was counted as

---

<sup>40</sup> OPEC[online]: OPEC and non-OPEC Ministerial Meeting,2016. WWW<[http://www.opec.org/opec\\_web/en/press\\_room/3944.htm](http://www.opec.org/opec_web/en/press_room/3944.htm)>

<sup>41</sup> OPEC[online]: OPEC Basket Price,2018. WWW<[http://www.opec.org/opec\\_web/en/data\\_graphs/40.htm](http://www.opec.org/opec_web/en/data_graphs/40.htm)>

arithmetic average of seven crude oils: Algerian Saharan Blend, Indonesian Minas, Nigerian Bonny Light, Saudi Arab Light, Dubai Fateh, Venezuelan Tia Juana Light and Mexican Isthmus (which is non-OPEC crude oil type)<sup>42</sup> In 2005 OPEC members decided to change the price calculating method and the basket composition as well. In 2016 OPEC members introduced the adjustment, which should better represent the oil quality.

### 3.4.2. Demand and Supply

The interaction of demand and supply determines the price of all products on the market.<sup>43</sup> To make an exchange of goods and services, the buyers and sellers must agree on the price, which is called “equilibrium price”. An increase in demand leads to an increase in a price and supply of a product, and an increase in supply leads to decrease in a price and demand for a product. Ultimately, all fluctuations of supply and demand lead to equilibrium.<sup>44</sup> Demand depends on the several factors like consumer preferences, income, advertisement etc. In the long run, a demand for crude oil depends on the global economic growth, in particular on the growth in manufacturing, transportation, electricity and shipping sectors. A decline in the world economy will reduce the oil demand. Growing in the total demand of crude oil provides the economic growth of countries which are the biggest oil consumers: China, USA, Russia, India, Brazil etc. From the end of 2015 to the end of 2016 the crude oil demand rose from 95.49 million barrels/day to 96.95 million barrels/day. The highest role in term of supply plays the OPEC organization, whose members produce about 40% of global crude oil production. At the end of 2016, OPEC oil supply was 33.43 million barrels/day, but at the beginning of 2017, it fell to 32.07 million barrels/day due to lower output in Saudi Arabia, Angola, and Venezuela. Global supply also went down from 98.22 million barrels/day at the end of 2016 to 96.62 million barrels/day at the beginning of 2017. The benchmark oil price was at the highest level in more the 2 years in December 2016.<sup>45</sup>

---

<sup>42</sup> J. Clifford Jones: “OPEC - Its Role and Influence since 1960.” ISBN 978-87-403-0748-1. p. 35

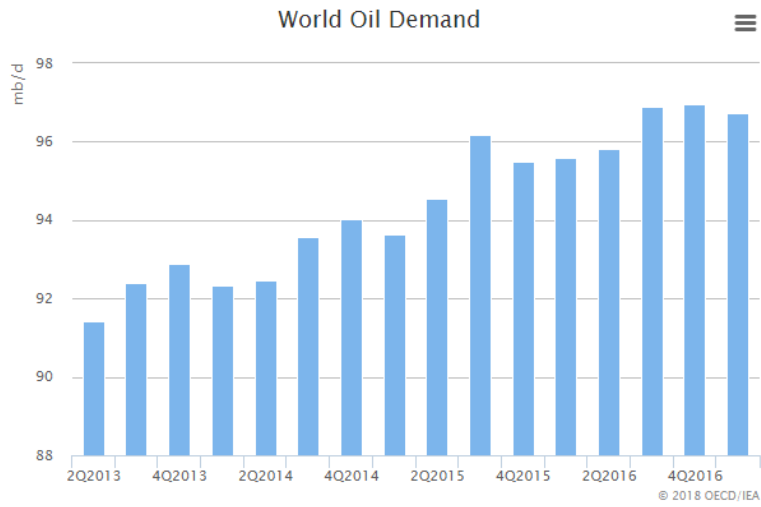
<sup>43</sup> Salvatore Carollo: “Understanding Oil Prices - A Guide to What Drives the Price of Oil in Today's Markets.” 2011. ISBN 1119962722. p. 10

<sup>44</sup> Futures trading charts[online]: How Supply and Demand determine Commodities Market Prices, WWW < [http://futures.tradingcharts.com/learning/supply\\_and\\_demand.html](http://futures.tradingcharts.com/learning/supply_and_demand.html) >

<sup>45</sup> International Energy Agency[online]: Oil market report,2017. WWW < <https://www.iea.org/oilmarketreport/omrpublic/> >

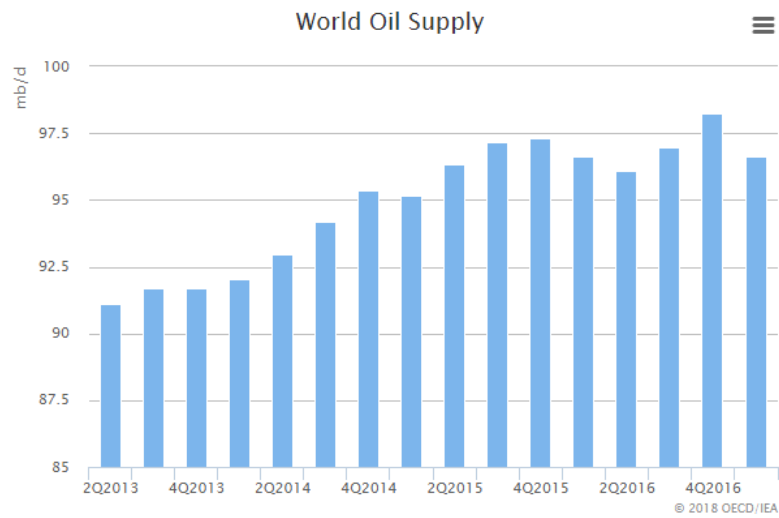


**Figure 8 World Oil Demand**



**Source:** International Energy Agency[online]; Oil market report,2017.  
WWW <<https://www.iea.org/oilmarketreport/omrpublic/>>

**Figure 9 World Oil Supply**



**Source:** International Energy Agency[online]; Oil market report,2017.  
WWW <<https://www.iea.org/oilmarketreport/omrpublic/>>

### 3.4.3. Other factors

**3.4.3.1. US dollar exchange rate:** Because of the stability, US dollar is a benchmark currency for the crude oil, that's why the price of crude oil and US dollar exchange rate are interdependent. Many of nations use the US dollar as reserve assets. When dollar depreciates, nations need more dollar amount to buy the oil. But with dollar depreciation, foreign buyers have more buying power and less amount of another currency is needed, what means that the crude oil price will increase.<sup>46</sup>

**3.4.3.2. The growth of world economy:** As we already know the price depends on the demand, which in its term depends on the global growth of the economy. The crude oil price rise with the growth of world economy.

**3.4.3.3. Geopolitical events:** Natural disaster or political conflicts also determine the price of crude oil. These events lead to loss of output, supply decline or ineffective market functioning, that cause the increase in the price of crude oil.

**3.4.3.4. Fiscal and Monetary policies:** Local fiscal and monetary policies, especially in the United States, European Union, China, and Japan impact the investments, capital flow and oil demand, that also determines the oil price on the global market.<sup>47</sup>

**3.4.3.5. Production cost:** The production cost also plays role in oil price fluctuations. The oil extraction in the Middle East is relatively cheap, what is not possible to say about extraction in Canada (Alberta's oil sands). The oil price will be up if the supply of cheap oil will be exhausted and the only oil left will be in oil sands in Canada.<sup>48</sup>

---

<sup>46</sup> The Balance[online]: How the dollar impacts Commodity Prices, 2017.  
WWW<<https://www.thebalance.com/how-the-dollar-impacts-commodity-prices-809294>>

<sup>47</sup> Oil & Gas Financial Journal[online]: Oil Price Fluctuations,2017.  
WWW<<http://www.ogfj.com/articles/print/volume-14/issue-4/features/oil-price-fluctuations.html>>

<sup>48</sup> Investopedia[online]: What causes oil prices to fluctuate?  
WWW< <https://www.investopedia.com/ask/answers/012715/what-causes-oil-prices-fluctuate.asp>>

## 4. Practical Part.

### 4.1 The Economy of Kazakhstan.

Kazakhstan is the largest country in Central Asia, which used to be a part of Soviet Union and now is a member of Commonwealth of Independent States. The area of the Republic of Kazakhstan is 2 724 902km<sup>2</sup>, which makes it the 9<sup>th</sup> largest country in the world and 2<sup>nd</sup> among the CIS countries (after Russia). Kazakhstan shares borders with Russia, China, Uzbekistan, Kyrgyzstan, and Turkmenistan. The Republic of Kazakhstan is the world's largest landlocked country, but it adjoins the large part of Caspian Sea. The official currency is Kazakh tenge (KZT). Kazakhstan has two official languages – Kazakh and Russian. The capital of Kazakhstan is Astana, but the largest city, which is the commercial and cultural center of the Republic is Almaty city.

After the collapse of Soviet Union, Kazakhstan gained its independence on 16 December 1991. According to the constitution, Kazakhstan is a democratic, legal, unitary, secular republic with a Presidential form of government. Also, the Republic of Kazakhstan has 3 independent branches of power: executive, legislative and judicial, the President doesn't belong to any of these 3 branches. The only president of Kazakhstan is Nursultan Nazarbayev, who has a very strong position in politics. The executive power is implemented by Government, which is formed by the president according to the Constitution. The head of the Government is the prime-minister, Bakytzhan Sagintayev. The legislative power is implemented by the Parliament, which has two chambers: The lower House, known as Assembly (Mazhilis in Kazakh) has 107 seats and the upper House, Senate, has 47 members. The Parliament is elected for 5 years for Mazhilis and for 6 years for Senate, wherein the half of the Senate members elect every 3 years. The authority of judicial power is the Supreme Court of Kazakhstan, the member election of which is based on the recommendation of the Supreme Judicial Council.

The population of Kazakhstan is more than 18 000 000 people, but it has very low population density, only 6 people per squared kilometer. Kazakhstan is multiethnic country, which has 131 ethnicities include Kazakhs, Russians, Uzbeks, Ukrainians, Germans, Tatars, and Uyghurs.<sup>49</sup>

The landscapes in Kazakhstan are also various, despite that most of the territory are deserts and semi-deserts, in Kazakhstan, there are flatlands, steppes, rock canyons, hills, and mountains. Kazakhstan has rich oil, gas and mineral resources, which helps Kazakhstan's economy to develop. Now Kazakhstan is a member of the United Nations, United Nations Educational, Scientific and Cultural Organization (UNESCO), World Trade Organization (WTO), Commonwealth of Independent Countries (CIS), Eurasian Economic Union (EAEU), Shanghai Cooperation Organization (SCO), Organization for Security and Co-operation in Europe (OSCE), Organization of Islamic Cooperation (OIC), Collective Security and Treaty Organization (CSTO) and International Organization of Turkic Cultures (TURKSOY) and many other organizations.<sup>50</sup>

According to the rating of World Bank, in terms of nominal GDP in 2016 Kazakhstan was on the 55<sup>th</sup> place and on the 41<sup>st</sup> place in terms of PPP GDP. Nominal GDP was \$184,388 billion in 2015 and \$137,278 billion in 2016. GDP using Purchasing Power Parity was \$440,299 billion and \$450,822 billion in 2016. The economic growth was 1,2% in 2015 and 1,1% in 2016.<sup>51</sup>

The inflation rate in 2016 was 8,29% what is by 5,24% less than in the year 2015. By the world yearly inflation rate in 2016, Kazakhstan was on the 15<sup>th</sup> place.<sup>52</sup> According to the World Bank annual ratings, in the ease of doing business, the Republic of Kazakhstan

---

<sup>49</sup> Ministry of the national economy of the Republic of Kazakhstan Committee of Statistics [online]: Results of the National Population Census,2009. WWW<  
[http://stat.gov.kz/faces/wcnav\\_externalId/p\\_perepisNews12-11?\\_afzLoop=2661582394294387#%40%3F\\_afzLoop%3D2661582394294387%26\\_adf.ctrl-state%3Dte5vcendh\\_123](http://stat.gov.kz/faces/wcnav_externalId/p_perepisNews12-11?_afzLoop=2661582394294387#%40%3F_afzLoop%3D2661582394294387%26_adf.ctrl-state%3Dte5vcendh_123)>

<sup>50</sup> The Ministry of Foreign Affairs Republic of Kazakhstan[online]. List of International Organization. WWW< <http://mfa.gov.kz/en/content-view/spisok-mezhdunarodnykh-organizatsij>>

<sup>51</sup> The World Bank[online] WWW. < <https://data.worldbank.org/country/kazakhstan>>

<sup>52</sup> StatBureau[online]: Kazakhstan inflation rate in 2016,2017. WWW<  
<https://www.statbureau.org/en/kazakhstan/inflation/2016>>

ranked 35 among 190 economies all over the world.<sup>53</sup> Unemployment rate in 2016 amounted 4,97%.<sup>54</sup>

The basis of the economy of Kazakhstan is industrial production, which accounts for more than 1/3 of total GDP. The most developed industries are mining industry, manufacturing industries, such as light, food and wood industries, metallurgical, chemical, machine-building and other. On the territory of Kazakhstan, there are reserves of 99 out of 105 elements of the periodic table, 70 of which are explored and 60 are involved in a production. Kazakhstan is on the 1<sup>st</sup> place in the world in reserves of wolfram (more than 50%), chrome (23%), zinc (13%) and vanadium ores, on the 2<sup>nd</sup> place- in uranium reserves (23%), on the 3<sup>rd</sup>- in the asbestos and manganese reserves, on the 4<sup>th</sup> place in the lead ore (19%), on the 6<sup>th</sup> place in reserves of phosphorite ores and gas, on the 7<sup>th</sup> -in reserves of iron ores(10%), oil and silver and on the 9<sup>th</sup> in reserves of copper(10%), coal and gold. Such as provision of diverse minerals makes a possibility to develop a complex diversified industrial system based on the extraction of fuel and energy minerals, iron and non-ferrous metal ores. It has a positive influence on the development of manufacturing industries, such are metallurgy, machine building, metalworking, petrochemical, chemical and pharmaceutical industries. And, of course, such wealth attracts foreign investors to the country, for example in the development of oil fields are engaged not only national companies, but foreign giants such are Royal Dutch Shell, LukOil, Total and ExxonMobil.

Agriculture is less developed in Kazakhstan, it produces only 8% of GDP. Nevertheless, among the CIS countries, Kazakhstan ranks 3<sup>rd</sup> place in the grain production. Also, in Kazakhstan are widely distributed such branches of agriculture as livestock, growing of vegetable, production of oilseeds, melons and sugar beets. Even in the most barren year, Kazakhstan provides itself with bread and at the same time exports about 70% of the crop.<sup>55</sup>

The main commodities of export in Kazakhstan are fuel and energy products, which characterizes the raw material orientation in Kazakhstan's economy. These kinds of products

---

<sup>53</sup> Trading Economics[online]: Ease of doing business in Kazakhstan,2017.  
WWW< <https://tradingeconomics.com/kazakhstan/ease-of-doing-business>>

<sup>54</sup> Statista[online]: Kazakhstan: Unemployment Rate 2012-2022,2018.  
WWW< <https://www.statista.com/statistics/436179/unemployment-rate-in-kazakhstan/>>

<sup>55</sup> Kz Spinform[online/RU]: The economy of Kazakhstan, 2017.  
WWW < <http://www.kz.spinform.ru/ekonomics.html>>

account for 80% of total country's export. Also, from Kazakhstan are exported metals and products from them (19%), chemicals (5%), machinery (3%) and other products like coal, grain, and wool. Kazakhstan mainly imports machinery, medicaments, equipment and vehicles (more than half of the total imports), also, metal, chemical products, food, clothes, footwear and other consumer products. It should be noted that the economy of Kazakhstan is oriented on the export, which exceeds import volumes by more than twice. The largest foreign trade partners are Russia, China, and Germany. Russia accounts almost 30% of the total foreign trade turnover.

Kazakhstan has a deficit budget, in the year 2015 country's expense was 8228097,2 million KZT, while income was 7634,804,9 million. KZT. The state's dependence on the revenue from oil and oil products sometimes can have a negative influence on the economic growth – the global market forces determine the oil price, that prevent the state to plan financially. Due to this, Kazakhstan has faced the GDP reduction and budget deficit. The national debt accounts \$163,757 billion in 2017, or 25,1% of GDP. National currency exchange rate, the tenge, fell almost twice in compare with US dollar, over the past 5 years.

Kazakhstan is working on increasing the foreign direct investments. In 2014, the government signed the law tax concessions, aimed to increase the FDI. These concessions include a ten-year exemption from corporate tax, eight-year – from property tax and ten-year freeze of other kinds of taxes. Kazakhstan, also, contracted VAT and other types of a levy. It was made to attract the foreign investors and promote the economic growth of the state.<sup>56</sup>

Despite the crisis, devaluation of national currency and the fall of GDP in a recalculation of the US dollar, the long-term forecasts of the economic development are favorable and positive. Of course, the raw material orientation of country's economy doesn't add to its stability in conditions of continuing fall in global oil prices, but overall potential of the country's economy is so great, that with proper management and state's support, all unfavorable processes will be overcome.<sup>57</sup>

---

<sup>56</sup> World Atlas[online]: The economy of Kazakhstan, 2017.  
WWW<<https://www.worldatlas.com/articles/the-economy-of-kazakhstan.html>>

<sup>57</sup> Kz Spinform[online/RU]: The economy of Kazakhstan, 2017.  
WWW <<http://www.kz.spinform.ru/ekonomics.html>>

## 4.2. Crude Oil in Kazakhstan

Kazakhstan is one of the top 20 global oil producers, it has the second largest oil production and reserves among the CIS countries after Russia. Kazakhstan became the oil producer in 1911. On the territory of Kazakhstan, there are more than 200 oil and gas fields, industrial oil reserves are mainly concentrated in 13 oil fields (91%), including two giant fields (69%)- Tengiz and Kashagan. Explored state's oil deposits are distributed extremely unevenly – all the largest oil fields are located on the East of the state, near the Caspian Sea, while most oil fields in the south of the country are small or medium. Thus, the central northern and western parts of Kazakhstan don't have any resource hydrocarbon potential. 4% (0,23 billion tones) of the total country's oil reserves are high-viscosity oil, which is difficult to extract, and about 40% of oil is sour, that significantly increase the cost of oil production. Since Kazakhstan in a landlocked country, that makes the country dependent on the pipeline's transportation of its hydrocarbons to the international market. Kazakhstan also is a transit territory for the oil and gas exports to China.<sup>58</sup>

### 4.2.1. The largest oil fields

Crude oil extraction is one of the major industries in the economy of Kazakhstan. The crude oil history in Kazakhstan began in 1899 when in the Karashungul oil field hit the first oil fountain and in 1911 in Dossor was found the high-quality oil. Crude oil on the territory of Kazakhstan began to be extracted much earlier than in Mexico, Iran, Kuwait and Saudi Arabia. The high probability of finding the industrial oil reserves in this region was noted by the Russian military, scientists, and travelers. Today the state balance of Kazakhstan considers the reserves for 223 oil fields. The biggest oil fields are Tengiz, Kashagan, and Karachaganak.<sup>59</sup>

---

<sup>58</sup> Facts and details[online]: Oil in Kazakhstan,2016.

WWW<[http://factsanddetails.com/central-asia/Kazakhstan/sub8\\_4e/entry-4676.html](http://factsanddetails.com/central-asia/Kazakhstan/sub8_4e/entry-4676.html)>

<sup>59</sup> NefteGaz[online/RU]: The history of Kazakhstan's oil industry.

WWW<<http://www.neftegaz.kz/analitik-articles/istoriya-kazaxstanskoj-neftyanoj-otrasli.html>>

### 4.2.1.1. Tengiz

The Tengiz oil field in Western Kazakhstan was discovered in 1979 near the Caspian Sea, this oil field is one of the largest and deepest oil fields in the world. Near this field, there is a smaller one, Korolev oil field, that also has a large deposit of oil. Both Korolev and Tengiz hold 750 million to 1,1 billion tones (6 billion to 9 billion barrels) in proven reserves. Total explored reserves in drilled and undrilled parts of Tengiz reservoirs are estimated at 3,1 billion tones or 26 billion barrels. The reserves of Korolev deposit, belonging to the world-class deposit, are estimated at 188 million tones (1.5 billion barrels), what is the one-sixth of the Tengiz's reserves.

Tengiz oil field is the world's deepest super-giant oil field, the upper oil-bearing reservoir of which is lying on the deep of about 4000 meters (13000 feet). The collector of Tengiz oil field stretches for 19 kilometers (12 miles) in length, 21 kilometers (13 miles) in width and thickness of oil mass measures incredible 1,6 kilometers (1 mile). From January to September 2017, crude oil production in this field amounted 21,4 million tones or 171 million barrels. Crude export is carried out via the Caspian Pipeline Consortium Oil Pipeline. This oil field is explored and developed by the LLP Tengizchevroil company, which was established by the agreement between the Government of the Republic of Kazakhstan and the Chevron Corporation in 1993. Chevron owns 50% of Tengizchevroil, also the interest in TCO hold ExxonMobil (25%), KazMunayGaz (20%) and LukArco (5%).<sup>60</sup>

### 4.2.1.2. Kashagan

Kashagan oil field was discovered on 30 June 2000 by the oil well Vostok-1 and named after a Kazakh poet. Kashagan is the large offshore oil and gas field, located in the northern part of the Caspian Sea. It's the largest oil deposit in the world, discovered in the last 40 years, as well as the largest oil field at the sea. Kashagan is divided into 3 parts: West, East, and South-West Kashagan. West Kashagan was explored in 2001, South-West in 2003. Kashagan oil field covers the area of 75x45 kilometers, with the collector lying at a depth of

---

<sup>60</sup> Tengizchevroil[online]: The Tengiz Field,2017. WWW< <http://www.tengizchevroil.com/about/tengiz>>



4200 meters below the seabed. The development of field is conducted by the construction of artificial islands. The oil field operating is made by the North Caspian Operating Company in the form of production sharing agreement for the Northern Caspian. This project is the largest and most complicated industry project in the world because of development in difficult geological conditions: a shelf zone, an unfavorable combination of shallow-water conditions and ice formation (about 5 months in a year), an eco-sensitive zone, large deposit depth (up to 4800 m.), high reservoir pressure (80 MPa) and high content of sulfuretted hydrogen (19%). Also, these difficulties relate to the ensuring the safety of production, solving engineering, logistic, and environmental problems.<sup>61</sup> It is interesting that word “қауаған” from the Kazakh language is translated as “nimble, intangible”.

Industrial oil recovery was started on 11 September 2013. Crude oil in this oil field is considered as high-quality -46° API, but with a high gas factor, the content of sulfuretted hydrogen and mercaptans. The recoverable reserves of Kashagan oil fluctuate within the wide range of 1,5- 10,5 billion tons, of these, Eastern accounts for 1,1-8 billion tons, for the Western – up to 2,5 billion tons and 150 billion tons fall to the South-West Kashagan. According to Kazakhstan’s geologists, the geological reserves of Kashagan accounts 4,8 billion tons of oil. The total oil reserves are 38 billion barrels (6 billion tons), according to the operator of the project and about 10 billion barrels of which are recoverable. Also, in Kashagan there are large reserves of natural gas – more than 1 trillion cubic meters. Export of oil from Kashagan is carried out by the existing pipeline and railway systems. The Western (Atyrau-Novorossiysk), Northern (Atyrau-Samara, connected to the Russian Rosneft system) and Eastern (Atyrau-Alashankou) routes of Caspian Pipeline Consortium provides connection to the existing export transportation systems. Now NCOC is exploring all the possible export routes, for example, South-Eastern route depends on the development of Kazakhstan’s Caspian Transportation System. The members of Consortium NCOC are KazMunayGas (16.81%), ENI (16.81%), ExxonMobil (16.81%), Royal Dutch Shell (16.81%), Total S.A (16.81%), CNPC (8.4%) and INPEX (7.56%).<sup>62</sup>

---

<sup>61</sup> NCOC[online]: Kashagan Oil field. WWW<<http://www.ncoc.kz/ru/kashagan/default.aspx>>

<sup>62</sup> NefteGaz[online/RU]: Kashagan. WWW<[https://neftegaz.ru/tech\\_library/view/4262-Kashagan](https://neftegaz.ru/tech_library/view/4262-Kashagan)>

### 4.2.1.3. Karachaganak

Karachaganak is one of the largest oil and gas condensate field in the world, that was discovered in 1979. Karachaganak is located in Western Kazakhstan and covers the area of more than 280 km<sup>2</sup>. The operating of this oil field is provided by Karachaganak Petroleum Operating, the last agreement was signed in 1997 by Eni SpA (29,25%) Royal Dutch Shell (29,5%), Chevron Corporation (18%), LukOil (13,5%) and KazMunayGas (10%), defining the conditions of joint development of Karachaganak oil field until 2038. Since that moment, more than \$22 billion has been invested in the oil field development. Due to a fact, that Karachaganak field is one of the most complex fields, KPO use the most advanced and, in some cases, innovative technologies to develop the field. The company drilled the deepest a technologically sophisticated well in Kazakhstan. Initially, all the production was sold to Russian OrenburgGaProm, but since June 2004 about 80% of crude oil is exported to the Western markets. The remaining values as unstable condensates and crude gas continue to be supplied in Russia, but some unstable condensate and dry gas are consumed on the domestic market. The company use 4 transportation systems to export the hydrocarbons, these are Karachaganak-Atyrau Transportation System, The Caspian Pipeline Consortium, The Karachaganak-Orenburg Transportation System and the Atyrau-Samara link. The total estimated reserves of Karachaganak field exceed 2,4 billion barrels of condensate and 16 trillion cubic feet of gas and initially estimated reserves of hydrocarbons amounted to 9 billion barrels of condensate and 48 trillion cubic feet of gas.

In 2016, the KPO company extracted 139,7 million barrels of stable and unstable liquid hydrocarbons, gas and fuel gas and 46% of the total volume of gas was injected back to maintain the pressure, what amounted to 8,04 billion cubic meters.<sup>63</sup>

---

<sup>63</sup> Karachaganak Petroleum Operating[online]: WWW<<http://www.kpo.kz/en/about-kpo.html>>

## 4.2.2. Crude oil Production and Consumption.

The crude oil production in Kazakhstan, the largest crude oil producer in Central Asia, amounted to 79,3 million tons in 2016 with the share value of 1,8% out of the global oil production. Since 2013, when the production amounted to 82,3 million tons, the crude oil production was declining. In 2015 the volume of oil produced in Kazakhstan was 80,2 million tons, by the 1,4% more than the production in 2016.<sup>64</sup> This is due to both macroeconomic factors and the deterioration of the existing infrastructure. More than 50% of the oil wells, using in the fields of Western Kazakhstan are operated for more than 20 years and require the modernization of equipment. Also, under the agreement with OPEC, Kazakhstan was obliged to reduce its production to 1,68 million barrels per day. Kazakhstan limited the production at some fields, but these limitations didn't affect Kazakhstan's giant oil fields such are Tengiz, Kashagan, and Karachaganak.<sup>65</sup> In 2017, the oil production was at the record level and amounted to 86,2 million tons. Joining the OPEC+ agreement to decline the oil production and maintain the oil prices, Kazakhstan had to decline the oil production to 20 000 barrels per day in 2017, but the growing production of raw material at Kashagan field, which began operating in 2016 after downtime due to technological problems, didn't provide the opportunity to fulfill the obligations. Other difficulties were caused by the contractual obligations to partners- foreign investors, working in large oil and gas fields. The prospect of oil production for the year 2018 is projected at the same level.<sup>66</sup>

Kazakhstan consumes only 0,3% out of the global oil consumption. Over the past 10 years, the oil consumption has increased by 3,5%, in 2016 Kazakhstan consumed 13,2 million tons or 287 000 barrels per day. In 2015, the amount of oil consumed was 289 000 barrels per day, that was by 0,6% more than in 2016. In 1992 the consumption in Kazakhstan

---

<sup>64</sup> BP[online]: BP Statistical Review of world energy, 2017. WWW <  
<https://www.bp.com/content/dam/bp/en/corporate/pdf/energy-economics/statistical-review-2017/bp-statistical-review-of-world-energy-2017-full-report.pdf>>

<sup>65</sup> NefteGaz[online/RU]: The oil extraction in Kazakhstan declined in 2016, 201. WWW <  
<https://neftegaz.ru/news/view/157327-Dobycha-nefti-v-Kazahstane-v-2016-g-snizilas-na-14-sokraschenie-nablyudaetsya-i-po-gazu>>

<sup>66</sup> Reuters[online/RU]: The oil production in Kazakhstan increased to 86,2 million tons, 2018. WWW <  
<https://ru.reuters.com/article/businessNews/idRUKBN1F00PM-ORUBS?feedType=RSS&feedName=businessNews>>

reached its maximum, which amounted 404 000 barrels per day and in 1992 Kazakhstan consumed only 171 000 barrels per day, which is considered as a minimum index.<sup>67</sup>

### 4.2.3. Crude oil export and import.

Kazakhstan is the 42<sup>nd</sup> largest export economy in the world. Crude oil and gas condensate are the most exported commodities for Kazakhstan's economy, a share of these commodities amounts to 61,8% or \$12,79 billion. The share of gas petroleum and other gas hydrocarbons amounts to \$1,01 billion (4,89%) and oil and its products obtained from bituminous rocks, other than crude – \$0,47 billion (2,5%). Higher oil prices allowed Kazakhstan to improve the export performance. In the first half of 2017, total exports increased by the 38,3% and amounted \$20,7 billion. Totally in this period, Kazakhstan exported 23 million 90 thousand tons of crude oil. Top Kazakhstan's exporters are: Italy, China, Netherlands, France, Switzerland, Spain, Uzbekistan, Greece, Turkey and Great Britain. The increase of funds can be noted by the increase in export to France by 73% due to an increase by 1/3 of crude oil and gas condensate purchases. Of course, here the additional role was played by the growth of world oil prices. The export to the Netherlands was increased by 58% due to an increase of purchases of crude oil and gas condensate (+10%) and petroleum products (+28%)<sup>68</sup>. In 2016 Kazakhstan exported the crude oil in the value of 53%, petroleum gas (4,7%) and oil products (2,2%). The biggest exporters of gas petroleum were: Ukraine (\$506 mln.), Poland (\$375 mln.), Switzerland (\$312 mln.), Russia (\$131 mln.) and China (\$126 mln.) and of oil products: The Netherlands (\$636 mln.), Ukraine (\$28,6 mln.), Russia (\$25,8 mln.), Kyrgyzstan (\$25,3 mln.) and Azerbaijan (\$22 mln.)<sup>69</sup>

---

<sup>67</sup> The Global Economy[online]: Kazakhstan: the oil consumption,2017.

WWW< [https://www.theglobaleconomy.com/Kazakhstan/oil\\_consumption/](https://www.theglobaleconomy.com/Kazakhstan/oil_consumption/)>

<sup>68</sup> Regnum[online/RU]: Export-Import of Kazakhstan,2017. WWW<<https://regnum.ru/news/2305481.html>>

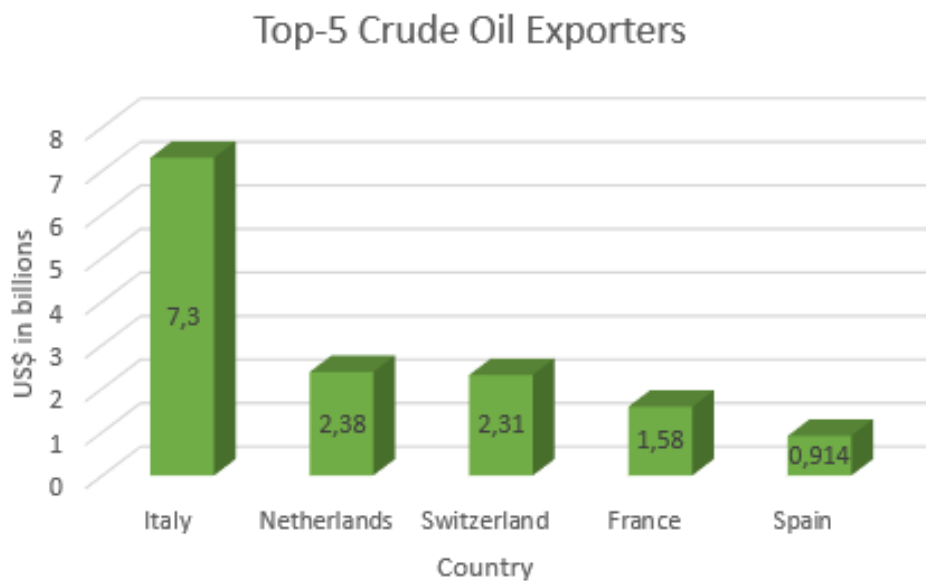
<sup>69</sup> OEC[online]: Kazakhstan, 2016. WWW<<https://atlas.media.mit.edu/en/profile/country/kaz/>>

**Figure 10 Major crude oil pipelines in Kazakhstan**



Source: EIA[online]: Kazakhstan,2017.  
 WWW<<https://www.eia.gov/beta/international/analysis.cfm?iso=KAZ>>

**Figure 11 Top-5 Kazakhstan's crude oil export destinations (2016)**



Source: OEC[online]: Where does Kazakhstan exports crude petroleum.  
 WWW<[https://atlas.media.mit.edu/en/visualize/tree\\_map/hs92/export/kaz/show/2709/2016/](https://atlas.media.mit.edu/en/visualize/tree_map/hs92/export/kaz/show/2709/2016/)>

Kazakhstan has a positive economy, what means that the volume of products exported exceeds the volume of imported products. In the first half of 2017, the total import of Kazakhstan increased by 10,7% and amounted to \$8,01 billion.<sup>70</sup> By the year 2020

<sup>70</sup> Regnum[online]: Export-Import in Kazakhstan, 2017.  
 WWW<[https://bnews.kz/ru/analysis/reviews/neft\\_kazahstana\\_v\\_tsifrah\\_ministr\\_energetiki\\_rasskazal\\_o\\_dob\\_iche\\_i\\_eksporte\\_na\\_2017\\_god](https://bnews.kz/ru/analysis/reviews/neft_kazahstana_v_tsifrah_ministr_energetiki_rasskazal_o_dob_iche_i_eksporte_na_2017_god)>

Kazakhstan is going to decrease the number of imported goods. Top importers are: China, Germany, Russia, and the USA. Kazakhstan is gradually decreasing the amount of total import: from \$38,9 billion in 2011 to \$25,1 billion in 2016. The most recent commodity imported was the Refined Petroleum, which represented 3,09% or \$777 million in 2016. The main supply was from Russia (82%), and Kyrgyzstan 5,8%. Petroleum gas imported in Kazakhstan amounted 1,9% or \$473 million, the three importers were: Turkmenistan (41%), Uzbekistan (23%) and Russia (36%).<sup>71</sup>

#### 4.2.5. Crude oil reserves in Kazakhstan

Kazakhstan has the 2<sup>nd</sup> largest oil reserves in Eurasia and the 12<sup>th</sup> largest in the world. For the last 20 years, the proved reserves in Kazakhstan have increased from 5,3 billion barrels at the end of 1996 to 30 billion barrels or 3,9 billion tons at the end of 2016, the global share of Kazakhstan's proved reserves is 1,8%. The reserves-to-production coefficient is 49 years. So, if we assume that the number of proven reserves will not change, reserves will last for the next 49 years at the same level of oil production.<sup>72</sup>

#### 4.2.6. Problems, Kazakhstan faced with the oil industry.

The most significant problem, Kazakhstan faced with industry – is the very sensitive ecological zone in the territory of Caspian. As we know, a greater number of oil deposits fall to the Western part of Kazakhstan. The oil recovery in this territory may lead to great problems, from environmental pollution to real catastrophes.

---

<sup>71</sup> OEC[online]: Kazakhstan, 2016. WWW<<https://atlas.media.mit.edu/en/profile/country/kaz/>>

<sup>72</sup> BP[online]: Statistical Review of World Energy June 2017.

WWW<<https://www.bp.com/content/dam/bp/en/corporate/pdf/energy-economics/statistical-review-2017/bp-statistical-review-of-world-energy-2017-full-report.pdf>>

#### 4.2.6.1. The Tengiz accident.

One of the catastrophes was at the time of Soviet Union, on the territory of Tengiz oil field. It happened on 25<sup>th</sup> of June 1985. During the passage of oil well №37, laid down to clarify the incision of Tengiz oil field and evaluate the oil and gas reserves, at the depth of 4 467 meters there was an accident and oil and gas were released to the atmosphere. A few hours later, an open fountain of oil and gas caught fire. The giant pillar of fire was 300 meters high and 50 meters wide, the temperature around the well was about 1500°C. Eyewitnesses described it as an apocalypse: at more than kilometer there were stench and roar, the fire devoured everything around, time to time fried flocks of migrated birds, attracted by fire fell to the Earth. To extinguish the burning well, the Soviet Union threw the best minds, forces, and equipment. The fire was extinguished for 398 days – from June 25, 1985, till July 27, 1986. During the extinguishing of the fire, there were human victims. It was tried many ways to extinguish the flame - from the air, from under the Earth, as a result, after a year, the well №37 was dumped by a direct explosion from the inside. The accident at the Tengiz disrupted the plans to increase the oil production in Kazakhstan from 18,7 million tons in 1981 to 25 million tons in 1985 and aggravated the continued in 1985 decline of oil production in USSR. Because of the Tengiz accident, 3,4 million tons of oil, 1,7 billion of combustible gases, 850 tons of mercaptans and 900 000 tons of soot were released into the atmosphere.

Similar accidents are quite expected and, also dangerous, especially when exploring the oil reservoirs on the high depth and extreme conditions. Also, the influence of hydrogen sulfide on the steel pipes, lying in water may lead to the steel cracks. The same situation happened at the Kashagan oil field.<sup>73</sup>

---

<sup>73</sup>Chervinsky O: "Chernaya krov Kazakhstana.Neftyanaya Istoriya Nezavisimosti." 2017- ISBN: 978-601-06-4488-5

#### 4.2.6.2. Kashagan oil field problems.

The content of hydrogen sulfide at the Kashagan oil field is one of the highest in the world. The oil production in Kashagan was started on September 11, 2013 but was stopped several weeks after, when a gas leak was found. Despite the fact, that the specifications for the steel pipelines, the methods of their construction and their gaskets were specially designed for Kashagan field, taking into the account the content of H<sub>2</sub>S. Fortunately, the gas leak was found on time, otherwise, there could be the ecological catastrophe and the consequences could be worth than after the accident in the Gulf of Mexico. The pressure level in the wells at Kashagan is several times greater than in the Mexican Gulf, so oil well leak from the sea depth with a cosmic speed. The wellhead of the emergency well could return into a raging geyser, air and seabed could heat up to the several hundred degrees. Also, Kashagan is located in shallow water, so when the wind flow of oil and gas mixed with the sea water, it sharply increases the water toxicity, that may lead to the death of all life in the Caspian Sea.<sup>74</sup> The project of Kashagan is the most expensive project in the world and, also the most problematic. This oil field was explored in 2000, but the commercial oil recovery was postponed several times: from 2005 to 2008, then in 2011 and finally, in 2013 the oil field began the oil production, which was not continuing long. After the October accident in 2013, the company totally stopped the field operating and started the repair works, that were continuing till 2016. The costs of developing the oil field increased from initial \$15 billion to \$136 billion and even with the price level of \$50-55 per barrel, Kazakhstan will not return its investments to this project for a long time. According to the research of analytical group “Halyk Finance”, only from 2044, all incomes from Kashagan oil field will start to flow into the state budget.<sup>75</sup>

---

<sup>74</sup> Nur.kz[online/RU]: The Kashagan accident will destroy every life in Caspian,2010.

WWW< <https://www.nur.kz/154374-avariya-na-kashagane-unichtozhit-vse-zhivoe-na-kaspii.html>>

<sup>75</sup> DW[online/RU]: Great Kazakhstan’s oil: The third attempt to start the oil production at Kashagan,2016.

WWW< <http://www.dw.com/ru/большая-нефть-казахстана-третья-попытка-запустить-кашаган/a-36735317>>



### 4.2.6.3. Petroleum deficit.

In autumn 2017 in some region of Kazakhstan, there was a petroleum deficit, people could buy the gasoline, only by coupons or cards of petrol stations. Due to this deficit, the price of petroleum increased in all regions to 152-157KZT per liter. This problem had several reasons: from July to September there was a significant increase in consumption – during 9 months in 2017 there was consumed 2 480 000 tons of gasoline, that is by 154 000 tons more than in the same period of previous year and at the same time on the border of Kazakhstan and Russia, the import price of gasoline brand AI-92 has increased by 7%, from \$517 to 555 per ton. Because of that, the amount of oil imported has decreased from 90 thousand tons to 30-35 thousand tons. Also, there was an exchange rate correction: from 312 to 340 KZT per 1 USD and sharp appreciation of RUB to KZT (in Russia the gasoline costs 37 rubles per liter and that at an exchange rate of 5,85 KZT per 1 RUB is 216 tenge per liter). Kazakhstan's gasoline price level was around 150 KZT per liter, so with such a price difference, it was unprofitable to import the oil from Russia. Another reason was that all three oil refineries were at repair works approximately at the same period, before the shutdowns of oil refineries the profile department assured that Kazakhstan has enough reserves to provide the gasoline to population, but it didn't happen. The increase in the gasoline prices could also be explained by the inability of refineries to fully cover the domestic demand. These problems as the chain reaction led to the gasoline deficit, at the beginning of November the gasoline was at the free sale, but its prices remained at the same level.

## 4.3. Analysis of oil industry in Kazakhstan

The income economy of the Republic of Kazakhstan is classified as upper-middle, the estimated growth of an economy to \$365 billion by 2018. The main factors, that influence the growth of Kazakhstan's economy are domestic demand and high export growth. But the economy of Kazakhstan depends on the country's oil industry. Kazakhstan is a very strong competitor on the oil market and many foreign companies invest money to operate and develop country's oil fields, so it is necessary to analyze the current position of Kazakhstan in this industry with the help of PEST and SWOT analysis's.

### 4.3.1. PEST analysis.

#### 4.3.1.1. Political environment

In general, the domestic and foreign policies of Kazakhstan are stable and peaceful. In 1997 in the President's message to the people was voiced the development strategy of Kazakhstan until the year 2030, in which the development of oil and gas industry belongs to the priorities of the economic growth. Nursultan Nazarbayev considers that energetic industry contributes to economic growth and political stability, which determines the implementation of national security. The development of Kazakhstan as regional leader raises the issue of geopolitical situation and foreign policy to a higher level. The importance of oil and gas industry in domestic policy is determined by several reasons:

- Oil and gas are two of the main natural resources of Kazakhstan and guarantor of the country's energy security for many decades to come.
- The energy sector in the economy of Kazakhstan remains the leading one, both in conditions of crises of the 1990s and current rise. Due to high export potential, this sector provides a significant part of tax revenues to the state budget.
- The oil industry is the most attractive area for foreign investors.

The energy factor is equally important to Kazakhstan's foreign policy. The oil market is the interesting arena of both industrialized energy importing counties (EIA) and groups of oil exporting countries (primarily OPEC). In the context of increasing interdependence of

world economic entities, Kazakhstan with the goal of national energy security must develop a system of interaction with existing international energy security systems (IEA, OPEC countries), it is important to respect the balance of interest of both parties. Furthermore, Kazakhstan, located in the center of geopolitical interests of the leading powers: Russia, China, EU, and the USA, so Kazakhstan tries to pursue a multi-vector energy policy, which leads to disagreements in relations between them. Kazakhstan, as an oil rich state, evokes a keen interest from other countries, intending to diversify the oil supply channels and Kazakhstan is forced to maneuver between the West, China, and Russia. In the context of oil disasters, Kazakhstan has to modernize the old ones and find new oil export channels. The oil and gas export opportunities are the most important lever of foreign economic diplomacy and the solution of the common tasks of Kazakhstan's foreign policy, so effective energy diplomacy can really help to strengthen the position of Kazakhstan in the world arena.<sup>76</sup>

#### 4.3.1.2. Economic environment.

Firstly, it should be noticed once again that the oil sector plays the key role in the economy and is the important foundation of stability of Kazakhstan. In the oil and gas complex has own structure: the production, transportation, and refining of oil and gas. The increase in oil production provides an increase in tax revenues and makes the greatest contribution to the revenue side of the budget and, therefore, guarantees financial support to other sectors of the economy and social sphere, improves quality standards and living standards of the population. Kazakhstan plays one of the key roles in the global oil market. In terms of international market, the economic and political factors are interdependent. As I mentioned earlier, Kazakhstan has a developing strategy and by the year 2020, it is planned to increase the oil production to 3 million barrels per day. To reduce the dependence of Kazakhstan on oil prices, the Government has established the National Oil Fund, but many experts consider that it is necessary to establish the alternative way to accumulate raw super-profit, not in the form of foreign currency or securities, but in the form of creating the oil

---

<sup>76</sup> Articlekz [online]: Oil as a source of energy and factor of 'great political game', 2011. WWW < <https://articlekz.com/article/7863> >

reserves, so-called “liquid currency”. Strategic oil reserves are needed to reduce the consequences of the fall in oil price, for the reliability and stability of the economy. Kazakhstan intends to invest up to \$20 billion in the non-raw sector. By the year 2020, Kazakhstan expects to increase the National Fund assets to \$90 billion (30% GDP). The huge internal investments resources will serve primarily to implement the transition from resource-raw to an industrial-innovative model of economic development in the long run perspective.<sup>77</sup>

### 4.3.1.3. Social environment.

In this part, I would like to emphasize on two themes, the first one is the conflict at the oil fields and the second one is the ecological role of the oil industry, influencing the social environment.

In Kazakhstan there is a problem with the qualified specialists in the oil and gas sector, now, as before, the problem is solved by the inviting experts from abroad. According to some Kazakh workers employed in oil and gas industry, their salary is less than the salaries of a foreign specialist. Unfortunately, due to that, the facts of the conflicts and strikes sometimes take place. For example, in 2006 at the one of the largest oil field in Kazakhstan, Tengiz, there was a massive ethnic conflict between the Kazakh and Turkish workers. During this fight, 140 people were injured. The reason was the domestic conflict, but more strikes occur because of dissatisfaction with wages. The largest of these is the protest in Mangystau region, occurred in 2011. Initially, strikes took place at Karazhanbas oil field, located in Western Kazakhstan, the labor conflict began in 2010, during which the workers require the improvement of working conditions and increasing the wages. Later they were joined by workers of production filial “Ozenmunaygaz” in Zhanaozen region. For 10 days, the “Karazhanbasmunay” company lost \$1,6 million of probable income. During these events, 15 people died, hundreds of people were injured and many of them arrested. According to the journalists, this conflict was more social-economic, than labor. People were dissatisfied with the low level of development of Mangystau region, primarily Zhanaozen

---

<sup>77</sup> Articlekz[online]: The role of oil production growth in solving the economic problem of the Republic of Kazakhstan,2011. WWW< <https://articlekz.com/article/8172>>

field, despite the huge company's profit. In 2012, at the "Tengizchevroil" plant workers require the increase of salaries. The same situation was at "Kalamkas" oil field in 2013 and "Tengiz" oil field in 2017.

In 2014, The Parliament of Kazakhstan imposed stringent legislative restrictions on the activities of independent trade unions and criminal punishment for provoking illegal strikes. In 2015, due to fall in Brent benchmark prices under \$50 per barrel, the Chinese-Kazakh drilling company "The Great Wall" announced the forced reduction of the staff and salaries. The workers reacted to this with understanding, although they were annoyed.

The ecological factor also plays a huge role in the social environment. The oil and gas raw material of many Kazakhstan's deposits contain a significant amount of sulfur components and other substances that pose a serious threat to the ecological situation. During offshore oil operations on the Caspian shelf and transportation of hydrocarbon raw materials, the main attention should be paid to the issues of environmental safety. Joint environmental control of the Caspian states over oil operations and the general situation in the Caspian is possible with the use of high-tech equipment that will significantly reduce the ingress of oily effluents into the marine environment. The "2030 strategy" aims at long-term environmental strategy - harmonization of interaction between society and the environment, as well as the creation of an environmentally safe, supportive habitat. Implementing the strategic objectives of the concept, Kazakhstan, increasing the efficiency of resource use, increasing life expectancy, providing an increase in the index of environmental sustainability, will create the opportunity to be on the level of quality of life among the most competitive and developed countries in the world.<sup>78</sup>

---

<sup>78</sup> Articlekz[online]: Problems of Ecological Safety of the Republic of Kazakhstan, 2011. WWW< <https://articlekz.com/article/9573>>

#### 4.3.1.4. Technological environment.

Kazakhstan is a technologically developed country. The oil fields are operating with the help of advanced and innovative technologies. On the territory of Kazakhstan, there are 32 mini-refineries and the 3 largest refineries, in 2019 Kazakhstan wants to build the 4<sup>th</sup> one. The newest refinery was built in 1985 and is the only one, located in the Southern Kazakhstan, in Shymkent region. Another two are built in Atyrau (1945) and Pavlodar (1978) regions.<sup>79</sup> All three refineries were modernized at the same time. Under the word “modernization” is not only the replacement of old equipment, in fact, in the territory of these refineries, new buildings were built without stopping the existing production. The repairs of all three refineries were completed in 2017. Earlier they covered only 85% of domestic oil supply, another 15% were covered by the import, mainly from Russia. During the repair processes, Kazakhstan has faced with a petroleum deficit and increase in petroleum prices. The realization of these projects provided the consumers with high-quality oil products, meeting the requirements of ecological classes K4 and K5 and reducing the harmful impact on the environment through the implementation of advanced technologies, improving management automation, rational use of natural resources. Also, with the modernization of oil refineries, Kazakhstan expects to provide all domestic market with oil, by the increase of oil production, decreasing in country’s oil products import and the production of air-kerosene at these refineries.<sup>80</sup> In 2017, Kazakhstan over-fulfilled its production plan, produced more of both oil and gas. By the second half of 2018, Kazakhstan will be able to provide itself with all oil refined products.

---

<sup>79</sup> KazEnergy [online]: Oil refineries in Kazakhstan, 2008.

WWW < [http://www.kazenergy.com/images/stories/magazines/PDF/6\\_2008\\_2.pdf](http://www.kazenergy.com/images/stories/magazines/PDF/6_2008_2.pdf) >

<sup>80</sup> Pavlodar oil chemistry refinery [online]: Plans for the reconstruction and modernization.

WWW < [https://www.pnhz.kz/en/modernization/modernization\\_plans/](https://www.pnhz.kz/en/modernization/modernization_plans/) >

### 4.3.2. SWOT Analysis

Based on all information, described in the practical part I composed a SWOT analysis of oil and gas industry in Kazakhstan.

**Table 3 SWOT analysis of oil and gas industry in Kazakhstan**

<p><b>Strengths:</b></p> <ul style="list-style-type: none"> <li>• Dynamic domestic and foreign policies, which provides political stability and maintains the high economic development</li> <li>• A high level of investment activity</li> <li>• Rich natural mineral resources</li> <li>• Integrated oil and gas transport infrastructure, providing the connection between foreign markets</li> <li>• High growth rate of oil and gas condensate production</li> <li>• The support by Government</li> <li>• The potential for the development of new transportation pipelines.</li> <li>• The presence of vertically integrated oil companies, as KazMunayGas</li> <li>• The implementation of a whole range of work: from oil exploration to oil retail sales</li> <li>• Developed legislative base in the field of subsoil use.</li> <li>• An established contract system for regulating subsoil use</li> </ul>	<p><b>Weaknesses:</b></p> <ul style="list-style-type: none"> <li>• Difficult hydrological and climatic conditions</li> <li>• Problems with pollution and associated petroleum gas</li> <li>• Dependence on the transit countries to enter the markets of Europe and other countries.</li> <li>• Remoteness from the main world markets.</li> <li>• A small share of national companies in the development of oil and gas fields.</li> <li>• Low depth of oil refining</li> <li>• A significant share of transportation part in the final price of Kazakhstan’s oil products.</li> <li>• Insufficient budget financing of gasification projects in the regions.</li> <li>• Lack of legally established tax incentives.</li> <li>• Weak development of oil transportation.</li> <li>• High depreciation of equipment, refineries</li> </ul>
<p><b>Opportunities:</b></p>	<p><b>Threats:</b></p> <ul style="list-style-type: none"> <li>• Risks of technogenic accidents</li> </ul>

<ul style="list-style-type: none"> <li>• The existence of new perspective high-quality oil and gas fields.</li> <li>• The tendency of outstrips the demand for energy in comparison with the growth of new hydrocarbon reserves. Limited world reserves of hydrocarbon resources.</li> <li>• Presence of a number of perspective objects in search of hydrocarbon raw material</li> <li>• The desire of major world oil producers to provide an economically justified level of prices.</li> <li>• High demand for hydrocarbons due to economic growth in developing countries, giving companies the opportunity to export more.</li> <li>• A release of products with high added value, that gives the opportunity to get more profit.</li> <li>• The Integration with Caspian region. The opportunity to participate in the development of Western part of China.</li> <li>• The construction of refining facilities will increase the revenue.</li> <li>• Ensuring employment of the population of Kazakhstan.</li> <li>• The development and modernization of other industries like machine building, construction industry, service companies, marine fleet.</li> </ul>	<ul style="list-style-type: none"> <li>• Oil production in the ecologically sensitive zone in Caspian.</li> <li>• A high content of hydrogen sulfide in oil.</li> <li>• Possible changes in policies and tariffs for transit oil and gas from transit countries.</li> <li>• Development of oil transportation projects bypassing the territory of a country.</li> <li>• Imbalance in the approaches to the development of offshore hydrocarbon fields and the development of coastal infrastructure.</li> <li>• Retention of state's fuel and raw orientation.</li> <li>• Lack of staff, technical personnel, middle and senior engineering specialists.</li> <li>• Delays in the implementation of projects and increase in their cost.</li> <li>• Availability of extensive experience and technical capacities in neighboring countries, which enhances their competitive advantage.</li> <li>• Limited import from Russia or charging the export duty.</li> <li>• Irrational development of oil fields.</li> <li>• A decline in world oil prices may lead to a decrease in the cost of oil products, that may lead to non-competitiveness of oil products produced by our companies.</li> </ul>
--	---



With a help of this data, we can identify the problems facing the national oil companies, as well as determine the direction of using the existing capacity to resolve them. The weaknesses described above could lead to negative impact without action by the side of the government. But in general, Kazakhstan can maintain the current and reinforce its positions on the global market. Existing trends suggest that Kazakhstan's oil and gas industry continues to be in the zone of active growth and maintains the high investment attractiveness. Today, investments in the subsoil use of hydrocarbon raw materials account for about 70% of the total investment in the development of Kazakhstan's mineral and raw material complex. Oil and gas sector is the driving force of social and economic reforms carried out in the republic, a vehicle for modern innovative and managerial decisions. Particularly noticeable in this process is the role of KazMunayGas company, which provides about a third of all oil production, almost 96% of gas transportation, 67% of pipeline oil transportation, 83% of oil refining in the country and has long become national oil and gas brand. This company is on the list of 50 leading oil and gas companies in the world. It should be noticed that 88% of all oil reserves are distributed by the largest companies, the remaining medium and small subsoil users account for only 7%, another 5% of oil reserves are free of subsoil use and are in the general fund. The main oil production lies on the three largest oil fields of Kazakhstan, and it is needed to direct forces and investments for development of other smaller oil fields, that provides the domestic oil supply. According to the forecast of world expert organizations, oil and gas in the foreseeable future will remain the main energy resources. The Republic of Kazakhstan with its open fields and still unexplored reserves of mineral resources, remains in the sphere of attention and influence of both regional and world powers, while at the same time trying to bring to its economy to the number of the most developed countries of the world. But despite the fact, that the wealth of mineral resources serves as a great impetus for the development of Kazakhstan's economy, as it was mentioned earlier, it is needed to develop not only hydrocarbons industry to avoid the dependence on it.

### 4.3.3. The relationship between the oil industry and GDP of Kazakhstan

#### 4.3.3.1. A regression model using SAS.

The time series analysis observes 11 periods from 2006 to 2016. Since Kazakhstan's economy has a raw-material orientation, the aim of this analysis is to find out the relationship between the country's GDP and oil price. Annual GDP is considered as a dependent variable and the annual average Brent price is an independent one.

**Table 4 The Data**

Time series	GDP (\$ billion)	Brent annual average price (\$/barrel)	Oil production (thousands barrels/day)
2006	81	64,14	1370
2007	104,8	72,52	1415
2008	133,4	96,99	1485
2009	115,3	61,51	1609
2010	148	79,47	1676
2011	192,6	111,27	1684
2012	208	111,63	1664
2013	236,6	108,56	1737
2014	221,4	99,03	1710
2015	184,4	52,35	1695
2016	133,7	43,55	1672

**Source:** statista.com & data.worldbank.org & BP Statistical Review of World energy, 2017

Now it is necessary to specify the model:

1. Simple linear regression model:  $y' = f(x) + \varepsilon$ ,

**Where**  $Y'$  is the dependent variable

$X$  is the independent variable

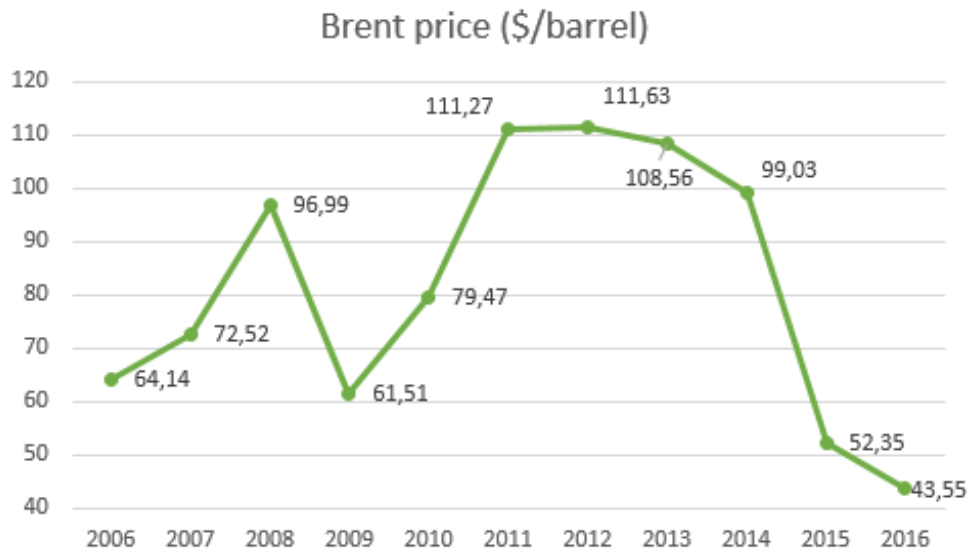
$\varepsilon$  is the random error (residual)

2. General economic model:

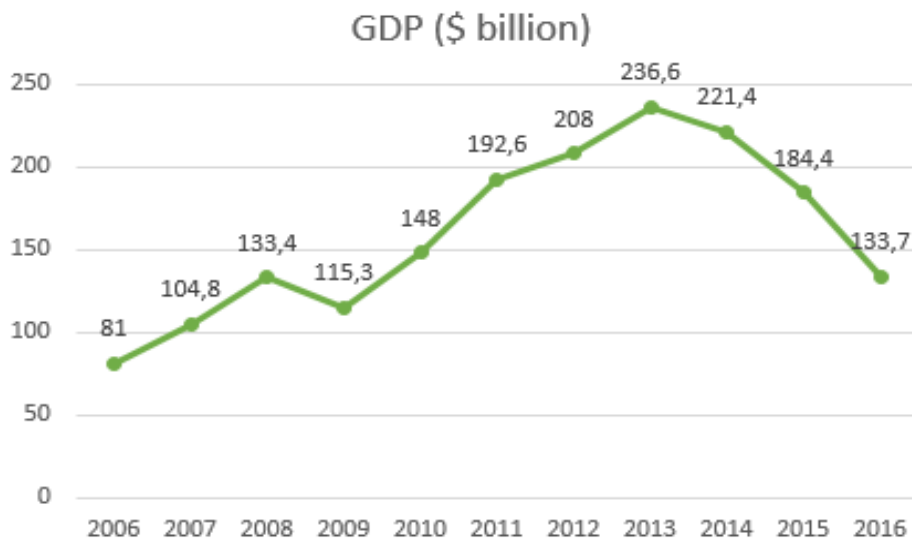
***Annual GDP = f (annual average Brent oil price)***

3. Creation of graphs:

**Figure 12 Brent annual average price (\$/barrel)**



**Figure 13 Annual GDP (\$billion)**



Source: statista.com & data.worldbank.org

As Kazakhstan has the hydrocarbons economic orientation, the main driver of national GDP is oil and gas industry. It means that the economy of Kazakhstan significantly

depends on the revenues from this industry. Kazakhstan experienced the deceleration of economic growth in 2014-2016, because of the decline in world oil prices from \$99 in 2014 and \$52 in 2015 to \$44 in 2016. Due to that, the country's GDP also declined from 4,2% in 2014 to 1,2% in 2016 and 1,1% in 2016. After the collapse of USSR, the economy of Kazakhstan can be divided into 3 periods: from 1991 to 1999 there was practically no increase in Kazakhstan's GDP. But the positive dynamics of the world oil prices, the flow of investments and increase in oil production in 2000-2014 were driving the economy of Kazakhstan to grow, the average growth of GDP during this period was 7-8% (except the period of World Crisis). In 2015-2017 there was a decrease in world oil price, the same as a decrease in investments and national oil production. Despite the low oil prices in 2000-2004, the flow of investments to oil industry contributed to the fast increase of oil production and export, and as a result, the growth of GDP reached double-digit values. In subsequent years the flow of investments was increasing and the growth of economic and the oil production was stabilizing.<sup>81</sup> In the period of World Crisis, the GDP experienced its decline and after 2010 again reached the mark of 7% growth, when the world oil prices were at the maximum level of more than \$110 per barrel. Thus, the driving force of the GDP's growth in Kazakhstan's economy always was the oil and gas industry.

#### 4. Calculations (using SAS)

**Table 5 Ordinary Least Squares for GDP and oil price**

Parameter Estimates					
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr >  t
Intercept	1	50.31861	45.01013	1.12	0.2925
Oil price	1	1.33814	0.52795	2.53	0.0320

Based on this table, the estimated parameters (*a* and *b*) can be defined:

$$y' = 50,31861 + 1,33814 * x$$

With a help of these parameters, we can express the relationship between GDP growth and Brent oil price. In order to do it, we define *b* parameter, which is a regression coefficient and explains the percentage change of GDP, if the oil price will change by \$1/barrel.

<sup>81</sup> Halyk Finance[online]: The oil and gas sector in the economy of Kazakhstan,2017. WWW<  
<http://www.halykfinance.kz/ru/site/index/research/report:108168>>

Also, it is needed to test the regression coefficient with  $\alpha=0,05$ .  $P=0,032$ .  $P<\alpha$ , so there is a relationship between GDP and oil price.

**Table 6 Correlation and Determination coefficients for GDP and oil price**

<b>Root MSE</b>	<b>41.39420</b>	<b>R-Square</b>	<b>0.4165</b>
<b>Dependent Mean</b>	<b>159.92727</b>	<b>Adj R-Sq</b>	<b>0.3517</b>
<b>Coeff Var</b>	<b>25.88314</b>		

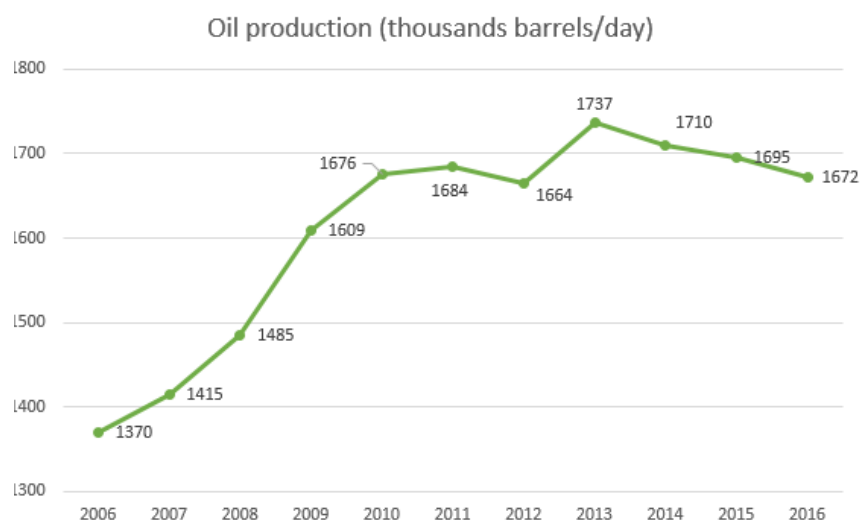
Using the  $R^2$  (coefficient of determination), we can denote the proportion, explained in our model, that is equal to 41,65%. The residual is 58,35%.

Also, we can define the  $R$  (coefficient of correlation), that explains the power of dependency.  $R \in \langle 0,3; 0,7 \rangle$ , so in this model, we have a medium dependency between oil price and GDP.

5. **Interpretation:** In our model, the coefficient of regression  $b$  is equal to 1,33814. It means, that with a change of oil price by \$1/barrel, the annual GDP of Kazakhstan will change by \$1,33814 billion.

In the same way, we can test the relationship between annual GDP of Kazakhstan (\$billion) and country's oil production (thousands barrel/day).

**Figure 14 Annual oil production in Kazakhstan**



**Source:** BP statistical review of world energy 2017

General economic model:  $Annual\ GDP = f(annual\ oil\ production)$

**Table 7 Ordinary Least Squares for GDP and oil production**

Parameter Estimates					
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr >  t
Intercept	1	-375.82602	124.31309	-3.02	0.0144
Oil production	1	0.33263	0.07697	4.32	0.0019

The parameters estimated can be defined as:

$$y' = (-375,82602) + 0,33263 * x$$

P value (0,0019) <  $\alpha$  (0,005). So, there is a relationship between GDP and oil production.

**Table 8 Coefficients of Determination and Correlation for GDP and oil production**

Root MSE	30.90072	R-Square	0.6748
Dependent Mean	159.92727	Adj R-Sq	0.6387
Coeff Var	19.32174		

$R^2=0.6748$ . It means, that 67,48% is explained by our model. The error is 32,52%

$R=0,821$ , so our relationship between annual GDP and annual oil production is strong.

**Interpretation:** The annual GDP of Kazakhstan will change by \$0,33263 billion if the national oil production volume will change by 1 000 barrels/day.

## 5. Conclusion.

The main factors influencing the crude oil prices are OPEC, crude oil demand, and supply, US dollar exchange rate, geopolitical events, a growth of world economy, production cost and fiscal and monetary policies. All these factors can determine the world crude oil price, which in its term, affects the growth of GDP in Kazakhstan.

The Linear Regression model shows the influence of world oil prices in the national budget. The GDP of Kazakhstan depends not only on the Brent prices but also on the national oil production. SWOT analysis shows that despite all weaknesses, Kazakhstan can maintain the current and to reinforce its positions on the global market. Existing trends suggest that Kazakhstan's oil and gas industry continues to be in the zone of active growth and maintains the high investment attractiveness. Today, investments in the subsoil use of hydrocarbon raw materials account for about 70% of the total investment in the development of Kazakhstan's mineral and raw material complex.

Kazakhstan has a raw material orientation, so the oil sector plays the key role in its the economic development. Kazakhstan has more than 200 oil fields, 3 of them are the plays the key role nor only in the economic development of Kazakhstan, but, also, have a global importance. Kazakhstan's annual oil production is about 78-80 million tons of crude oil, by the year 2025 the projected amount of oil production is 110 million tons. More than 60% out of the total exports of Kazakhstan represent crude oil and oil products, it is almost 80% out of the total oil produced in Kazakhstan. The oil production of Kazakhstan, as an independent state, was developing fast enough. Kazakhstan has entered one of the leading positions in terms of oil and gas industry. At the same time, the state authorities are setting ever more serious economic goals and some of them have already begun to be implemented. Oil and gas sector of Kazakhstan contributed to the economic growth of the state and to this day remains as the driving force of the national economy. The main factors of the oil sector's growth were price, direct investments, and growth in oil production. Other sectors of the national economy could not provide such a strong a sustainable growth of GDP. After the decline in oil prices and production, the growth of GDP sharply fell and fiscal imbalances appeared, that depleted the National Fund's currency assets. The rapid development of oil and gas industry of Kazakhstan over a decade has led to a significant economic dependence on oil exports and volatility of the oil price. Now Kazakhstan is developing other industries,

to avoid this dependence and not to become the country with a mono-raw orientation. The President of Kazakhstan in his message to people “Kazakhstan 2030” said about plans of developing of light and food industries, oil and gas processing, chemistry and petrochemistry, separate sub-branches of machine building, final high-tech industries, services, and tourism. The diversification of production will help Kazakhstan to provide a steady economic growth.

The economic situation in the Republic of Kazakhstan has the positive orientation due to revenues from the work of oil and gas industry and geological exploration activities. The revenues of the state budget and the volume of financial flow from foreign countries are directly dependent on the fuel, energy and extractive industries of the economy. Now, the economy of Kazakhstan so far has a raw-material orientation, and, in the near future, the situation will not change significantly. In the future, the volume of oil and gas production in Kazakhstan will tend to grow significantly. So, Kazakhstan should improve the oil industry: to develop more export channels, work on the infrastructure of oil and gas industry, develop the strategies, with help of which, Kazakhstan may ecologically safely extract the oil production in Caspian. Due to a fact, that the largest oil fields provide the national export of oil, it is very necessary to develop the smaller oil fields to avoid the dependence on the oil import from Russia.



## References:

1. **C. J. R. Braithwaite, G. Rizzi, G. Darke (2004)** “*The Geometry and Petrogenesis of Dolomite Hydrocarbon Reservoirs.*” p. 18 ISBN 1862391661
2. **Bushuyev V.V. (2013)** “*Ceny na neft: analis, tendencii, prognoz.*”. p. 131/197. ISBN 9785989081103
3. **Chervinsky O (2016):** “*Chernaya krov Kazakhstana. Neftyanaya Istoriya Nezavisimosti.*” ISBN: 978-601-06-4488-5
4. **Forbes R.J. (1964)** “*Studies in Ancient Technology, Vol. VI*”. p.46  
ISBN: 9789004006263
5. **Francisco Parra (2009)** “*Oil Politics - A Modern History of Petroleum.*” 2009. p. 44/335. ISBN 1848851294.
6. **Norman J. Hyne (1984)** “*Geology for petroleum exploration, drilling, and production.*” ISBN 0070316597
7. **Salvatore Carollo (2011)** “*Understanding Oil Prices - A Guide to What Drives the Price of Oil in Today's Markets.*” p. 10. ISBN 1119962722.
8. **Sonia Shah (2007)** “*Crude - The Story of Oil.*” 2004. p. 34 ISBN 1583226257.
9. **Tushar Ghosh (2009)** “*Energy Resources and Systems - Fundamentals and Non-Renewable Resources.*” p. 401 ISBN 9048123828.
10. **Václav Čilek (2007)** “*Nejistý plamen - Průvodce ropným světem.*” p. 20-22  
ISBN 9788073631222.

## Internet Resources:

1. **American Oil and Gas Historical Society**[online]: History of the 42-Gallon Oil Barrel. WWW <<https://aoghs.org/transportation/history-of-the-42-gallon-oil-barrel/>>
2. **Articlekz**[online]: Oil as a source of energy and factor of 'great political game',2011/ The role of oil production growth in solving economic problem of the Republic of Kazakhstan,2011/ Problems of Ecological Safety of the Republic of Kazakhstan, 2011. WWW< <https://articlekz.com/article/tag/853> >
3. **BP** [online] Statistical Review of World Energy, June 2017/ Oil reserves definition. WWW<<https://www.bp.com/content/dam/bp/en/corporate/pdf/energy-economics/statistical-review-2017/bp-statistical-review-of-world-energy-2017-full-report.pdf>>
4. **DW**[online/RU]: The great Kazakhstan's oil: The third attempt to start the oil production at Kashagan,2016. WWW<<http://www.dw.com/ru/большая-нефть-казахстана-третья-попытка-запустить-кашаган/a-36735317>>
5. **Eni**[online]: World Oil & Gas Review 2016. WWW<[https://www.eni.com/docs/en\\_IT/enicom/company/fuel-cafe/WOGR-2016.pdf](https://www.eni.com/docs/en_IT/enicom/company/fuel-cafe/WOGR-2016.pdf)>
6. **Facts and details** [online]: Oil in Kazakhstan,2016. WWW<[http://factsanddetails.com/central-asia/Kazakhstan/sub8\\_4e/entry-4676.html](http://factsanddetails.com/central-asia/Kazakhstan/sub8_4e/entry-4676.html)>
7. **Forbes** [online]: OPEC's Trillion-Dollar Miscalculation. 2016. WWW<<http://www.forbes.com/sites/rrapier/2016/01/08/opecs-trillion-dollar-miscalculation/#41e81e2273c1>>
8. **Futures trading charts** [online]: How Supply and Demand determine Commodities Market Prices. WWW< [http://futures.tradingcharts.com/learning/supply\\_and\\_demand.html](http://futures.tradingcharts.com/learning/supply_and_demand.html)>
9. **International Energy Agency** [online]: Oil market report,2017. WWW < <https://www.iea.org/oilmarketreport/omrpublic/>>
10. **Investopedia** [online]: Oil Reserves/What is international trade, 2015/ What causes oil prices to fluctuate,2018? WWW <<https://www.investopedia.com>>
11. **Karachaganak Petroleum Operating**[online]: Karachaganak Field discovery. WWW<<http://www.kpo.kz/en/about-kpo.html>>

12. **KazEnergy** [online]: Oil refineries in Kazakhstan, 2008.  
WWW< [http://www.kazenergy.com/images/stories/magazines/PDF/6\\_2008\\_2.pdf](http://www.kazenergy.com/images/stories/magazines/PDF/6_2008_2.pdf)>
13. **Maitah.com** [online] Foreign Trade Operations, 2017  
WWW< [http://www.maitah.com/TT/lecture\\_7.pdf](http://www.maitah.com/TT/lecture_7.pdf)>
14. **Ministry of the national economy of the Republic of Kazakhstan Committee on Statistics** [online]: Results of the National Population Census,2009.  
WWW<[http://stat.gov.kz/faces/wcnav\\_externalId/p\\_perepisNews12-11?\\_afzLoop=2661582394294387#%40%3F\\_afzLoop%3D2661582394294387%26\\_a df.ctrl-state%3Dte5vcendh\\_123](http://stat.gov.kz/faces/wcnav_externalId/p_perepisNews12-11?_afzLoop=2661582394294387#%40%3F_afzLoop%3D2661582394294387%26_a df.ctrl-state%3Dte5vcendh_123)>
15. **NCOC**[online]: Kashagan Oil field.  
WWW<<http://www.ncoc.kz/ru/kashagan/default.aspx>>
16. **NefteGaz**[online/RU]: The history of Kazakhstan's oil industry/ The oil extraction in Kazakhstan declined in 2016, 2017. WWW<<http://www.neftegaz.kz> >
17. **Nur.kz**[online/RU]: The Kashagan accident will destroy every live in Caspian,2010.  
WWW<<https://www.nur.kz/154374-avariya-na-kashagane-unichtozhit-vse-zhivoe-na-kaspii.html>>
18. **OECD**[online]: Kazakhstan, 2016.  
WWW<<https://atlas.media.mit.edu/en/profile/country/kaz/>>
19. **Oil & Gas Financial Journal** [online]: Oil Price Fluctuations,2017.  
WWW<<http://www.ogfj.com/articles/print/volume-14/issue-4/features/oil-price-fluctuations.html>>
20. **Oil Price** [online]: What is crude oil? A detailed Explanation on this Essential Fossil Fuel. 2009. WWW <<https://oilprice.com/Energy/Crude-Oil/What-Is-Crude-Oil-A-Detailed-Explanation-On-This-Essential-Fossil-Fuel.html>>
21. **OPEC** [online]: OPEC and non-OPEC Ministerial Meeting,2016/ OPEC Basket Price,2018/ Brief History,2018/ OPEC Statistical Bulletin 2017/ OPEC share of world crude oil reserves,2016. WWW<[http://www.opec.org/opec\\_web/en/](http://www.opec.org/opec_web/en/)>
22. **Pavlodar oil chemistry refinery**[online]: Plans of the reconstruction and modernization.  
WWW< [https://www.pnhz.kz/en/modernization/modernization\\_plans/](https://www.pnhz.kz/en/modernization/modernization_plans/)>
23. **Petro Industry New** [online]: What is API gravity? 2015. WWW<<https://www.petro-online.com/news/fuel-for-thought/13/breaking-news/what-is-api-gravity/33309>>

24. **Petro Wiki** [online]: Origin of petroleum  
 WWW<[http://petrowiki.org/Origin\\_of\\_petroleum#cite\\_note-r2-3](http://petrowiki.org/Origin_of_petroleum#cite_note-r2-3)>
25. **Petroleum roughneck** [online]: Know your crude 2017.  
 WWW<<http://www.petroleumroughneck.com/2017/03/know-your-crude.html>>
26. **Petroleum.co.uk** [online]: Sweet vs. Sour Crude oil. 2015  
 WWW<<http://www.petroleum.co.uk/sweet-vs-sour>>
27. **Regnum**[online/RU]: Export-Import of Kazakhstan,2017.  
 WWW<<https://regnum.ru/news/2305481.html>>
28. **Reuters**[online/RU]: The oil production in Kazakhstan increased to 86,2 million tons, 2018. WWW<<https://ru.reuters.com/article/businessNews/idRUKBN1F00PM-ORUBS?feedType=RSS&feedName=businessNews>>
29. **Spinform** [online/RU]: The economy of Kazakhstan, 2017.  
 WWW <<http://www.kz.spinform.ru/ekonomics.html>>
30. **Stat Bureau** [online]: Kazakhstan inflation rate in 2016,2017.  
 WWW<<https://www.statbureau.org/en/kazakhstan/inflation/2016>>
31. **Statista** [online]: Kazakhstan: Unemployment Rate 2012-2022,2018.  
 WWW< <https://www.statista.com/statistics/436179/unemployment-rate-in-kazakhstan/>>
32. **Student Energy** [online]: Oil transport.  
 WWW <<https://www.studentenergy.org/topics/ff-transport>>
33. **The Balance** [online]: Oil Reserves, Their Categories, And the World's Largest, 2017/  
 The Basics of trading crude oil futures, 2017/ How the dollar impacts Commodity Prices, 2017. WWW<<https://www.thebalance.com>>
34. **The Global Economy**[online]: Kazakhstan: the oil consumption,2017.  
 WWW< [https://www.theglobaleconomy.com/Kazakhstan/oil\\_consumption/](https://www.theglobaleconomy.com/Kazakhstan/oil_consumption/)>
35. **The Ministry of Foreign Affairs Republic of Kazakhstan**[online]: List of International Organization,2014.  
 WWW<<http://mfa.gov.kz/en/content-view/spisok-mezhdunarodnykh-organizatsij>>
36. **The World Bank**[online]: GDP current (\$ billion),2017.  
 WWW<<https://data.worldbank.org/country/kazakhstan>>
37. **The world of oil** [online/RU]: Oil in Ancient and Medieval history.  
 WWW<<http://www.mirnefti.ru/index.php?id=15>>

38. **Trading Economics**[online]: Ease of doing business in Kazakhstan,2017.  
WWW< <https://tradingeconomics.com/kazakhstan/ease-of-doing-business>>
39. **World Atlas** [online]: The World's largest Oil Reserves by Country, 2017/ The economy of Kazakhstan, 2017. WWW<<http://www.worldatlas.com>>
40. **World Petroleum**[online]:Enhanced oil recovery: chalennges&oppotrunities,2010  
WWW<[http://www.worldpetroleum.org/docs/docs/publications/2010yearbook/P64-69\\_Kokal-Al\\_Kaabi.pdf](http://www.worldpetroleum.org/docs/docs/publications/2010yearbook/P64-69_Kokal-Al_Kaabi.pdf)>
41. **World's top exports**[online]: World's top imports: Products and Countries,2015/  
Crude oil exports by country, 2018/ Crude oil imports by country, 2017.  
WWW< <http://www.worldstopexports.com/worlds-top-imports-products-countries/>>

## List of figures

Figure 1 Oil recovery stages .....	20
Figure 2 Dynamics of oil production in the world, million tons .....	21
Figure 3 World Main Oil Consumers 2016 .....	22
Figure 4 World Top 10 Reserves Holders (in million barrels at 31st December) .....	25
Figure 5 Distribution of proved reserves in 1996, 2006 and 2016 (percentages).....	25
Figure 6 World top 10 crude oil exporters.....	28
Figure 7 World top 10 Crude oil importers .....	28
Figure 8 World Oil Demand .....	33
Figure 9 World Oil Supply .....	33
Figure 10 Major crude oil pipelines in Kazakhstan.....	45
Figure 11 Top-5 Kazakhstan's crude oil export destinations (2016) .....	45
Figure 12 Brent annual average price (\$/barrel) .....	59
Figure 13 Annual GDP (\$billion) .....	59
Figure 16 Annual oil production in Kazakhstan .....	61

## List of Tables

Table 1: Crude oil density.....	16
Table 2 OPEC benchmark examples .....	18
Table 3 SWOT analysis of oil and gas industry in Kazakhstan.....	55
Table 4 The Data.....	58
Table 5 Ordinary Least Squares for GDP and oil price .....	60
Table 6 Correlation and Determination coefficients for GDP and oil price.....	61
Table 7 Ordinary Least Squares for GDP and oil production.....	62
Table 8 Coefficients of Determination and Correlation for GDP and oil production .....	62

## List of Abbreviations

API- American Petroleum Institute

b/day -barrel per day

bbbl- blue barrel

CIS- Commonwealth of Independent States

FDI- Foreign Direct Investment

KZT – Kazakhstani tenge

Mln. - million

mln.t.- million tons

NCOC- North Caspian Operating Company

NE- Net Export

OPEC-Organization of the Petroleum Exporting Countries.

PPP GDP- Gross Domestic Product based on Purchasing Power Parity

RUB- Russian ruble

thsd. - thousand

URR- Ultimately recoverable resource

US- United States

USSR- Union of Soviet Socialist Republics

VAT- Value Added Tax