

Analytical Comparison of Economic Growth of Kazakhstan and Azerbaijan Republics: Using the sustainable Development Indexes for Years 1999 to 2009

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Abstract: After dissolution of Soviet Union, Mazandaran Sea became the place of regional and international conflict. Today, the sea is limited to 5 countries of Iran, Turkmenistan, Kazakhstan, Russia and Azerbaijan and In addition to the geopolitical importance; it is especially important in geo-economic aspects because of holding oil and gas reserves. Kazakhstan and Azerbaijan, the independent republics in the margin of sea have been confronted proportionally with undesirable experiences such as constant changes and conflicts of various political groups. The political instability led to weakening of country and poverty, inflation and unemployment of people. The political stability aided by oil revenues provided the economic growth but there is a long way to reach to the sustainable development. In this paper, Pearson correlation coefficient was used to examine the relation of development indexes such as CO₂ (ECO₂) emission, energy consumption equal to thousand tonnes of oil (EU), total labor force per million (LFT), total population in million (PT), total life expectancy in year (LET) and GDP in Kazakhstan and Azerbaijan by Minitab Software. This examination is important because of comparative analysis of variables effect on the economic growth and explanation of instability factors in development of these countries.

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Introduction

Russia used the oil reserves of Mazandaran Sea in Baku for the first time in the middle of 13th century. Since 1990, the independent republics began to extract these resources to implement their development plans. Lack of technological, financial and managerial abilities to explore, extract and transfer of resources made the oil companies to enter to this region. Fast and hasty developments of oil industry and following increasing growth of GDP in marginal countries of Mazandaran sea have changed the region so that it became the topic of discussion for many researches. In this paper, definition of sustainable development and its indexes as independent variables is used to examine the effect of CO₂ (ECO₂) emission, energy consumption equal to thousand tones of oil (EU), total labor force in million (LFT), total population in million (PT), total life expectancy in year (LET) on GDP in Kazakhstan and Azerbaijan by Minitab Software.

1- Development Views

Since 17th and 18th centuries, development arguments arose in European countries and attention to economic growth as increasing of GDP in a year in comparison to the last year faded in these years and concept of economic development replaced it. In other words, the economical development is appeared where the quantitative growth of production along the positive changes of social institutions increase the exploitation capacity of produced resources constantly and dynamically. Before, postmodern

concept of "Sustainable Development" evolved following the environmental disasters as serious danger for the future of earth planet. The prominent views of this evolution are stated as "Traditional Development: and "Sustainable Development".

1.1: Theory of Traditional Development

1.1.1: Adam smith's view, (1723-1790)

Adam smith believed that capitalism is the way to reach to the economic development and work division increase skill, operation, production and transaction at last. Hence, development of market and transportation substructures makes people to sell their surplus products. Smith treated the capital accumulation as a way to develop technology and reach to the economic growth and he believed that free competition and trade in the market intensify the trend of development.

1.1.2: Malthus View, (1766-1823)

Malthus became famous due to theory of population. He believed that agricultural products growth and population growth increase in proportion of arithmetic and geometric progression respectively. So where there is balance that the rate of population growth is compatible with the rate of production growth.

1.1.3: Karl Marx's View: (1818-1883)

in view of Marx, the social class of each one is defined as his/her role in the production process. The general production function of Marx is that supply function of classics but he emphasized more on the institutional and

Social structures. He believed that capitalists accumulate capital to obtain more profit. The profit rate depends on added value and rate of population growth or infertile land has no effect on it. Marx recognized declining of per capita income as optimistic prediction of classics. He emphasized on imbalance of per capita income in capital society and acknowledged that the problem is solved by class struggles.

Schumpeter's View: (1870-1950)

Schumpeter distinguishes precisely the concepts of economic growth and development from each other. He believes that development is a set of changes and upheavals in the economic life which is not imposed by the outside forces and their origin is inside forces. The most important economic work of Schumpeter is "Theory of Economic Development" which had published in German language in the fall of 1911.

1.2: Sustainable Development

Sustainable development arose against the traditional development in 1950s and 1960s. According to complete definition of sustainable development in report of environment and United Nations development commission (1987) about the global environmental problems, sustainable development is a kind of development that meet the present needs of human with no risk to future generations in order to fulfill their own needs. The other definition of commission for sustainable development is change process of using the natural resources, guidance of investments, technology development orientation and institutional changes consistent with the present and future needs. Michael Jacobs in his book "Greening of Millennium" states that 6 main subjects is important in the concept of sustainability and sustainable development as follows: integration of environmental considerations in economic planning, futurism in taking decisions which have effect on future generations, environment protection and policy making to reduce the environmental degradation, justice orientation and commitment to meet the poor people's needs in present and future. The sustainable development based on this principal includes the economical, social, cultural and environmental dimensions. A list of various indexes is determined for each one of these dimensions. These quantitative, qualitative and even synthetic indexes measure the

mortality, pulmonary, cardiac and neurological diseases and decreasing of life quality. This quantitative index is very important where it decrease the human welfare.

2- Analytical and Statistical Examination

2-1: Pearson correlation Coefficient

Pearson correlation coefficient which also is called moment correlation coefficient or zero-order

development achievements and indicate changes of development over time in some cases.

1.2.1: Sustainable Development Indexes

1.2.1.1: Life Expectancy Mechanism

The experts believe that application of life expectancy as one of the main indexes of human development is important in 3 aspects. 1- It is valuable and help people to follow their various aims, 2- intrinsic value of longevity, 3- its dependency to other characteristics of life such as health, satisfaction and adequate nutrition. Longevity depends on adequate nutrition, physical health, education and other significant human achievements. So life expectancy as a quantitative index is a suitable instrument to measure other various variables which have effect on the human development.

1.2.1.2: Energy Consumption Mechanism

The rich sources of energy can be an important factor in the economic development if it is applied optimally. Otherwise, energy as an incompatible and unbalance sector make instable other economic sectors. The basic role of energy consumption as a quantitative index in economic development indicates that the necessity of precise and economical preservation and operation of energy resources is inevitable.

1.2.1.3: Population Growth Mechanism

Today, governments attempt to adopt certain population policies with regards to their population, social, cultural, economical and political structures. The necessary factor in the policy making of population is that there is consistency between the economic, social and cultural objectives in one hand and population issues in the other hand. Population growth as a qualitative index is the most important factor to provide welfare in the society.

1.2.1.4: Labor force Mechanism

Increasing of job opportunities is one of the consequences of economic growth and availability of active labor force is the necessary parameter to meet this need. Immigration policies of government have special effect on this quantitative index.

1.2.1.5: Air Pollution Mechanism

Hasty economic growth usually leads to environment degradation because of progressive usage of natural resources and air pollution is one of the effects of environmental degradation that hurt the society health by increasing of correlation coefficient introduced by Sir Karl Pearson. This coefficient is applied to determine the range, type and direction of relationship between two distance or relative variable and or one distance and relative variable. A couple of equal computational methods can be defined to calculate this coefficient.

A: computation method of using the raw numbers

$$r = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{[n(\sum x^2) - (\sum x)^2][n(\sum y^2) - (\sum y)^2]}}$$

B: computation method of using the standard marks

Defining of , Where, are the standard deviation of variables x, y respectively.

Pearson correlation coefficient is variable between 1 and -1. If r=1 indicate the direct or positive relationship of 2 variables, it means that if one of the variables increase (decrease), the other variable increase (decrease) too. R=-1 indicate the negative relationship so that if one of the variables increase, the other one decrease and vice versa. If r=0, it indicates that there is no linear relationship between variables. Correlation of 2 variables indicate the effect of increasing or decreasing of one variable on the other one but necessarily it is not refer to the causal relationship of variables. After confirming normal distribution of data by Kolmogrov- Smirnov test, Pearson correlation coefficient is used to explain the relationship of economic growth and sustainable development indexes in 2 countries of Azerbaijan and Kazakhstan.

3- Region situation

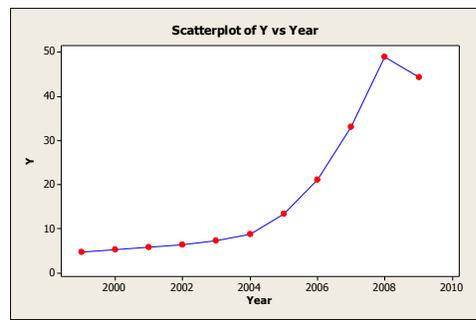
Mazandaran Sea which is the remaining of Tethys Sea that connected the Atlantic Ocean to the Pacific Ocean about 50 millions years ago is situated in the border of Asia and Europe and intersection of central Asia, Caucasus and Iran. So from the oceanography aspect, it is one of the 4 seas of world that called closed seas. There was no competition in this region before the Soviet Union's dissolution because Iran was unwilling to involve with the northern neighbor. But after that, Mazandaran Sea became the place of regional and international conflict. Today, the sea is limited to 5 countries of Iran, Turkmenistan, Kazakhstan, Russia and Azerbaijan and In addition to the geopolitical importance; it is especially important in geo-economic aspects because of holding oil and gas reserves.

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Nominal price	27.39	23.00	22.81	27.69	37.66	50.04	58.30	64.20	91.48	53.48

inflationdata.com/Inflation/Inflation_Rate/Historical_O.

Generally, development of this country is divided to 2 periods of times: 1- (1991 to 1995), period of chaos and decline, 2- (1996 to now), period of economic stability and dynamism. The studied period of times

was



3.1: Azerbaijan Republic

Azerbaijan Republic is situated in south of Caucasus Mountains and north of Aras River with 800km long coastline along the Mazandaran Sea. Azerbaijan is bounded by Iran to the south, Armenia and turkey to the west, Georgia to the western north and Russia to the north. Azerbaijan, Turkmenistan and Kazakhstan are situated in border of Mazandaran Sea. There is more than 4500 plant species in Azerbaijan's mountains and this biodiversity is because of variety of climates in this country.

Exploration of Azykh cave indicates the evidences of human life dating back to 3500 to 4000 years ago. Romans dominated on this region since 1st to 3rd AD century and called it Albania. Before attack of Arabs, there were conflicts to take control of this region among the Romans, Sassanian and Local governors. Moslem Arabs dominated on this region in 667 Ad. Sharvanshahyan, Ghaznavi, Seljuk and in later centuries, Afshariyeh and Ghajar which they were Iranian governments governed in this region for years. Finally, this region departed from Iran and included into the Russia Empire because of treaty of Gulistan and Turkmenchay in 1193 and 1207. Since 1920, victory of Bolsheviks made the Azerbaijan Republic to be one of the republics of Socialist Soviet Union till 1992. Political instability following the Azerbaijan independence and Karabakh war led to devaluation of money, inflation and economic crisis. As Heydar Aliyev became the president of Azerbaijan in 1993, this country experienced the period of political stability. Since 2005, Azerbaijan developed increasingly due to unprecedented oil revenues, foreign investment growth and International Fund Credits.

Table 1: Annual Average Domestic Crude Oil prices (in \$/Barrel)

considered from 1999 to 2009. Graph 1 is drawn according to the World Bank Data and indicates the changes of GDP in billion dollars in this period of time. Oil and gas sector contribution to GDP was 29% in 2000 and increased to 45% in 2009 which refers to the importance of oil and gas in development of country.

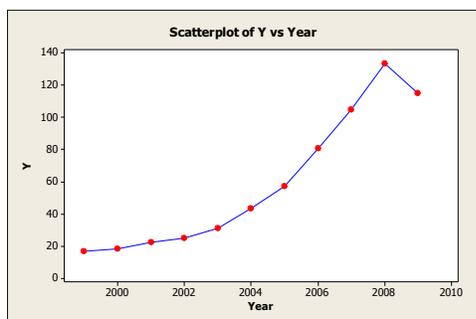
Graph 1: Changes of GDP in Azerbaijan Republic: 1999 to 2009)

Kazakhstan became one of Soviet Union as Kazakhstan Socialist Republic following the revolution and composition of Soviet Union in October 1917. Historians consider Kazakhstan in 3 historical periods: 1) prehistory 2) antiquity 3) middle ages. Kazakhstan democratic Republic became independent in 16th December 1991. Government of Kazakhstan is democratic and presidential. The president is the head of state as executive power and parliament as the legislative power of Kazakhstan. Kazakhstan is bounded by Russia to the north, china to the east, Kyrgyzstan to the eastern south, Uzbekistan to the south and Turkmenistan to the western south. The eastern north coasts of Mazandaran Sea are situated in Kazakhstan. Area of Kazakhstan is 2717300 square kilometers and is the ninth largest country in the world. However, most

part of the country is desert and steppe and population density is 6 persons per square kilometer. Large cities of Kazakhstan are Astana, Almay, Shipment, Airwave, Semen and Karajan.

Decreasing demands of Russia in heavy industries products which were produced traditionally in Kazakhstan led to economic crisis in this country in 1991 and intensified in 1994. The government promoted privatization according to development and reform plans. Construction agreement of new pipeline from Tengiz oil field in west of Kazakhstan to Black Sea increased the oil exports and transferred large share of assets to private sector. Graph 2 shows the trend of GDP growth in this country based on World Bank data. The president announced the first long term plan of development in his message in 10th October 1997. This plan which is called "long-term strategy of Kazakhstan to 2030" is in order to enhance the welfare, security and life level of citizens to 2030. This plan is designed in 3 phases: 1) 2003-2005, 2) 2006-2010, 3) 2011-2015

Graph 2: Changes of GDP in Kazakhstan Republic (1999 to 2009)



4- Statistical Method

Data is gathered from the statistical information and surveys of World Bank. Used indexes are GDP in billion dollars, CO2 or ECO2 emission, energy consumption equal to 1000 tonnes of oil (EU), total labor force per million (LFT), total population in million (PT), total life expectancy in year (LET). Kolmogrov- Smirnov test used to test the normality of quantitative data distribution in 5% standard error.

H0: data distribution of each one of the variables is not normal

Table 2 indicates the results of Kolmogrov- Smirnov test for Azerbaijan Republic's Data. p value was calculated for all variables. value of each variable is more than 5% so, H0 is acceptable.

Table 2: Results of Kolmogrov-Smirnov Test for Azerbaijan Republic's Data (1999 to 2009)

Index	Kolmogorov-Smirnov Test				
	Mean	StDev	KS	p-Value	N
ECO2	36385	8914	0,231	0,099	11
EU	12209	973,7	0,174	<0,150	11
LFT	3,947	0,341	0,097	<0,150	11
PT	68,43	1,371	0,116	<0,150	11
LET	8,366	0,3046	0,123	<0,150	11

H1: data distribution of each one of the variables is not normal.

With regards to the results and P value, there is no reason to reject H0. Pearson correlation coefficient was calculated for determine the type and direction of variables relationships by Minitab software.

4.1- Statistical analysis Using Azerbaijan Republic's Data

As the variables are normal and quantitative, Pearson correlation coefficient is used to express the relationship of effective factors on GDP which is shown in table 3.

Table 3: Pearson Correlation Coefficient for Azerbaijan Republic (1999 to 2009)

INDEX										
GDP	ECO2		EU		LFT		PT		LET	
	R	p-Value								
	0,996	0,000	0,356	0,282	0,908	0,000	0,945	0,000	0,882	0,000

The most correlation coefficient is CO2, $r = 0.996$. Therefore, results of study cover the ascending part of Kuznets curve. There is inverse relationship between economic growth and air pollution. Environment degradation is high at the first phases of economic growth and reach to its peak point but quality of environment optimize in the later phases of economic growth. Variables of population growth, total labor force and life expectancy indicate positive and relatively high correlation coefficient respectively so that the development plans of government is justifiable based on results of statistical analysis. The most important plans of government are "supporting small and average producers" (1997 to 2000), "government plan to growth. But, energy consumption decrease because of environmental concerns and application of high technology to energy efficiency. Results of analysis confirm the theory.

4-1: Statistical Analysis Using Azerbaijan Republic's Data

As the variables are distributed normally and quantitatively, using of Pearson correlation coefficient is necessary.

Table 5 show coefficients of each variable.

Table 5: Pearson Correlation Coefficient for Kazakhstan Republic (1999-2009)

INDEX										
GDP	ECO2		EU		LFT		PT		LET	
	R	p-Value								
	0,968	0,000	0,969	0,000	0,963	0,000	0,927	0,000	0,813	0,002

Variable changes of CO2 (ECO2) emission, energy consumption equal to thousand tonnes of oil (EU), total labor force per million (LFT), total population in million (PT), total life expectancy in year (LET) has positive effect on GDP in Kazakhstan Republic during 1999 to 2009. The relationship of energy consumption ($r=0.969$, $p: 0.000$), CO2 emission ($r=0.968$, $p: 0.000$) and GDP is due to application of low technology and non-economical energy consumption in this country. Because using of high technology and economical pattern of energy consumption during the economic growth reduce the energy consumption and environment pollution.

reduce poverty and economic growth"(2003-2005), government plan for economical, social and regional development of Azerbaijan Republic, (2004-2008). Attention to business development, creation of job opportunities, enhance of life quality, reduce the poverty through reforms in education, health, social security sectors and family support, citizen and cultural rights refer to comprehensive human development. Variable of energy consumption has the least correlation coefficient in comparison with the other variables of this model. It is evident that there is meaningful relationship between variables. the biologist economists believe that energy is the dominant factor in the production function and the most important factor of economic Table 4 indicates the results of Kolmogrov- Smirnov test for Azerbaijan Republic's Data. p value was calculated for all variables. value of each variable is more than 5% so, H0 is acceptable.

Table 4: Results of Kolmogrov- Smirnov Test for Azerbaijan Republic's Data (1999 to 2009)

Human development plans of Kazakhstan to enhance the life quality including "Health Development" from 2005 and "Healthy Life" from 2007 increased the population growth and life expectancy so that there is meaningful relationship between these 2 variables and GDP. Training of skilled work force and increasing of work force is the other aim to reach to the human development that has special effect on GDP. ($r=0.963$)

Conclusion

After dissolution of Soviet Union, Kazakhstan and Azerbaijan as 2 independent republics experienced constant changes and conflict of political groups.

Political instability weakened the country which resulted in poverty, inflation and unemployment. Although oil revenues underpinned political stability and economic growth, but there was problems in ground of free market system, privatization, depreciation of fixed assets and environment pollution because of low technology, lack of full production cycle, high energy consumption, domestic market fragmentation, reduction of mineral resources, low capacity of internal markets and excessive exports required sustainable development pattern including economic, social and environmental perspectives. Governments used available pattern of foreign expert to reach to the sustainable development but they took the long way. The present study shows that Azerbaijan and Kazakhstan have achieved desirable results in ground of human development. Total population in million (PT) and total life expectancy in year (LET) as the human development indexes had positive effect on GDP. EU and Azerbaijan concluded partnership agreement in 22 April 1996 but it took effect in June 1999. One of achievements of Azerbaijan's adoption in EU was easy accessibility to high and state-of-art technologies. Comparison of variable's effect of energy consumption equal to thousand tonnes of oil (EU) as economic index on GDP in these countries

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show high technology application in Azerbaijan than Kazakhstan. CO2 emission as environmental index has strong and positive effect on GDP in these countries. Despite the internal (rules and regulations of environment protection), international (environmental conventions of UN) and regional actions (Mazandaran's Environment Pollution Organization) to protect the environment, economic growth increases environmental pollution. Fast economic growth in Kazakhstan and Azerbaijan provides immigration. Net immigration increased from 53264 in 2000 to 127510 in 2005 and from 7502 in 2003 to 8306 in 2009 in Azerbaijan and Kazakhstan respectively. Presence of oil companies, oil industry nad trade advancements, security, attention to human development, welfare facilities, urbanization and creation of job opportunities were the important effective factors on immigration in these countries.

Generally, despite the efforts of these 2 countries to reach to the sustainable development given the human development achievements, unsustainable development is the result of factors such as lack of integrated management, indigenou development model consistent to local needs and resources and low-level technology and environmental problems.

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