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The relation between air pollution and national economy and society development - the case study of Kazakhstan

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Thesis title

The relation between air polution and national economy and society development – the case study of Kazakhstan

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Objectives of thesis

The purpose of this master thesis is to assess and estimate the influence of the environmental situation in Kazakhstan with the focus on air quality, on the population and economy. In this work, an appropriate theoretical framework would be provided that describe relationships of selected types of pollution and their overall impact. There are also partial goals. The first partial goal is to estimate the industrial sector's impact/influence on the environmental situation in Kazakhstan. The next partial goal is to evaluate the government's actions concerning emissions reduction on the ecology of the country.

Methodology

The methodology of this work is following the above goals. In the theoretical part, literature research is conducted based on relevant literature overview – this chapter contains the compilation of different experts' opinions on the selected topic. In the practical part methods such as descriptive and graphic analysis are introduced. They are applied to present the situation and achieve relevant results. The next step in the research is a creation of statistical research where the following tools are used: minimum, maximum, arithmetic average, variance, regression analysis with evaluation of sensitiveness (regression line and coefficient of determination), chain index geomean and finally correlation analysis.

The proposed extent of the thesis

60 pages

Keywords

Kazakhstan, ecology, polution, health, environment, economic growth.

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Declaration

I declare that I have worked on my diploma thesis "The relation between air pollution and national economy and society development - the case study of Kazakhstan " by myself and I have used only the sources mentioned at the end of the thesis. As the author of the diploma thesis, I declare that the thesis does not break copyrights of any third person.

 In Prague 28.11.2019   _____

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 I would like to thank my supervisor prof. Ing. Luboš Smutka, Ph.D. for his help and useful advice during my work on this thesis.

The relation between air pollution and national economy and society development - the case study of Kazakhstan

Summary

This master thesis is analyzing the influence of ecology on human life. The purpose of this master thesis is to assess and estimate the influence of the environmental situation in Kazakhstan, on the Kazakh population based on selected indicators: international indicators comparisons, level of consumption, level of pollution and other indicators. The hypothesis is the assumption that the respiratory diseases in the region depend on the car's number and air quality.

The current problems of the country are related to air quality arising from the rapid car number increase. All of the above causes, respiratory diseases and cancer.

The development of the economy of the country happens due to the development of the mining industry. On the other hand, this type of economy brings increased consumption of resources and generates a lot of garbage. The government is constantly struggling with this phenomenon.

Thanks to the steps taken by the Kazakh government, the level of pollution is gradually decreasing even though rather slowly. The current situation has greatly improved, compared to the state that was 10 years ago. The remaining problems in the country are the number of cars, air pollution and the waste produced by agriculture.

Keywords: Kazakhstan, ecology, pollutions, health, economic growth.

Vztah mezi znečištěním ovzduší a národním hospodářstvím a vývojem společnosti - případová studie Kazachstánu

Abstrakt

Tato diplomová práce analyzuje vliv ekologie na lidský život. Účelem této diplomové práce je posoudit a odhadnout vliv environmentální situace v Kazachstánu na kazašskou populaci na základě vybraných ukazatelů: srovnání mezinárodních ukazatelů, úroveň spotřeby, úroveň znečištění a další ukazatele. Hypotéza je předpoklad, že respirační onemocnění v regionu závisí na počtu automobilů a kvalitě vzduchu.

Současné problémy země souvisejí s kvalitou ovzduší vyplývající z prudkého nárůstu počtu automobilů. Všechny výše uvedené příčiny, respirační onemocnění a rakovinu.

K rozvoji ekonomiky země dochází díky rozvoji těžebního průmyslu. Na druhé straně tento druh ekonomiky přináší zvýšenou spotřebu zdrojů a generuje spoustu odpadu. Vláda neustále bojuje s tímto jevem.

Díky krokům podniknutým kazašskou vládou se úroveň znečištění postupně snižuje na normální úroveň. Současná situace se oproti stavu před 10 lety výrazně zlepšila. Zbývajícími problémy v zemi jsou počet automobilů, znicisteni vzduchu a odpady zemědělství.

Klíčová slova: Kazachstán, ekologie, znečištění, zdraví, ekonomický růst.

Contents

1 Introduction

This master thesis is oriented on a theme that has an indisputably key role, in the modern world - the impact of ecology on human life. In recent decades, we are witnessing an unprecedented economic growth, which has led to the very rapid growth of life quality, on the entire planet. Many diseases, ailments, and mankind problems have been solved thanks to penicillin, mandatory vaccination, etc. Obviously, a lot of problems have not been solved. For example, the gap between the rich countries in the "North" still exists, which includes primarily the EU countries, Canada, the United States, Japan, and the poor in the "South" with Africa, Latin America, etc. But there are seen tendencies of improvement.

On the other hand, economic growth usually leads to a certain imbalance in nature, which fact was already pointed in ancient Greece. Mankind, by its activities and behavior, does not live very often as a part of nature but adapts the nature to the comfortable living of people. Such attitude results in the deterioration of the environment that subsequently affects the health of people, of course.

As a result of industrial sector activity or construction, there is occurring not only the gradual environmental degradation but also technogenic catastrophes that bring to a fast deterioration of the situation in nature. On top, these catastrophes turn up into malign influence on people's health. For instance, the accident at the nuclear atomic power plant in Chernobyl, as the world known accident that could lead to the complete abolition of nuclear power. One of the latest accidents to be mentioned is the industrial disaster of the oil spill in the Gulf of Mexico by BP, which led to a biological disaster in the region.

The negative effect of the environment on mankind causes the growth of public expenditure on medicine and public health services, which of course influences the budget and debts. Hence, there are several directions in politics oriented on the prevention of the probability of environmental impact. Undoubtedly, this policy is mostly developed in the EU countries and in the USA.

2 Aim and methodology

The purpose of this master thesis is to assess and estimate the influence of the environmental situation in Kazakhstan, on the Kazakh population based on selected indicators: international indicators comparisons, level of consumption, level of pollution and other indicators. There are also partial goals in the paperwork. The first one is to is to estimate the industrial sector work on the environmental situation in Kazakhstan. The next partial goal is to evaluate the government's actions concerning emissions reduction on the ecology of the country.

The hypothesis is the following assumption: respiratory diseases in the region depend on the car's number and air quality.

Research questions are the following: impact of economic growth on life expectancy, ozone-depleting substances, and greenhouse gas emissions, steps taken by Kazakh government in order to reduce pollution and evaluation of overall country situation via using Environmental performance index and Environmental Health and Ecosystem Vitality.

The methodology of work will repeat the above goals. The first step in the methodology is to conduct literature research based on Czech and foreign authors' books. This chapter contains the compilation of authors' opinions on this topic.

In the first part of the research, the attention is paid to the overall presentation of the country using Environmental performance index, Environmental Health, and Ecosystem Vitality. Moreover, there is also the introduction of basic macroeconomic indicators – GDP, average salary. Of course, in this part, it is also necessary to mention the main ecological disasters influenced the current ecological situation – Aral Sea problem, radioactive contamination and urban development together with air pollution.

In the second part of the research, there is a presentation of basic areas explained in the literature research – especially consumption level and pollution level. Each area is divided into several indicators that are deeply explained.

If we talk about consumption level, the investigation is aimed at consumption of ozone-depleting substances. Pollution is presented by the following indicators: greenhouse gas emissions and waste generation. Other indicators are the following: life expectancy, death rate, passanger transport and air temperature,

The final step in the research is a creation of statistical research where the following tools are used: minimum, maximum, arithmetic average, variance, regression analysis with evaluation

of sensitiveness (regression line and coefficient of determination), chain index geomean and finally correlation analysis. As dependent variables are chosen life expectancy, infant mortality rate, and average salary, independent variables are consumption of ozone-depleting substances, greenhouse gas emissions, and waste generation. In other words, there are three regression lines obtained in the final step of the research. Finally, there is a case study comparing ecological situation in Almaty and Astany in the sphere of respiratory diseases.

The sources utilized in the thesis are freely available on the Internet. As a framework served the official databases published by Kazakh authorities. Information from foreign sources was also used in the masterwork.

3 Literature research

The first part of the master thesis is focused on the creation of literature research in the field of the environmental situation. The fundamentals will be created, on which the practical part of the work will be based.

3.1 Ecology, environment and its influence on health

The 20th and 21st centuries brought a huge increase in people's well-being. Many diseases were cured, and men had never been taken ill with these diseases. Variola, plague and other diseases that had taken the lives of entire villages and cities had become a thing of the past. Nowadays, all these diseases can be met solely in test glasses in a laboratory. On the other hand, it is important to understand the ecology of the modern city and our own home does not help in maintaining and strengthening the immunity of people, especially children. The reason for such a situation is the big problem of cities, where most of the population of countries live, at the moment. The cities big problem is associated with the high population density, agglomeration of industries and transport in relatively small areas. As a result, an ecological balance arises that affects the health of people.

3.1.1 Air pollution

The first environmental problem, which impact is very much discussed in the media is air pollution. Long stay or residence near busy motorways, increases several times the probability of asthma progress. On top the most vulnerable to the diseases associated with the respiratory system are the children. The pollution of atmospheric air worsens the sanitary and hygienic living conditions of the population, which is manifested in a decrease in the transparency of the atmosphere, a reduction in natural illumination. When speaking about air pollution, it is necessary to underline the cases of irritating fogs that contain complexes of organic sulfur compounds, that affect negatively the human body. Therefore, it is necessary to avoid walks in foggy weather, in large cities. The air quality is also changed and polluted by oil refineries and waste disposal works factories. The activity of these factories does contaminate the air with a high quantity of dust that leads to a deterioration of solar radiation. As a result, the processes of plants vital activity are disturbed, and they are dying. With the loss of green spaces, which represent urban lungs, the natural filter that purifies the air stops functioning because suspended

particles matter and gaseous impurities settle down on the plants. Not to forget about the automobiles that are also a direct air polluter. For the health of the inhabitants, the gases worked out by the car, the exhaust gases, represent the highest danger, because these gases enter the atmosphere directly in the breathing zone of a person; unlike it is occurring in case of emissions from industrial enterprises. The volume of exhaust gases by motor vehicles increases not only on the roadways but also in yards where vehicles engines operate in the most "non-ecological" regime - for example, at low speeds. Moreover, there located resting areas and playgrounds on building surrounding territories, which directly increases the danger to human health (Vallero, 2014, p. 43-46).

According to the World Health Organization, air pollution is the greatest environmental health risk in the world. According to the opinion of the experts, the main problem of air pollution is the following diseases: 40% coronary heart disease; 40% stroke; 11% chronic obstructive pulmonary disease; 6% lung cancer and 3% acute infections of the lower respiratory tract in case of children (WHO, 2019).

This organization writes that there is a strong relationship between exposure to polluted air both indoors and in the atmosphere and cardiovascular diseases such as strokes and coronary heart disease, as well as between air pollution and cancer.

In addition, air pollution causes respiratory diseases, including acute respiratory infections and chronic obstructive pulmonary diseases. The main region with negative air impact is the region of Southeast Asia and the Western Pacific. This is due to the fastly growing economies of these countries as well as to the emissions into the atmosphere, that come from the industry. Unfortunately, the environmental requirements in these countries are very low, which leads to the transfer of hazardous production in this part of our planet.

Let's see how the German authorities fight against air pollution. The country is one of the leaders of the European Union in the field of ecology and is a world industrial leader.

The first method to combat air pollution in Germany is the rejection of the construction of thermal power plants that are operating on coal and lignite. Due to this, heat will be obtained not by burning coal, but by more environmental methods - an example is the use of wind or sun. The country is very actively developing the topic of alternative energy sources (Vsja Evropa, 2019).

One of the main reasons for air pollution in Germany is cars. The German government is taking several steps to resolve it. Firstly, it is the financial assistance intended to retool small trucks

used by municipal services and artisans. Secondly, it is the financial support for the purchase of electric vehicles by municipal services, the installation of stations for charging electric vehicles and the technical retrofitting of buses with diesel engines. The government also restricts the number of diesel cars in the country (Misenko, 2019).

There is also a reduction in other types of pollution that do not have such a big impact on air quality in Germany, but the German government is still struggling with them. An example is fireworks. According to data released by the German authorities, the level of air pollution on New Year's Eve because of many fireworks exceeded the permissible norms. For example, in Munich on New Year's Eve, the level of harmful substances in the air exceeded by 27 times the EU recommended level - 50 micrograms of harmful particles per cubic meter of air. There have already been proposals to stop it by prohibiting the utilization of fireworks by individuals (BBC, 2019).

3.1.2 Impact of pollution

The results of the impact on human health can be divided into:

- Human biorhythms disorder,
- Acceleration of development,
- Allergy,
- Diseases transmitted via dirty water,
- Sleep disturbance, insomnia, dizziness, etc.

The problems in the environment can bring to human biorhythms disorder and subsequently affect health. Because of the negative influence of the environment, chaos begins, and the human body is not able to adequately respond to these changes.

Under the result of environmental pollution is oncological diseases rate is increasing. These diseases are caused by tumors, which is an overgrowth of tissues.

The human body may experience the process of acceleration, which is the accelerated development of individual organs or parts of the body in comparison with their biological norm. Currently, this is related to body size increase and earlier puberty of adolescents (Donna, 2012, p. 338).

The ordinary problem of the modern world is the appearance of numerous allergies. This disease represents an ultra-high sensitivity of the body to a substance. The cause of the disease is the human immune system perturbation, which was all his time, in balance with the natural environment. The urban environment and its pollutions lead to the appearance of completely new substances, that are unknown for the human immune system because it did not work before with them. As it was noticed by Ring (2010, p. 36): *"Allergy can be regarded as "the environmental disease number one".*

Water can be one of the main sources of the spread of disease, especially when it comes to swimming in open and stagnant water reservoirs. There are a lot of cases when polluted water sources caused epidemics of cholera, typhoid, dysentery; diseases transmitted to humans via contaminated water pools by pathogens and viruses. This is applicable especially for big cities with a big number of industrial facilities. Even water purification in such cities may not always give expected results, and sometimes the water is dangerous for the organism - the utilization of such water as potable through water pipes may cause cardiovascular and kidney pathologies, diseases of the liver, biliary tract and gastrointestinal tract (Baleshwar, 2007, p. 74-75). According to Boomgaard (2007, p. 281) situation is critical is some highly developing Asian countries – like Malaysia.

Because of soil contamination, the population is under the risk of such rare diseases as anthrax or tetanus (Alcamo, 2012, p. 409).

Noise pollution, unlike other types of pollution, is not so obvious and manifests itself over a certain period. A typical result of noise pollution according to Younes (2017, p. 20) is insomnia and lack of sleep. Constant exposure to big noise can cause a decrease in hearing sensitivity and provoke other harmful effects - ringing in the ears, dizziness, headache, increased fatigue, decrease in immunity, hypertension and may lead even to coronary heart disease.

On the other hand, not all environmental problems are the main cause of populations' poor health, this is far from being the case. For example, the Accident in Chernobyl that occurred in the second half of the 1980s. After only a few years after the Chernobyl accident, the thyroid cancer rate among children and adolescents in Belarus increased 45 times, in Russia and Ukraine increased 4 times. These numbers indicate clearly the discharge in the air of Russia, Belarus and Ukraine territories, had a huge impact on the risks of cancer in these countries. On the other side, in neighboring country Poland, the cancer rate did not increase at all. The specialist Z. Jaworski, who conducted a study in the territories of four countries with

approximately the same radioactive contamination, concluded the health of Belarusians, Ukrainians, and Russians, unlike the Poles, was severely undermined by such factors as stress and the nutrition characteristics. In addition, the oncology disease rate was affected by the living standards in these countries, that had worsened a lot and people could no longer afford, for example, a stable intake of iodine in their diet. This example shows that lifestyle and income also can influence the rate of disease (Informational portal dishisvobodno.ru, 2018).

For that reason, a person must take care of his/her diet and lifestyle - tobacco smoking, sedentary lifestyle, excessive consumption of alcohol, low consumption of fruits and vegetables, etc. can have a very negative influence on health, sometimes even more than the environmental condition.

It is highly important to pay close attention to your own home/apartment. The main enemies of our living place are not only the dust but also various organisms that colonize the room, such as bacteria and fungi. These microorganisms may attack seriously the human body and unpleasant consequences may arise in the form of allergic diseases.

3.2   Measuring of ecological and environmental situation

This chapter will be describing the fundamental pollution indicators of the environment. For a better guide, the text will be divided by the main indicators, which include:

- International indicators,
- Consumption level,
- Pollution level,
- Other indicators.

3.2.1   International indicators

The first method of measuring the pollution in the country is to analyze the international indicators, that are compiled on a regular basis. Thanks to these indicators, it is quite easy to determine the state of the environment in a country and compare it with other countries. An example can be the ENVIRONMENTAL PERFORMANCE INDEX. This index is constructed based on CO_2 emissions, fertilizer consumption and deforestation (Duit, 2014, p. 85).

3.2.2   Consumption level

A very important indicator of the environmental situation in the country is the final consumption of energy, supplied to the final consumer, both to industrial production and to the population. Derived from this indicator is the country's energy efficiency, which shows the general relationship between energy consumption and economic development. In other words, the purpose of this indicator is to demonstrate, how much energy the economy needs, and the volume of production the economy can produce. This group of indicators also includes the amount of energy consumed from renewable sources, divided by the main sources of energy. A similar index is the part of the energy produced from renewable sources in total energy consumption.

The usage of ozone-depleting substances is also an important indicator relating to the country's ecology. It is necessary to underline, the ozone layer in the stratosphere is the most important component of the Earth's atmosphere; this layer protects humans, flora, and fauna from negative ultraviolet radiation from space. Without this layer, life on earth would be impossible. The ozone layer is destroyed as a result of reactions with certain chemical elements. Typically, these elements are formed from solvents, refrigerants, foaming and degreasing agents, aerosol propellants and agricultural pesticides (Andersen, 2012, p. 187).

When it comes to agriculture, in this area of the economy, the main indicators are the application of mineral and organic fertilizers as well as the application of pesticides. In agriculture, the amount of land withdrawn from productive turnover is also measured, as well as the size of the regions affected by soil erosion (Braatz, 2010, p. 311).

Water resources are also an important environmental indicator. These include: Renewable freshwater resources, Freshwater abstraction, Domestic water consumption per capita, Water loss, Reuse and recycling of fresh water, Drinking water quality, Biochemical oxygen demand and concentration of ammonium nitrogen in river water, Biogenic substances in fresh water, Biogenic substances in coastal waters, and Polluted wastewater (Ministry of national economy of the Republic of Kazakhstan. Committee on statistics. Ecological indicators of environmental monitoring and assessment).

3.2.3 Pollution level

After the accident in Chernobyl, the main indicator for environmentalists is radioactive pollution of the environment. These pointers are used to measure the effects of radiation. Moreover, this type of pollution could bring according to Birsen (2012, p. 88) psychological effects.

The following key indicator of radiation measurement is CO_2 emissions into the atmosphere. This gas is, above all, a product of industry and causes enormous harm to human health. On the other hand, sometimes industry and economy decline, on the contrary, lead to an improvement in the ecological situation, as was the case in Russia. In the 90s, the country experienced a severe crisis, which was reflected in the decline of industrial production. As a result of this situation, local industrial enterprises have limited their production and, consequently, the emission of poisonous gases into the atmosphere. Besides the CO_2 emission measurement, the emission of the following gases is also followed: sulfur dioxide, nitrogen oxides, ammonia, and hydrocarbons (Ministry of the national economy of the Republic of Kazakhstan, 2018).

3.2.4 Other indicators

A very interesting indicator is the deviation in temperature norm or in precipitation level. These two indicators demonstration that the ecological situation in the country is disturbed in the given year since the temperature or rainfall should not change often. As a result, a clear threat is climate change with all the ensuing consequences. The next environmental indicator is the quality of atmospheric air measured in urban conditions. The quality of this indicator can be judged by the number of days per year when, after conducting regular observations of its level, the level of air pollution in each city exceeds the established values. The values can be one time or daily average, the condition is their maximum allowability. The following indicator from this group is the percentage of the country's urban population that is affected by these concentrations. As a rule, the population living outside the city is not subject to this negative phenomenon; therefore, more and more people tend to leave large cities, in developed countries (Ministry of the national economy of the Republic of Kazakhstan, 2018).

Another indicator worth mentioning is the percentage of waste recycling, from the population. In the modern world, it is one of the main indicators of state policy aimed at limiting landfills and regular household waste combustion. This also includes the level of waste recycling, both

in industrial and waste from the population. Passenger traffic can be an environmental indicator, as well. As a rule, this indicator is determined by summing up the passengers' number for each transportation position by the transportation distance. Passenger traffic is calculated, most often by types of transport. Vehicular transportation is considered being the most dangerous for nature (Ministry of the national economy of the Republic of Kazakhstan, 2018).

3.3 State policy in the sphere of ecology, environment and health

This chapter deals with public policy aimed at the sphere of ecology and human health. Currently, ecology and medicine are undoubtedly part of the state's strategy.

3.3.1 Ecology and environment

For quite a long time, the issue of environmental protection was considered a problem of secondary importance, at the state level. The main assumption was firstly to develop actively the economy and increase the level of population welfare; only after that, the environment will become a priority. The last century, especially the second half, proved the inconsistency of this approach. The reason is that the economy of a country, especially when it is built on the idea of making a quick profit from the extraction of natural resources, without compensating the damage to natural ecosystems or to the population, sooner or later is in crisis (Bioscience, 2018).

The basis of environmental policy can now be found in the most important legal document of the country which is the constitution. This example demonstrates how important is the environmental policy, for the state. The most important goal of environmental policy is to ensure stability and maintain the steady-state condition of the local nature, and all ecological systems.

Unfortunately, the technical progress has brought not just improvement in life quality, but also caused environmental degradation. As a result, not only nature suffers, but also people's health (Bioscience, 2018).

Nowadays, the state policy in the field of ecology refers to the following subjects:

- Sustainable use of natural resources,

- Pollution reduction,
- Conservation of nature for future generations and restoration of the natural environment.

Of course, it is impossible to stop using natural resources at once. On the other hand, the predatory approach to the exploitation of natural resources must be stopped. Consequently, the first goal in state policy is the very rational use of non-renewable natural resources. So, the state is working to reduce the share of enterprises that are based on natural resources exploitation and develop high-tech, environmentally friendly industries. This also includes policies aimed at minimizing waste during their extraction and processing. Recently, the support of environmentally efficient energy production has become part of the state's strategy; such as the use of wind, water, sun, etc. and their gradual replacement of the energy produced by oil or gas. It is characteristic especially for the countries of Western Europe and the USA (Bioscience, 2018).

Policies that are engaged in pollution reduction apply primarily to industrial enterprises. In this context, the state directs all its efforts to reduce pollution produced mainly by extractive enterprises. Further, this policy applies also to the development of the economy associated with enterprises that do not belong to the extractive industry.

The last vector of the state strategy refers to the future and is based on the purification of water, soil, etc., from the consequences of industrial activity. Starting in recent times, the same applies to the recycling of garbage from the cities - the waste separation by types is already practiced not only in Western Europe or the United States.

3.3.2 Public health

The second important policy in this area is health policy aimed to support public health. The aim of this policy is creating conditions for the health system functioning that allows to treat the population and prevent diseases occurrence. The next goal is research and developmental work - conducting research in the field of health care and training medical and pharmaceutical workers responsible for public health (Kyberleninka.ru, 2018).

In some countries, health policy is the government's priority task, and even sometimes it can be found among the main factors of a country's security.

Examples of public health care policy are the following subjects:

- Reduce mortality;
- Maintain and strengthen public health, increase the role of medical prevention, and the role of healthy lifestyle education;
- Increase the birth rate;
- To provide the population with protection from natural and technical emergency situations;
- Health care for refugees.

Reduction of mortality can be achieved by prevention and early detection, in the early stages of diseases that have a high percentage of mortality among the population, especially if we talk about developing countries (Hout, 2016, p. 179-180). Here are on the list: cardiovascular diseases, oncology, etc. Therefore, the state policy in health care is oriented principally at the prevention of these diseases. The next problem in this area is the reduction of mortality and injuries in industrial production and the reduction of professional illness. This issue is also solved by early detection and prevention of diseases. For a very long time, there was the problem of maternal and infant mortality. In the modern world, thanks to medical advances and public health care policy, this problem has been almost completely solved.

The second area is understandable – the maintenance and strengthening of public health give a very good effect in the field of medicine. It is much better, to spend financial resources on adopting the policy aimed at promoting a healthy lifestyle than later to solve problems associated with the aggravation of people's health. The state should elaborate steps aimed at encouraging citizens to take a responsible attitude towards their health and increase their interest in sports.

Unfortunately, in the modern world, there is an acute problem with the birth rate. Almost all developed countries face one common problem - families do not want to have children or have one child only. There should be considered two areas of support - this is economic support of families with children, and the appropriate medical service. The economic component includes also the financial support of young families. Medical support is, first of all, required by pregnant women and in childbirth. In developed countries, state medical support includes, as well, support for the treatment of infertility. Important is, of course, the psychological component of this policy, namely – strengthening the institution of the family and the influence

of family education. This area is often referred to as the family support service that adopts children left without parental care (Murphy, 2010, p. 51).

The last part of the state policy proceeds from technogenic disasters that have happened over the past 30 years. These disasters are described in detail in the appropriate chapter. The main goal of the state in this regard is to prevent the occurrence of these disasters. This policy also includes the gradual transition from non-renewable to renewable sources of energy.

The modern world is also facing a very big problem related to the migration of the population. This problem is primarily faced by Western countries, where lots of migrants, from less-prosperous countries, have recently flooded too. In these less-prosperous countries, medicine is at a very low level, so it can be expected that there will be not vaccinated representant between the refugees. Then, Western countries have to resolve this issue. In contrast to previous years, the number of immigrants has increased incredibly and reaches tens and even hundreds of thousands of people, in some countries.

As a rule, in most countries, the Ministry of Health is the organization that does the management arrangements of the health care system of the country. It should be mentioned that local authorities can supervise and implement the country's health care policy, it all depends on the specific situation and specific country.

In addition, the health care system of most countries includes both, the municipal and private health care sectors. The private health care sector can include both, private healthcare organizations and citizens who are engaged in individual medical practice (Kyberleninka.ru. Osobennosti gosudarstvennoj politiki v oblasti zdravoohranenija).

3.4   Way of improving ecological and environmental situation on human health

Currently, the protection of the environment is one of the main areas of public policy. There are many regulatory documents that regulate the protection of air, water, and soil. In many countries, the protection of nature and the human right to protect health are even an integral part of the constitution.

The state should play a key role in the public health service area. The International Health Organization offers the following guidance in the field of environmental protection requiring active government intervention:

- Industry,

- Transport,

- Urban planning,

- Energy and energetic,

- Waste utilization (World Health Organization. Kachestvo atmosfernogo vozduha i zdorove).

In the field of industry, WHO advises focusing on clean technologies that help to reduce the emissions from industrial chimneys; improved the utilization of urban and agricultural waste, including capturing methane from waste disposal sites, as an alternative to incineration (for use as biogas).

The most successful measures for environment protection are correlated to government measures directed on technology. The first method to limit the discharge into the air is to use a closed technological process – the process of production - which is based on the complete absence of gas emissions, in the final stages of the production cycle. Unfortunately, modern technology does not have such an ability to perform a completely closed production cycle. The second method is the complex (maximum) methodology of raw materials use, intermediate products and production waste, by the type of production with "wasteless" or low-waste technology. In other words, this production is based on limiting emissions to the environment and their control utilizing the resource recovery. There are fewer radical ways to limit emissions. The first of them is the replacement of harmful substances in production by harmless or less harmful. For example, conversion of boiler stations from solid fuel and fuel oil burning to natural gas; or replacement of gasoline (in internal combustion engines) with hydrogen and other chemical compounds. Another example is the preliminary treatment of fuel or raw materials in order to reduce the content of harmful impurities so that the pollution of air will be very limited.

The state according to Velikhov (2013, p. 412-413) can also demand sanitary and technical measures from industrial enterprises. The aim of these sanitary engineering measures is to extract or neutralize the emission components, that are in gaseous, liquid or solid form. In order to achieve this goal, various facilities are used to reduce emissions into the atmosphere.

In the case of transport, WHO gives the following tips: transition to clean energy production methods; give priory attention to high-speed urban transport, pedestrian and bicycle networks in cities, as well as long-distance railway freight and passenger transportation; transition to the

use of cleaner heavy-duty diesel transports and vehicles with low emissions, as well as cleaner fuels, including fuels with reduced sulfur concentration (World Health Organization, 2018).

Urban planning is also important, as most of the population lives in cities. In government policy, WHO advises to focus on the improvement of buildings' energy efficiency and to supply greener and more compact, thus more energy efficient towns. The city is not represented only by streets, houses, parks, etc., that are placed at random; the planning and construction of a city is a process that requires functional zoning of the territories of the town; the allocation of functional zones, such as - industrial, external transportation zone, suburban, communal and warehouse, etc. This process requires a deep analysis of nature around the city, knowledge of the direction of winds, etc. Zoning leads to the improvement of environmental conditions in the city, especially given the number of industrial enterprises located within its boundaries (Murgante, 2010, p. 5).

In the field of energy, it is necessary to direct on providing access to low-cost energy sources in household use for cooking, heating, and lighting, as well as for the wider use of low-emission and renewable energy fuels not based on combustion (such as solar, wind or hydropower); combined heat and power production; and distributed power generation (for example, energy mini systems and roof-mounted units to generate energy from solar energy). Therefore, the topic of alternative energy sources is of key importance for many countries. To be mentioned that China, which is one of the countries of the main emitter of planet pollution; at the same time is a world leader in the use of alternative energy sources (Harris, 2012, p. 10).

The final area of the government policy per WHO is the disposal of urban and agricultural waste. The main areas for this organization represent waste reduction strategies, waste segregation, recycling, waste reuse or waste utilization; also improved methods of biological waste management, such as anaerobic digestion of biogas waste, are realizable, inexpensive alternatives to open burning of solid waste. Where combustion cannot be avoided, combustion technologies with strict emission control are extremely important (World Health Organization, 2018).

4 Own research

After the theoretical part of the diploma work, it is time to proceed to a detailed analysis of the ecological situation in the country. Ecology is undoubtedly an area that is on the border of several areas, therefore the ecological situation in the country should be analyzed from broad perspectives concerning both the economy and the social area.

4.1 Ecological situation

Obviously, the economic growth and the welfare of the country in recent times have consequences. The suffering part is the environmental situation in the country. In addition, the unresolved environmental problems from the past should be added.

4.1.1 Overall ecological situation

When speaking about the country's historical environmental problems, then the problem of the Aral Sea and the consequences of tests at the Palatine testing ground should be noted. The first environmental problem arose because of the predatory approach to water resources; the case of the Aral Sea is known worldwide, which dried out and turned into a salty desert, in consequence of the communist authorities' approach. The reason was the utilization of water from the sea to irrigate cotton fields, in the southern regions of the USSR. As a result, the sea dried out and its bottom has turned into a lifeless salt desert. Accordingly, agriculture in the regions adjacent to the former sea suffers; salt carried by the wind for hundreds of kilometers causes land erosion. At the beginning of the 20th century, this sea was categorized into being one of the largest inland seas in the world, and its shores were highly developed economically - agriculture, fishing, tourism, etc. There are big problems with the nearby Caspian Sea; it loses the self-purification capacity. In this case, the reason is the extraction of oil on the coast and underwater on platforms, far into the sea (NUR.kz, 2018).

The second largest environmental problem in the country is radioactive contamination. The site was officially closed in 1991, after 40 years of atomic weapons testing. Currently, about 300 square kilometers of land remains to be dangerous for all biological living. Unfortunately, a comprehensive study of the effects of nuclear testing has not yet been conducted. Unlike Chernobyl, radioactive contamination is not in the center of attention, however, there was of the biggest test site worldwide – see chart below. The possible reason might be that

Semipalatinsk lies rather far from Europe and the consequences of radioactive contamination are not felt by Europeans (NUR.kz, 2018).

There are several reasons for the degradation of the ecological situation. Firstly, it is the growth of the mining and processing of minerals, which, of course, causes damage to nature. Further, there are still in use old inefficient cleaning systems; as a result of using these methods, tons of harmful substances are released into the atmosphere. The process of associated gas flaring, during the production of oil and gas, is also harmful to the atmosphere. As a result of these actions, the air in large cities gets worst.

4.1.2   Urban development and air pollution

The next problem arose recently, from the very large and not properly thought urban development - this applies to the former capital of the country - the city of Almaty. As a result of improper construction, all winds entering the city end up stopping in the center of the city. Thus, an airlock (plug) is formed; the air does not circulate properly because it cannot be blown by the winds, and it stays in the city instead of being taken away/out of the city by the winds (MK.kz, 2018).

Unfortunately, Kazakhstan is a country where 9 cities have a very high degree of air pollution. One of the main reasons for this situation is that there is no incentive for environmental users to implement environmental protection measures. It is more profitable for enterprises to pay the penalty, very often, for excess emissions than to install modern cleaning equipment. The consequences have already been described in the previous part of the work: increase in headaches, breathing problems, lung cancer, and other diseases (Atabaev, 2019).

Moreover, the causes of air pollution in the country are almost the same - it is the growing number of personal vehicles (primarily in Almaty), non-ferrous metallurgy, the chemical and petrochemical industries. That is to say, the cause for the deterioration of the ecological situation in the country is directly related to the development of the country's economy and its industry. As a result of the growing demand for the products of Kazakh mining companies, the gas emissions to the atmosphere are increasing. The economic development leads to an increase in demand for private cars, which affects the environment even more.

Unfortunately, in the 90s, complete degradation of public transport happened, and it caused citizens' preferences to use private cars instead of public transport, which increased radically

the number of cars in the city. Therefore, if the wealth level of the citizens increases, they instantly start using their personal transport, after purchasing it. To own a car in Kazakhstan means to have status. Unfortunately, this affects the ecology of the country.

The next cause of air pollution in the cities is also the increasing number of population. Regrettably, the policy of regional development does not function in Kazakhstan, and people from Kazakhstan's regions are massively moving to big cities, this result in strong pressure on the environment. The reason for moving is purely economic - big wages in the big cities, especially when it comes to Almaty or Astana.

More than that, there is a big number of private houses in the capital that are heated by coal. The transition to more environmentally friendly fuels, such as gas, requires the purchase of expensive equipment, which ordinary Kazakhs living in large cities cannot always afford. As a result, they are forced to utilize regular coal. Sometimes citizens living in the private sector even stoke their stoves with old automobile tires, which of course worsens the ecological situation in the country.

The last cause of air pollution is construction sites. The growth of the economy leads to an increase in demand for housing, moreover, this demand is also fueled by the massive move of Kazakhs from the regions to big cities, as mentioned above. There is a high centralization of construction sites in one place, which increases both air pollution and noise pollution.

4.1.3 Environmental indexes

Further, let's consider the situation in the country by international indices. The country's environmental performance index has a value of 54.56, which means Kazakhstan is in 101st place. The maximum of this indicator is 100; the overall situation in the country is still neutral (Environmental Performance Index. Kazakhstan, 2018).

The situation with the Environmental Health index is much better; the country is in 79th place and has an index of 66.7. Among its components, the country has the best rating for Heavy Metals, thanks to which it gets 50th place in this category. Kazakhstan has the worst rating in the field of Air Quality, which indicates strong pollution of the air in the country. It is on the 90th place in terms of air quality. Remarkably, the international water assessment is average, given the huge problems with the Aral Sea.

The Ecosystem Vitality index is not good - the country is in 126th place with 46.46 points. It is related to the very low Biodiversity and Habitat – 162nd place. On the contrary, Kazakhstan is on the 15th place in Tree Cover Loss, which means the forests in the country are in perfect order. This is a very good result, given the fact that most of the country is located in the steppe zone (Environmental Performance Index. Kazakhstan, 2018).

4.2   Economic situation

The country has a wide variety of minerals. In the subsoil of Kazakhstan, there are approximately 99 elements of Mendeleev's table. Obviously, not all of these elements are explored and are in production, but the number itself speaks of the geological wealth of the country. It is referring not only to oil and gas, as it may seem from the first time. The surveyed country ranks first in the world in explored reserves of zinc, tungsten, and barite, the second in silver, lead, uranium and chromites, the third in copper and fluorite, the fourth in molybdenum, and the fifth in gold.

The proved reserves of oil and natural gas liquids, in the country, may last for 70 years, if maintaining the current level of production and unchanging reserves of oil and gas. The country is also actively developing new mineral fields - primarily in the Caspian region.

Until today, the exploratory survey was carried out and were explored only the shores of this region, whereas it is quite possible that in the future, the development of offshore fields will have an ecocomomic meaning.

The industrial development of the country begins in the middle of the 20th century. Long before this time, it was known that there was a huge amount of minerals in Kazakhstan. The Russian Empire, in contrast to the Soviet Union, did not have enough strength to build the mining industry, mainly because of poorly populated territory and long distances.

Kazakhstan is undoubtedly a country that has made a huge leap forward, over the past two decades, especially when it comes to the economic situation in the country. Certainly, the country has quite large volumes of minerals that build the basis of the country's economic growth. On the other hand, there are countries that also have large mineral reserves, but their development is not as rapid as in Kazakhstan - for example, Nigeria, Uzbekistan, etc. So, the country's leadership was able to fully take advantage of what the rich Kazakh nature offers them.

The following text will present the main macroeconomic indicators that will be used in further research: Overall rate of unemployment in percent, Average monthly salary, CPI and GDP in mil USD million dollars.

Unemployment is not the problem of Kazakhstan; as it can be seen in the table below, the negative consequences associated with the collapse of the USSR and the subsequent reduction of jobs, have ended. Unemployment does not exceed eight percent, as over ten years.

The employees' salary has increased tremendously – from $100 in the late 90s to $500 now, in the country. Due to this, the growth of citizens' welfare can be observed. It should be noted that the data for the past year is slightly distorted because the Kazakh currency has dropped over the past few years, from 150 tenges per dollar in 2011, to 350 tenges per dollar at present.

The same applies to the GDP of the country, which has grown from 20 billion in the late 90s to 160 billion at present.

Table 1. Unemployment, GDP and CPI – 1998-2017, in constant prices

Name	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Overall rate of unemployment in %	13,1	13,5	12,8	10,4	9,3	8,8	8,4	8,1	7,8	7,3	6,6
Moving average	13,2	13,1	12,2	10,8	9,5	8,8	8,4	8,1	7,7	7,2	6,8
Chain index	1,01	1,03	0,95	0,81	0,89	0,95	0,95	0,96	0,96	0,94	0,90
Average monthly salary in USD	124	99	101	118	133	155	208	256	324	428	505
Moving average	112,0	108,0	106,0	117,3	135,3	165,3	206,3	262,7	336,0	419,0	463,0
Chain index	1,10	0,80	1,02	1,17	1,13	1,17	1,34	1,23	1,27	1,32	1,18
CPI in %	1,9	17,8	9,8	6,4	6,6	6,8	6,7	7,5	8,4	18,8	9,5
Moving average	10,3	9,8	11,3	7,6	6,6	6,7	7,0	7,5	11,6	12,2	11,5
Chain index	0,17	9,37	0,55	0,65	1,03	1,03	0,99	1,12	1,12	2,24	0,51
GDP in mil USD	22 136,2	16 871,3	18 292,4	22 152,1	24 636,5	30 832,8	43 150,1	57 123,7	81 003,5	104 853,5	133 440,7
Moving average	20390,9	19100,0	19105,3	21693,7	25873,8	32873,1	43702,2	60425,8	80993,6	106432,6	117866,8
Chain index	1,00	0,76	1,08	1,21	1,11	1,25	1,40	1,32	1,42	1,29	1,27

Name	2009	2010	2011	2012	2013	2014	2015	2016	2017

Overall rate of unemployment in %	6,6	5,8	5,4	5,3	5,2	5,0	5,1	5	4,9
Moving average	6,3	5,9	5,5	5,3	5,2	5,1	5,0	5,0	3,3
Chain index	1,00	0,88	0,93	0,98	0,98	0,96	1,02	0,98	0,98
Average monthly salary in USD	456	527	614	679	717	675	568	418	463
Moving average	496,0	532,3	606,7	670,0	690,3	653,3	553,7	483,0	293,7
Chain index	0,90	1,16	1,17	1,11	1,06	0,94	0,84	0,74	1,11
CPI in %	6,2	7,8	7,4	6,0	4,8	7,4	13,6	8,5	7,1
Moving average	7,8	7,1	7,1	6,1	6,1	8,6	9,8	9,7	5,2
Chain index	0,65	1,26	0,95	0,81	0,80	1,54	1,84	0,63	0,84
GDP in mil USD	115 306,1	148 052,4	192 627,6	208 002,1	236 633,3	221 417,7	184 387,0	137 278,3	162 887,4
Moving average	132266,4	151995,4	182894,0	212421,0	222017,7	214146,0	181027,7	161517,6	100055,2
Chain index	0,86	1,28	1,30	1,08	1,14	0,94	0,83	0,74	1,19

Source: Ministry of national economy of the Republic of Kazakhstan. Committee on statistics. Dinamika osnovnyh socialno-ekonomicheskih pokazatelej. Own calculations

Further, the extremes will be investigated according to the given data, that is, the minima and maxima. In order to fulfill the overall picture, the average value for this data will be calculated. According to the survey, unemployment was not a problem for the country. Its value did not exceed 14%, on average. Over the past twenty years, the average salary has increased a lot: from $100 in the late 90s to $378 in 2017. Inflation is not a problem for the economy. For the period of observation, its value did not exceed 18%. The country's GDP has increased several times over the entire observation period, which is undoubtedly the main merit of the country's government.

Table 2. Minimum, maximum, average – unemployment, salary, CPI, GDP in constant prices

	Minimum	Maximum	Average
Overall rate of unemployment in percent	4,9	13,5	7,7
Average monthly salary	99,0	717,0	378,4
CPI in %	1,9	18,8	8,5
GDP in mil USD	16 871,3	236 633,3	106 516,1

Source: Ministry of national economy of the Republic of Kazakhstan. Committee on statistics. Dinamika osnovnyh socialno-ekonomicheskih pokazatelej. Own calculations.

The Correlation Index, that measures the relationship between the GDP of the country and the average salary, indicates that there is a direct correlation between the two values; the growth of one value leads to an increase in the other — the index correlation reaches almost 1. The

explanation for this phenomenon is the following - as salaries grow, so does consumption, which is the most important part of GDP. Conversely, GDP growth shows that firms can hire more people and therefore pay them more.

Table 3. Correlation index
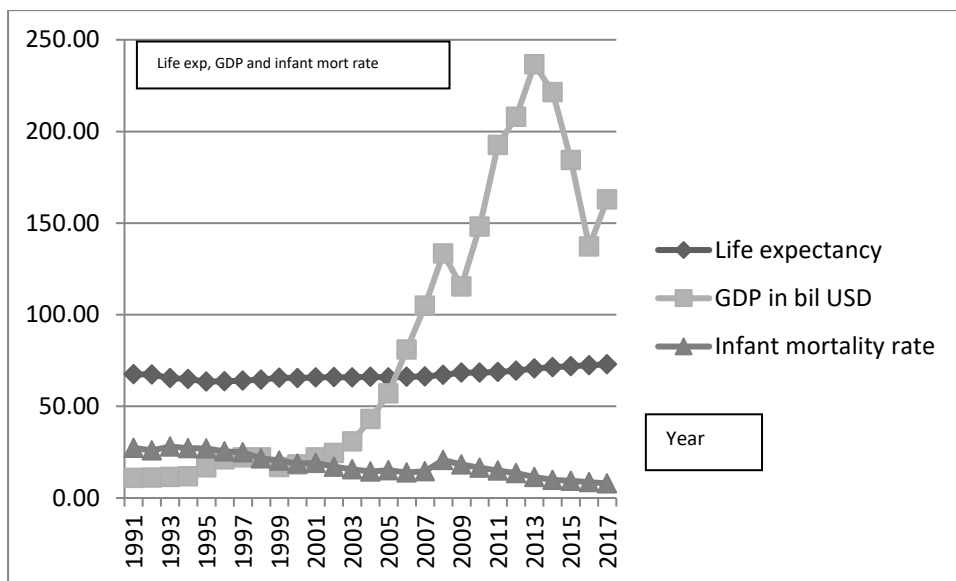
GDP and Average salary
0,987693

Source: Ministry of national economy of the Republic of Kazakhstan. Committee on statistics. Dinamika osnovnyh socialno-ekonomicheskih pokazatelej. Own calculations.

When talking about the culture and politics of Kazakhstan, there are prevailing Islamic influences here, as well as there is present the influence of neighboring Russia. Therefore, most of the population speaks Russian, but at the same time follows Muslim traditions. The country has three cities and the population exceeds one million people. These are the capital Astana, the former capital Almaty, and Shimkent. The rest of the country is not particularly populated. Most of the country's population are Kazakhs. There is also a very large Slavic minority living in the country consisting primarily of Russians and Ukrainians; they consist of about 1/4 of the total population of the country.

Finally, it is necessary to check the dependency between main economic indicators - GDP and social indicators (life expectancy and infant mortality rate). As it is obvious from the chart growing GDP brought an increase in both indicators.

Kazakh GDP was increasing until 2013 due to the growing demand for oil and gas produced in Kazakhstan. It is necessary to highlight, that global crisis reached Kazakh economy only in 2013 together with decreasing demand for above mentioned fossils.
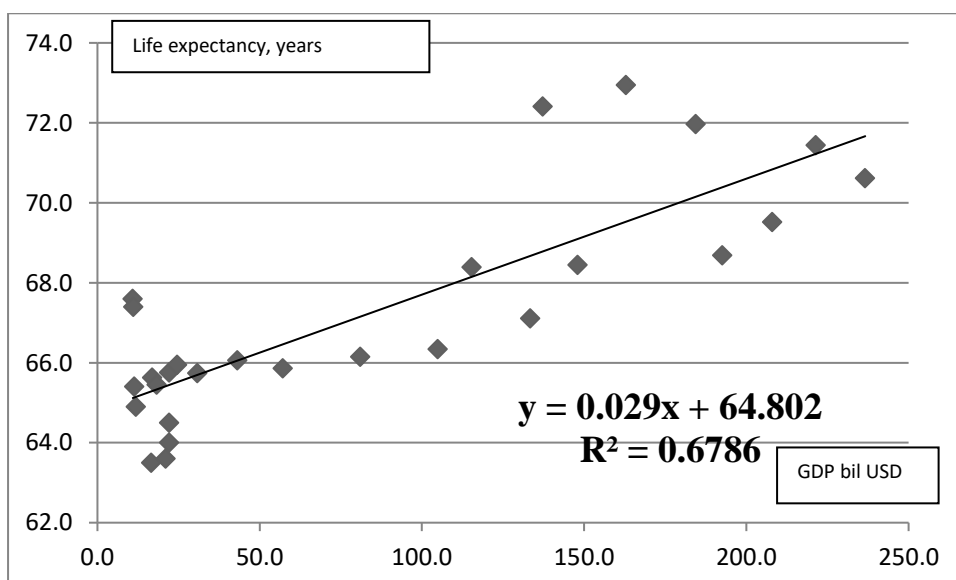
Chart 1. Life expectancy, GDP in constant prices and infant mortality rate

The above-mentioned assumption was confirmed after regression analysis – on the chart below we could see life expectancy as an independent variable and GDP as an independent variable. R^2 is very high and achieved 67 %.

Chart 2. GDP in constant prices and life expectancy

$$y = 0.029x + 64.802$$
$$R^2 = 0.6786$$

Due to the very high level of R^2, it is possible to check the data in the model and compare them with a real result. In other words, obtained formula y=0,029X+64,802 could be used for calculation and prediction of life expectancy. Instead of X, GDP is used. The obtained results are compared with real data – see table below. As it is obvious, prediction worked relatively good until 2003. After this year variance is too high. For example, in 2017 life expectancy according to the model is 112 years, which is 39 years more than in real life.

Table 4. GDP in constant prices and life expecancy

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
GDP in bil USD	11,4	11,9	16,6	21,0	22,2	22,1	16,9	18,3	22,2	24,6	30,8	43,2	57,1
Life expectancy real	65,4	64,9	63,5	63,6	64,0	64,5	65,6	65,5	65,8	66,0	65,7	66,1	65,9
Life expectancy per calculation	68,1	68,2	69,6	70,9	71,2	71,2	69,7	70,1	71,2	71,9	73,7	77,3	81,4
Difference	-2,7	-3,3	-6,1	-7,3	-7,2	-6,7	-4,1	-4,7	-5,5	-6,0	-8,0	-11,3	-15,5
Difference in %	-3,98	-4,91	-8,80	-10,30	-10,15	-9,44	-5,83	-6,64	-7,67	-8,33	-10,85	-14,56	-19,06

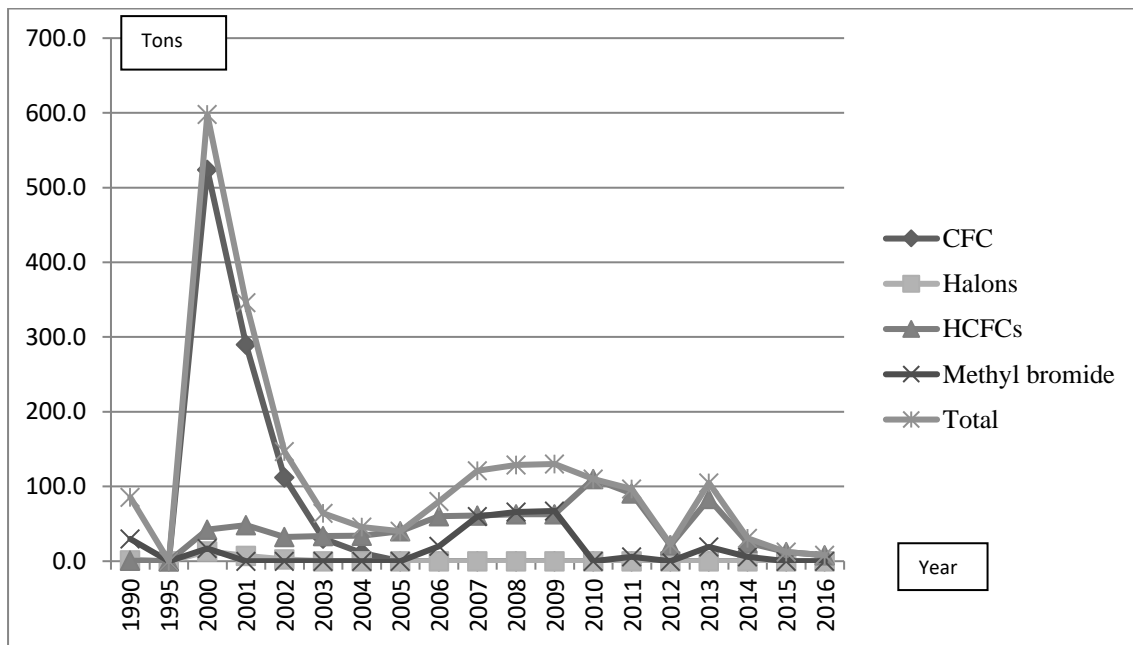|	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
GDP in bil USD	81,0	104,9	133,4	115,3	148,1	192,6	208,0	236,6	221,4	184,4	137,3	162,9
Life expectancy real	66,2	66,3	67,1	68,4	68,5	68,7	69,5	70,6	71,4	72,0	72,4	73,0
Life expectancy per calculation	88,3	95,2	103,5	98,2	107,7	120,7	125,1	133,4	129,0	118,3	104,6	112,0
Difference	-22,1	-28,9	-36,4	-29,9	-39,3	-52,0	-55,6	-62,8	-57,6	-46,3	-32,2	-39,1
Difference in %	-25,08	-30,32	-35,16	-30,39	-36,47	-43,07	-44,44	-47,07	-44,63	-39,15	-30,78	-34,89

4.3 Presentation of basic areas

The next chapter will be describing the main indicators of environmental pollution. The changes in the indicators will be shown on the charts.

4.3.1 Consumption level

Consumption of ozone-depleting substances

There are indicated the total costs of ozone-containing substances on the chart, as well as the main driver, that affects the total consumption. According to the graph/ chart, the destruction of ozone-containing substances is continually falling, which is related to the targeted policy of Kazakhstan, which is aimed to reduce gas consumption to protect the atmosphere of the country. Maximum of consumption was reached in late 90th, when Kazakh economy started to grow. After that Kazakh government adopted legislative aiming on reducing of consumption, result is perfectly seen on the chart.

Chart 3. Ozone depleting substances and its main drivers (in tons)

This reduction was achieved in several ways, based on the adoption of a legislative act in 2004, concerning the environmental situation in the country. Firstly, in 2004, a decision was made to set the limits (quotas) of total permissible greenhouse gas emissions and the consumption of ozone-depleting substances, by enterprises. Secondly, the local government bodies were appointed to control compliance with quotas, having broad supervisory powers. The government began to strictly regulate the import of ozone-depleting substances into the territory of Kazakhstan, which affected the reduction of given gas consumption. Thirdly, at the legislative level, a regulation was adopted to limit the utilization of ozone-depleting substances in the construction work for reparation, installation or maintenance of equipment. Therefore, the government has limited the enterprises capacity to continue working with ozone-depleting gases. Finally, the projection, reconstruction, and exploitation of facilities used for economic and other activities, when building and developing the urban and other settlements should be conducted with due minimization of greenhouse gas emissions. There were appointed local authorities responsible for control compliance with these rules (Pravitelstvo Respubliki Kazahstan ot 8 janvarja 2004 goda № 19 «Ob utverzhdenii perechnja jekologicheski opasnyh vidov hozjajstvennoj dejatel'nosti i Pravil ih objazatel'nogo gosudarstvennogo licenzirovanija»).

Thanks to this policy, the environmental situation is improving. For example, Methyl bromide gas consumption is almost zero tons now, whereas back in 1990, this gas emission accounted for 35% of all ozone-depleting gas emissions.

The issue of gas emission affects strongly public health, especially in the north of the country, where the main production facilities are located. As a rule, other types of pollution occur in these regions.

4.3.2   Pollution level
Greenhouse gas emissions

The below graph illustrates the greenhouse gas emissions in Kazakhstan. According to the chart, there is a decrease in gas consumption, at the beginning of the 90s, which is related to the decline in the entire production and industry in the country, and it does not have anything in common with the targeted policy of the government. The principal cause of greenhouse gas emissions is the energy, oil and gas, metallurgical and chemical industries, that began to develop rapidly after the 90s. The matter is this type of pollution is to produce heat and

electricity. Heat and electricity production that is obtained by burning fuel, generate a gas consumption increase.

Chart 4. Green house gas emission –CO2 equivalentsa and carbon dioxide (in Mt/year)
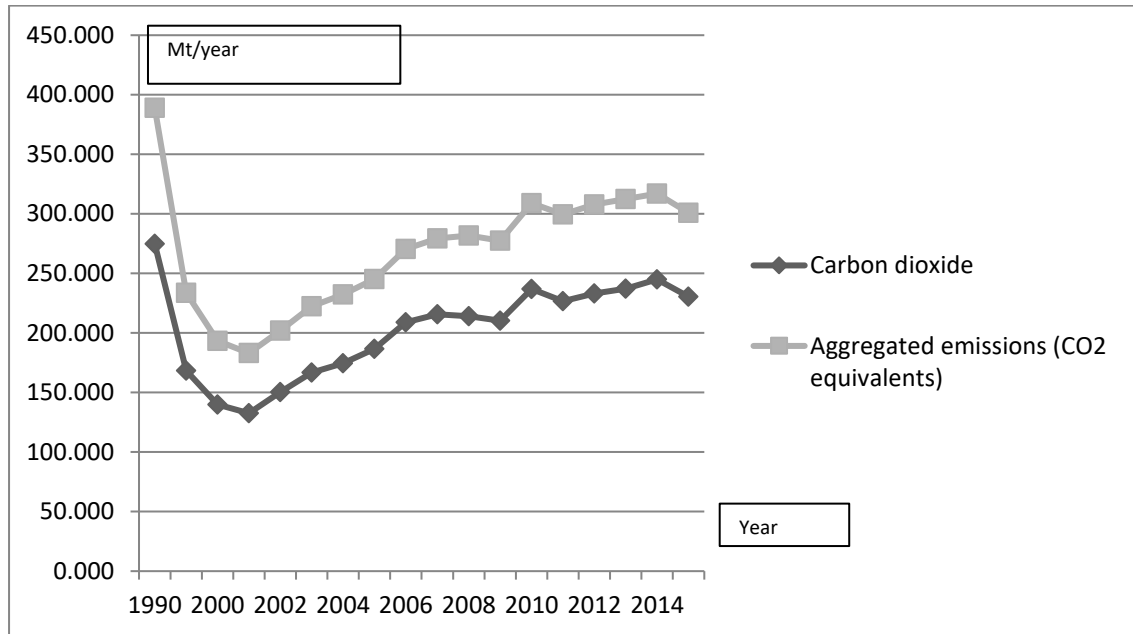
Unluckily, until recent years, the government of the country did not specifically regulate this industry, since the oil and gas sector, of the country, represents the fundamental for the state's welfare. This type of environmental pollution clearly illustrates the negative effect of economic growth, which is reflected in environmental degradation. Consequently, the government is facing the dilemma - how to increase the level of citizens' welfare and, at the same time, not stop economic growth. The answer and solution could be formulated as follows: to limit gas emissions into the atmosphere and to develop or start developing the sectors of the economy that do not have such a negative impact on nature - for example, tourism. It is this strategy that Kazakhstan is applying.

Since 2014, there has been created an online platform to monitor, report and verify the emission sources and greenhouse gases. Starting with the same period, there has been noticed a reduction in emissions of greenhouse gases, and it might be associated with the online platform. This platform was launched by the Ministry of Energy of Kazakhstan and the World Bank. The goal of the platform - is to regulate greenhouse gas emissions. There is also an option of trading gas

emissions quotas on this platform. Until 2030, the government is planning to reduce the consumption of these gases by 15-20% (CA-climate, 2018).

This chapter, demonstrates clearly that the economy of the country and its growth affect directly pollution growth.

Waste generation (agriculture, mining, manufacturing, construction and municipal waste)

The chart below indicates the areas of the economy that least pollute the least, the environment - this is agriculture and construction. It is a matter of interest, that construction does not have a growth trend, whereas it would be logical to assume that economic growth leads to the development of construction, which will inevitably be reflected in big gas emissions, in this sector. There can be only one explanation. Nowadays, construction companies are using technologies that do not have such a negative impact on the environment. Perhaps this is because in-country foreign construction companies are activating in the country, and their projections and technology are based on eco-friendly principles.

**Chart 5. Agriculture and constuction waste (in 1000 t/year)**
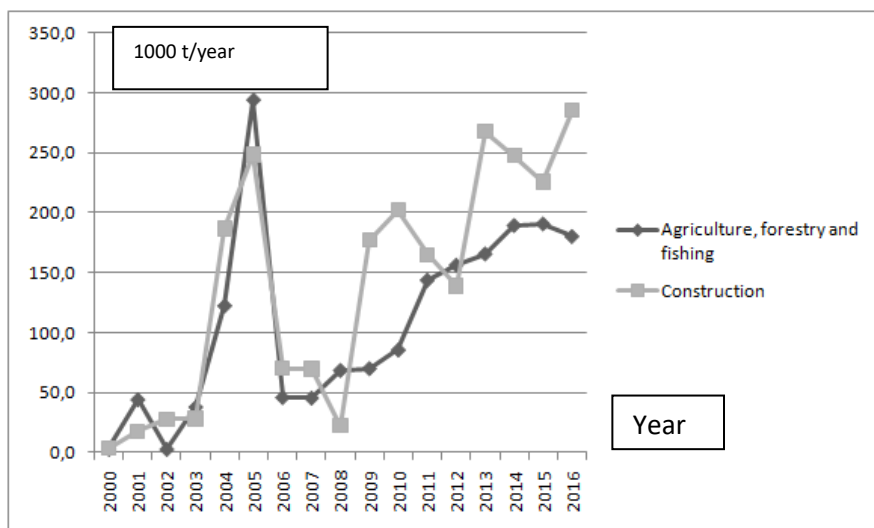
It is interesting that both graphs repeat their trends which it is related to the development of the economy – in the early 2000s the country was in strong economic growth, which can be seen in the growth of both graphs.

Unfortunately, the situation in the field of agriculture is totally different. The contamination amounts, that are generated by this sector are enormous and continue growing by huge percentages.

Unfortuntely reducing of waste generated by agriculture is not a priority for local government. This sector is expanding due to growth demand of local people for local food. That is why we see constant increase of waste generation, especially in recent years. So far local government is regulating only industry sector.

The increase in pollution is a problem especially in the southern provinces of the country, where agriculture is predominantly developed. The cause of the rise in pollution level is the discharged waters, a result of agriculture activities in the country. Also, there is waste from cattle. It seems the government is not interested in this problem. It could be thought, that the issue of pollution of the local nature through agriculture is not a priority for the local government. Besides, agriculture has a very significant role in the life of the southern regions of the country. So, it is possible that the tightening of legislation in the field of agriculture can lead to civil disagreements, in the south of the country (Ecocitizens, 2018).

Chart 6. Mining, manufacturing and muncipal waste (in 1000 t/year)
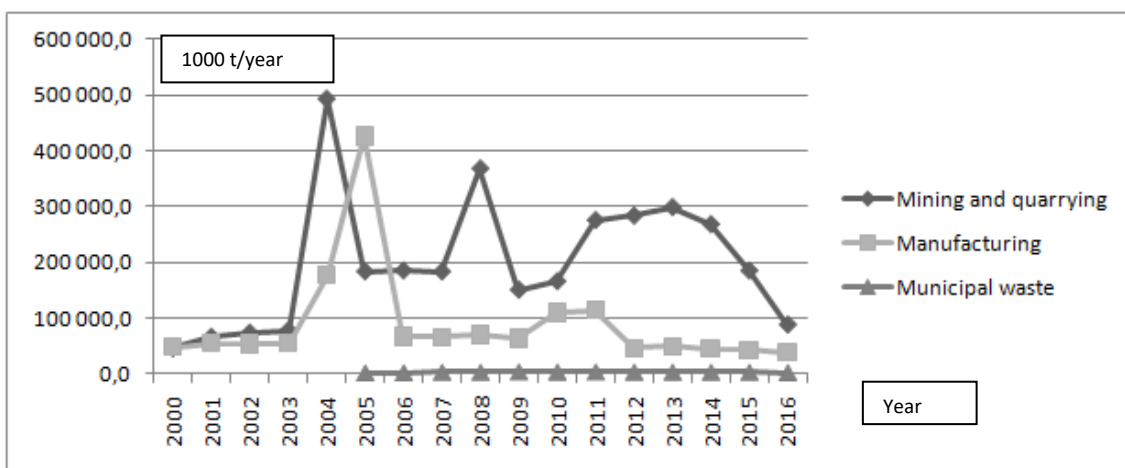
Source: Ministry of national economy of the Republic of Kazakhstan. Committee on statistics. Dinamika osnovnyh socialno-ekonomicheskih pokazatelej Own calculations

At the same time, the Kazakh government has strongly succeeded to reduce the emissions of the main sources of environmental pollution produced by the manufacturing sector. Thanks to timely adopted laws, the volumes of pollution from this sector are small. The decrease of contamination volumes in 2008–2010, is primarily due to the economic crisis and the fall in demand for products of Kazakhstan producers (Egov, 2018).

Chart 7. Municipal waste per capita and industrial waste per unit of GDP
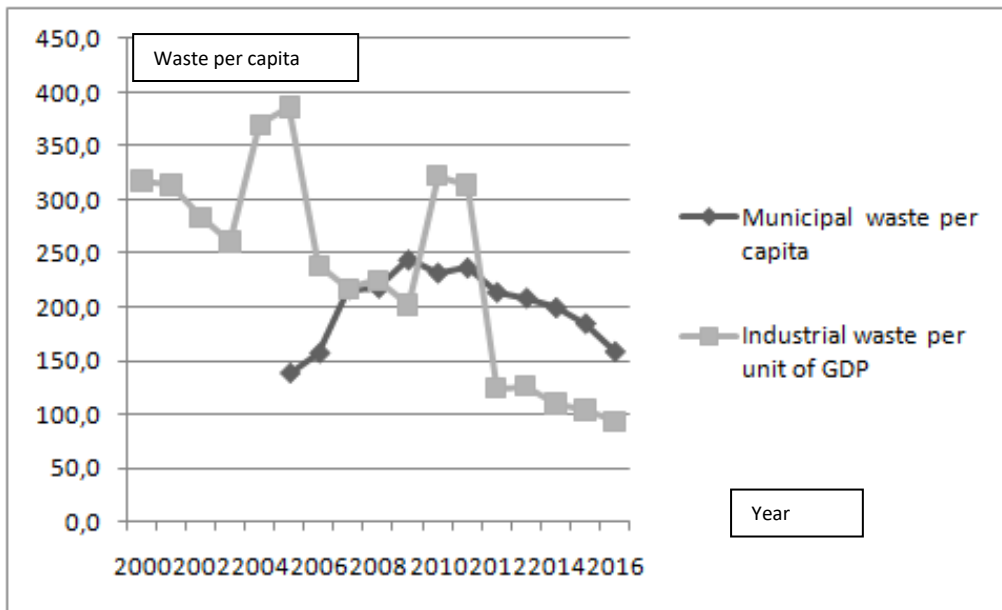
Finally, it is possible to show both relative results and again make sure that waste products from industry in relation to GDP are constantly falling, which is a big plus for the ecology of Kazakhstan. This indicates that recently the government has found a solution to the issue of economic growth without affecting the environment.

Peak of industrial waste was reached in 2005 due to economic growth of local market. Thanks to attitude of local authority this amount was significantly reduced.

The pollution of Kazakhstan with municipal garbage started being gradually solved. Currently, the government of the country is choosing the path of controlling and supporting the enterprises activating in the field of recycling. First of all, containers for sorting garbage appeared in big cities of the country. Secondly, the rules for garbage collection have tightened - unfortunately, during the 90s, the garbage was simply taken out of the city to the dump. Unfortunately, it was

the cheapest way, that at that time suited both, the authorities and most of the population. The above method is currently strictly prohibited. Lastly, the state strongly supports waste recycling plants oriented on recycling municipal garbage. The government's priority is currently the city of Almaty, as the largest "supplier" of municipal waste (Abdrachmanov, 2018).

4.3.3 Other indicators

Life expectancy and death rate

The graph below shows that life expectancy is constantly growing in the country, so it reaches 73 years, but life expectancy was much lower, about 65 years, at the beginning of the 90s. This increase is related to the growing standards of living. This area was analyzed in detail in the chapter about the economy of the country. So, the impact of economic growth on the life expectancy of people can be seen directly.

The overall mortality rate (per 1000 people) remained at the same level. This can be explained by the fact that this index is stable and does not depend on the economic component of life in the country.

Chart 8. Life expectancy and death rate
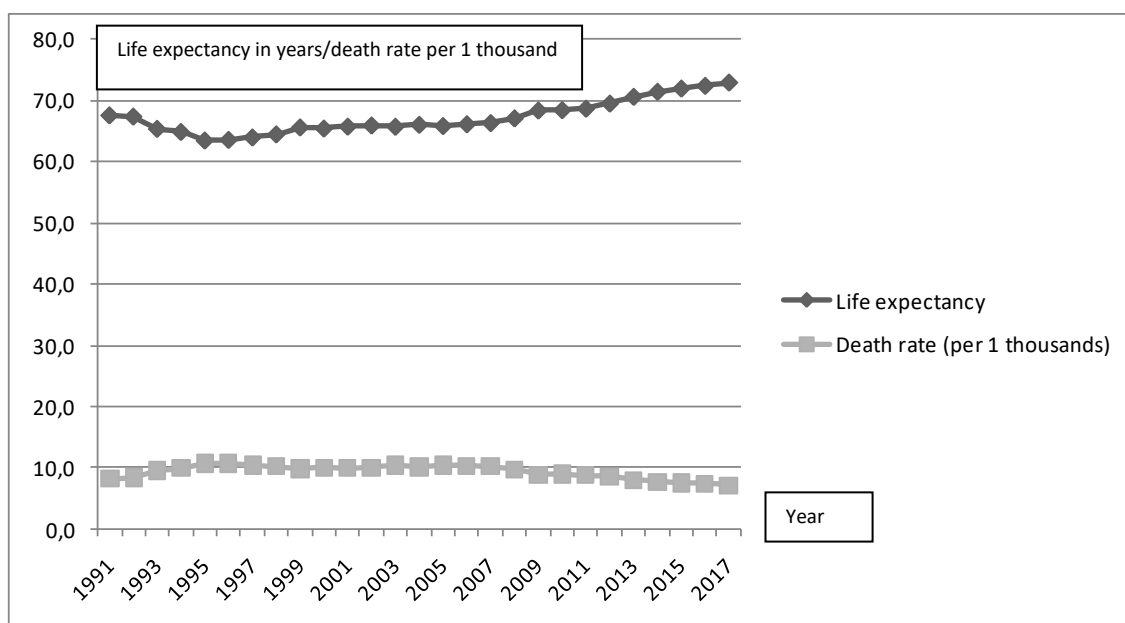
Source: Ministry of national economy of the Republic of Kazakhstan. Committee on statistics. Ecologycal monitoring indicators and environmental assessment. Own calculations

Passenger transport

The growth of the Kazakhs' welfare leads to an increase in the local traffic load. In the early 90s, when the country's economy was in deep crisis, the demand for transport was minimal. Everything changed in the late 90s as a result of the growth of the country's welfare, which

caused demand and movement. In this area, there is a big task for the leadership of the country - they should work out the public transport system so that people are more motivated to use public transport instead of a personal vehicle. Also, the citizens could try to work remotely or from home so that the traffic load is not so strong.

Chart 9. Passanger transport demand in passangers per km

Transport strongly pollutes the air, but traffic jams that happen in large cities, especially in Almaty, pollute the air even more. There will be more details on this topic in the corresponding chapter of the work. The government of the countries should work harder on the development of public transport to make it more attractive for citizens so that people switch from their cars to buses.

Air temperature

The environmental situation in the country influences critically the average temperature. The average temperature in the country for the years 1961-1990 was 5.5 degrees, but now it reaches about 7 degrees. The country is on the verge of global warming. The graph also shows distinct differences in the geography of Kazakhstan, it is much colder in the north of the country than in the south. But, there is evidence of warming even in the north. In the 60-90s, the average air

temperature in Astana was 2.7 degrees, whereas now it is already at the level of 4.6 degrees. In the last 30 years, the temperature has increased almost 2 times. In the case of Almaty, the difference is not so big, but still significant. At present, the average temperature reaches 11 degrees, whereas it was at the level of 9 degrees, in the 60-90s. In the south of Kazakhstan, the temperature changes are not so noticeable, here the average temperature fluctuates in 15 degrees Celsius, whereas in the 60-90s it was at the level of 13.6 degrees.

However, an increase in temperature is not always associated with the worsening of the ecological situation and the with gas emission. Warming can relate to global climate change, as well.

Chart 10. Average temperature
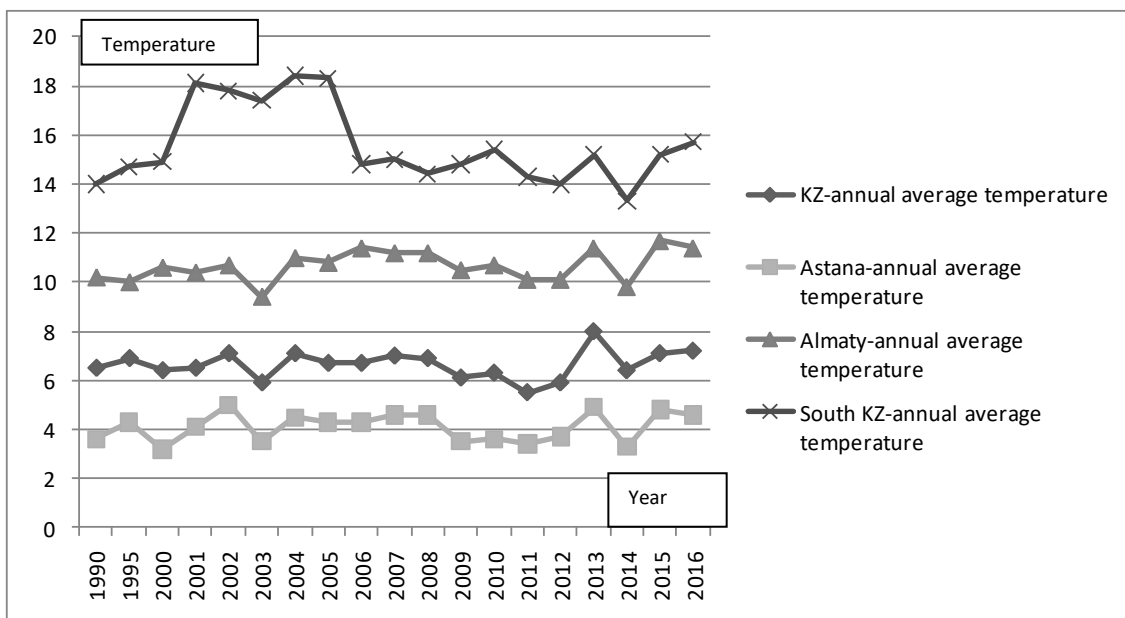
In the future, the increase in temperature may adversely affect the entire environmental situation in the country.

4.4 Statistical research

4.4.1 Quality of air

First and undoubtedly the most important part of ecology is air, because every citizen of the country is influenced by air. The quality of air is significantly influenced by the concentration of the most negative chemical elements - SO_2, NO_2, NO_x and CO.

As it is obvious from the table, quality of air is still a problem for Kazakh ecology – variation between minimum and maximum is huge. Quality of air is a big problem for local ecology, especially in big cities.

Table 5. Minimum, maximum and average – quality of air in mg/m³

	SO2		
	Minimum	Maximum	Average
Annual average concentration	0,004	0,020	0,009
Maximum daily concentration	0,020	0,790	0,214
	NO2		
	Minimum	Maximum	Average
Annual average concentration	0,026	0,061	0,041
Maximum daily concentration	0,160	0,620	0,323
	Nox		
	Minimum	Maximum	Average
Annual average concentration	0,007	0,048	0,022
Maximum daily concentration	0,040	0,560	0,200
	CO		
	Minimum	Maximum	Average
Annual average concentration	1,000	2,370	1,515
Maximum daily concentration	6,000	83,000	20,261

Source: Ministry of national economy of the Republic of Kazakhstan. Committee on statistics. Dinamika osnovnyh socialno-ekonomicheskih pokazatelej Own calculations

NO2, NOx and CO are gases that are mainly produced by cars. Due to economic growth of the country the number of cars has significantly increased, that had result in the increase of average concentration of all gases. For example, average yearly amount (between 2000-2005) of CO was 1,2 and average maximum amount in the same time was 11,6, however in latest five years (between 2013-2017) average yearly amount reached 1,406 and average maximum daily amount is 40,34, that is more than two times higher.

Chart 11. Average mount of NO2, NOx and CO in the atmosphere in mg/m³
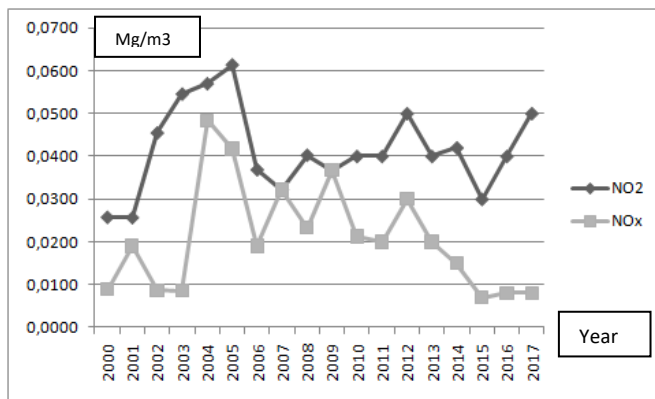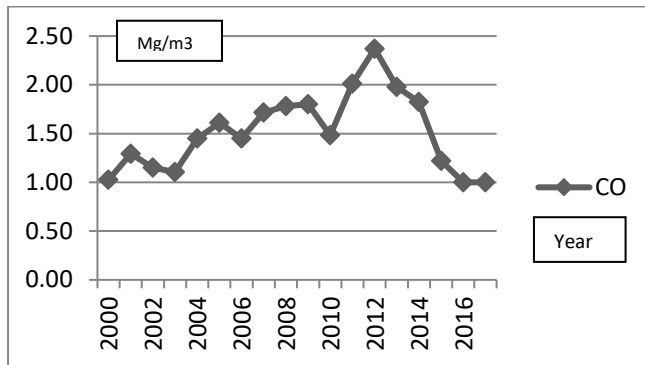
Source: Ministry of national economy of the Republic of Kazakhstan. Committee on statistics. Dinamika osnovnyh socialno-ekonomicheskih pokazatelej Own calculations

Above mentioned assumption could be easily confirmed by regression analysis based on number of cars and maximum yearly daily concentration of CO in mg/m3 – see chart below. As it is obvious from the chart, dependence is direct and R^2 almost reached 30 %.

Chart 12. Maximum yearly daily concentration of CO in mg/m3 vs. number of cars

The problem of air quality is one of the most important problems in the country, especially when it comes to big cities. Therefore, this area will be examined in more detail on the example of Astana and Almaty.

4.4.2   Greenhouse gas emissions

Unfortunately, when it comes to the next index, we see that there is no significant difference between the minimum, maximum, and average indicators. The maximum greenhouse gas emission is 371, while the average is 278, over the past five years.

Table 6. Minimum, maximum and average – greenhouse gas emissions

Minimum	Maximum	Average
199,09	371,83	278,59

The growth trend can be seen even better when analyzing the changes between years. As a rule, for the entire period of research, there is a higher volume of greenhouse gas emissions in the following year than in the previous year, and the increase is constant.

Table 7. Chain index and moving average – greenhouse gas emissions

	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008
Chain index	0,64	0,89	0,95	1,09	1,09	1,04	1,05	1,09	1,03	1,00
Moving average	272,84	215,26	208,66	217,40	233,03	247,10	262,51	277,33	288,20	288,41

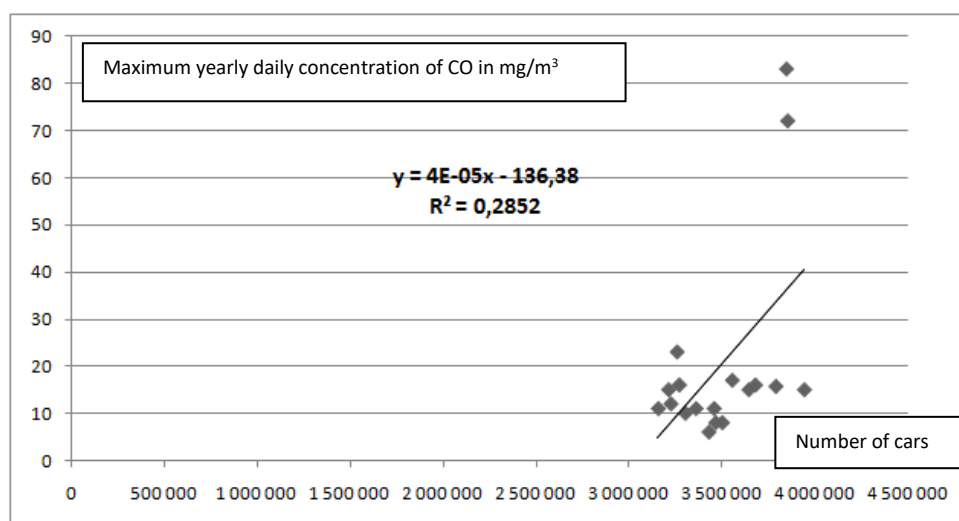|	2009	2010	2011	2012	2013	2014	2015
Chain index	0,97	1,10	0,98	1,03	1,02	1,03	0,96
Moving average	295,40	299,51	309,61	312,36	320,37	320,77	214,21

Source: Ministry of national economy of the Republic of Kazakhstan. Committee on statistics. Dinamika osnovnyh socialno-ekonomicheskih pokazatelej Own calculations

4.4.3 Waste generation (only for industry)

The government of the country has succeeded in reducing the waste generation in the industrial sector of the country. The highest volume of waste generation was in 2004. During the last 5 years, the average volume of waste generation is 44 thousand, whereas the average volume of waste generation for all time is 93 thousand.

Table 8. Minimum, maximum and average – waste generation in 1000 t/year

Minimum	Maximum	Average
42 929,50	426 152,80	93 326,96

Source: Ministry of national economy of the Republic of Kazakhstan. Committee on statistics. Dinamika osnovnyh socialno-ekonomicheskih pokazatelej Own calculations

The decrease in waste generation can also be observed in the following table comparing the indices. Waste generation is stable since 2006 and lower than in previous years, reason is state policy aiming on reducing waste generation.

Table 9. Chain index and moving average – waste generation (only industry) in 1000 t/year

	2001	2002	2003	2004	2005	2006	2007	2008	2009
Chain index	1,12	0,99	1,01	3,24	2,40	0,16	0,99	1,07	0,91

Moving average	52 823,90	54 763,70	95 588,73	219 465,33	223 460,83	186 341,47	67 895,40	67 099,20	81 747,30

	2010	2011	2012	2013	2014	2015	2016
Chain index	1,71	1,05	0,40	1,07	0,91	0,96	0,91
Moving average	96 475,77	90 342,67	70 134,17	46 773,57	45 750,07	42 336,20	27 363,47

Source: Ministry of national economy of the Republic of Kazakhstan. Committee on statistics. Dinamika osnovnyh socialno-ekonomicheskih pokazatelej Own calculations

4.4.4 Life expectancy and consumption of ozone-depleting substances

The first dependency is the relationship between life expectancy and the consumption of ozone-depleting substances. For the selected period, it was evident that the probability of living to a ripe old age significantly increased. At the beginning of the 90s, most people died around 65-67 years, however, nowadays they die around 73-73 years. It was obvious that the consumption of ozone-depleting substances consists of CFC, halons, other fully halogenated CFCs, carbon tetrachloride, methyl chloroform, HCFCs, HBFCs, bromochloromethane and finally methyl bromide significantly decreased – since 85 tons in 1991 until 8,04 tons in 2016.

It is likely to assume, that due to the decreasing consumption of harmful substances Kazakh people could live longer because the overall effect on their health is much better. In this case, life expectancy is depended on variables driven by the consumption of ozone-depleting substances.

As it is clear from the chart it is not possible to see the dependency. R2 index is about 23 % that is strongly under 100 %. It is useless to count life expectancy based on the received regression equation. In other words, people in Kazakhstan could live longer due to other reasons – for example, thanks to growing wealth they could afford better food, medicine, etc.

Chart 13. Life expectancy and consumption of ozone-depleting substances
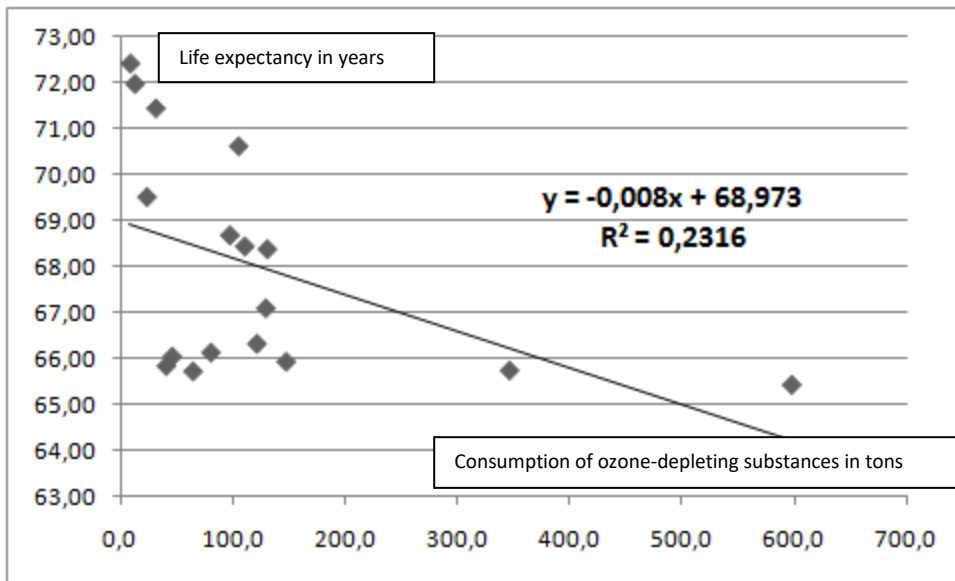
Source: Ministry of national economy of the Republic of Kazakhstan. Committee on statistics Dinamika osnovnyh socialno-ekonomicheskih pokazatelej Own calculations

4.4.5 Infant mortality rate and consumption of ozone-depleting substances

The second dependency is the study of Infant Mortality Rate (per 1000 births) and the consumption of ozone-depleting substances. The dependence assumes that a larger volume of gas emission, especially such as Methyl chloroform, may lead to an increase in infant mortality.

This assumption comes from the theoretical part, where on the example of an industrial accident, it was shown that pollution leads to health problems primarily in children and not in adults. This is because children's body is weaker than an adult's body.

Chart 14. Infant mortality and consumption of ozone-depleting substances

$$y = 0.0173x + 13.87$$
$$R^2 = 0.2372$$

Infant mortality per 1 thousands new born

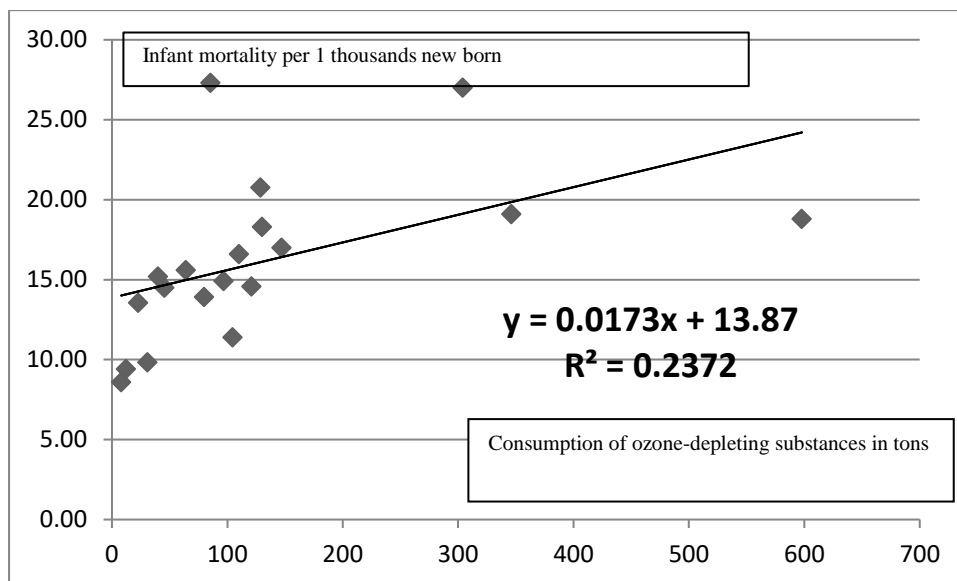Consumption of ozone-depleting substances in tons

Source: Ministry of national economy of the Republic of Kazakhstan. Committee on statistics. Dinamika osnovnyh socialno-ekonomicheskih pokazatelej. Own calculations

According to the chart, gas emission does not especially affect this type of mortality.

As international experts have noted, there has happened a strong decline in child and especially infant mortality, in Kazakhstan, over the past years; in large portion because of the increased well-being of the country's citizens, as well as thanks to the investments of the government and international organizations in the health care system. For example, the new vaccine against pneumococcus introduced as a mandatory vaccine for infants in 2010. As a consequence, the number of medical errors was greatly reduced, and the cause of death represent congenital diseases that are incompatible with life (about 20-30% cause of death) (UNICEF, 2018).

4.5 Case study – Almaty and Astana

Further, we will be considering the specific situation in two regions of the country - Almaty and Astana. The first city, Almaty, is the former capital of the country, where live about 1.8 million people; the second city, Astana, is the current capital of the country, with a population of 0.8 million people. In 2007 1.2 million people lived in Almaty and 0.57 in Astana.

As noted above, there is a big problem, in Almaty, because of the wrong town planning – the smog stays in the city instead of being blown away by the winds. Unfortunately, there is a big percentage of the ill population, in the former capital. Mathematically it accounts for 83.05 diseases per 100 people. However, in the same time in Astana the same ration is only 20.62 cases per 100 inhabitants. It is not surprising, that the diseases of the upper respiratory tract are most frequent and prevail in the country.

Table 10. Ecological situation in Almaty and Astana

	2007	2008	2009	2010	2011
Number of cars-Astana (thousands)	310	315	320	335	338
Number of cars-Almaty (thousands)	361	371	375	370	388
Air pollution index IZA5 Astana	7,10	5,95	5,35	6,20	5,71
Air pollution index IZA5 Almaty	13,29	13,31	13,52	13,63	13,64
Number of people with respiratory diseases – Astana (in thousands)	165	180	162	185	181
Number of people with respiratory diseases – Almaty (in thousands)	1 242	1 356	1 487	1 502	1 401

	2012	2013	2014	2015	2016	2017
Number of cars-Astana (thousands)	340	345	348	355	358	360
Number of cars-Almaty	391	392	396	398	399	401
Air pollution index IZA5 Astana	6,12	7,85	5,94	6,85	5,42	6,54
Air pollution index IZA5 Almaty	13,67	13,71	13,61	13,67	13,73	13,74
Number of people with respiratory diseases – Astana	174	162	161	165	166	165
Number of people with respiratory diseases – Almaty	1 435	1 355	1 486	1 478	1 486	1 495

The wrong layout of the city Almaty cannot be transferred into numbers. It is very important to mention that there are no enterprises near Almaty, that could seriously pollute the atmosphere. Therefore, transportation is the principal reason of air pollution in the country.

Due to the growth of Kazakhstan citizens' welfare, the number of cars in personal use is also increasing. Currently, nearly every resident of Almaty has his/her own car. While, the number of cars in Astana is not much smaller, although the number of citizens is almost half the population of Almaty. This can be explained by two reasons. Astana is located much to the north, where the climate is very harsh and resembles the Siberian climate. The temperature in winter drops to - 20 and even below. Hence, personal transport there is simply necessary. The second reason is that there is a very large number of state structures in the city.

It is evident that many more people have problems with respiratory diseases, in Almaty. The growth dynamics of these diseases is very clearly noticeable here – see table above. As it is obvious from the table, number of people with this disease in Almaty was 1.2 million in 2007, however in 2017 it reached 1.5 million. Meanwhile overall number of people living in Almaty changed from 1.2 million to 1.8 million. Of course, the question is if the increase of amount of people with respiratory disease is caused by pollution or by increase number of people living in the city. That is why in the further text it is necessary to apply regression model.

In Astana, thanks to a more qualitative layout of the city, nothing happens, like Almaty. The city is also located in the steppe, where the wind blows constantly. Astana residents always complain about the wind, but apparently, the wind brings great benefits to the city.

The environmental situation in both cities is complicated by the fact that there is many old passenger cars, with the manufacture year more than 10 years; the number of these cars is 80.8 % of all registered passenger cars. Per the experts' opinion, these vehicles give up to 70 % of the total volume of emissions of automobile transportation. Almost all cars use gasoline, which complicates the situation and worsens the ecology of the city (Sultanova, 2018).

Almaty heads the list of the Republic of Kazakhstan for diseases of the respiratory and endocrine systems, blood diseases, cancer, and bronchial asthma. Moreover, there are no large industrial facilities located in the region where Almaty is. The entire industry of the country is located in the north, while Almaty is in the south. The quality of air in Almaty is on the same

level as in such cities as New Delhi or Ho Chi Minh City, where are living over 10 million people (Ramazanova, 2018).

According to the figure, it is evident that the increase in the incidence of diseases is directly related to the index. The figure shows the increase in pollution can explain 38.73% of the incidence of the respiratory tract. It is obviously, that increase number of respiratory disease is caused by pollution problem, not by growing number of people living in the city as it could seems on the first glance.

Chart 15. Almaty – respiratory disease and index IZA5
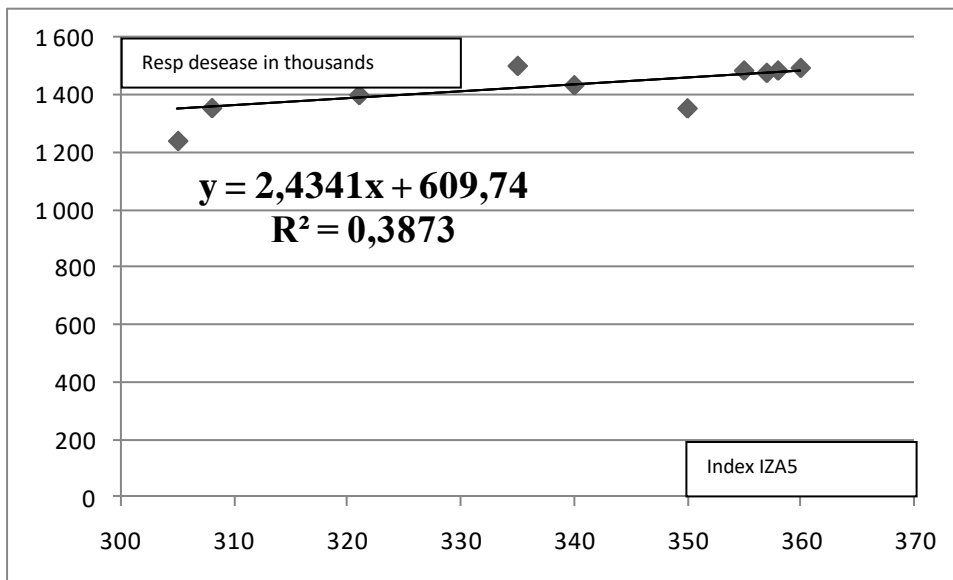
The chart shows a scatter plot with trend line. Legend: "Resp desease in thousands" and "Index IZA5". Equation displayed:

$$y = 2{,}4341x + 609{,}74$$
$$R^2 = 0{,}3873$$

When talking about cars, the situation in Almaty is completely the same – we can explain 30.84 % of respiratory disease by number of cars. Therefore, the conclusion is obvious – the leadership of the country is simply obliged to reduce the number of cars in the city. This step should be aimed especially on old cars.

Chart 16. Almaty – respiratory disease and number of cars in thousands
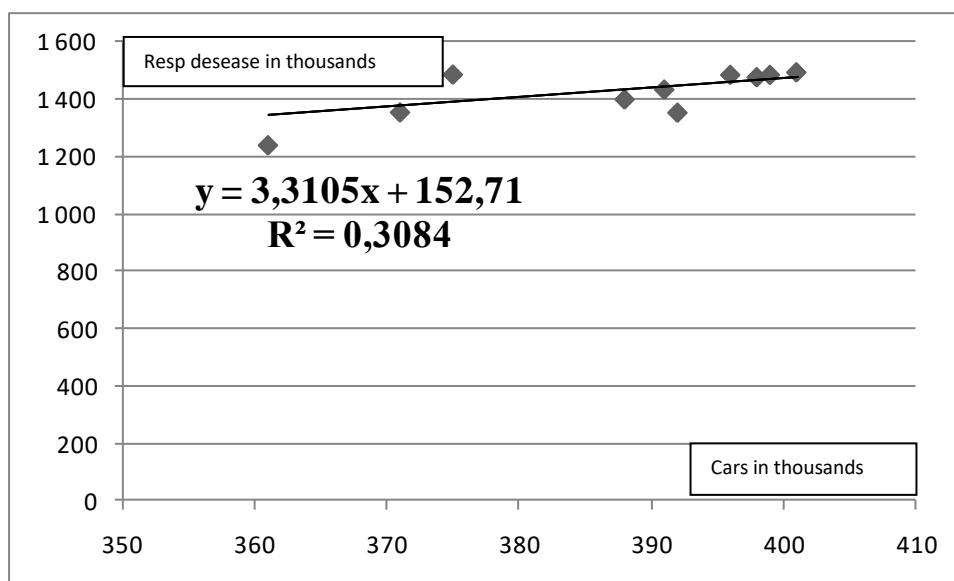
Chart showing scatter plot with trend line.
- Resp desease in thousands
- Cars in thousands
- $y = 3{,}3105x + 152{,}71$
- $R^2 = 0{,}3084$

Y-axis values: 0, 200, 400, 600, 800, 1 000, 1 200, 1 400, 1 600
X-axis values: 350, 360, 370, 380, 390, 400, 410

Source: Ministry of national economy of the Republic of Kazakhstan. Committee on statistics. Dinamika osnovnyh socialno-ekonomicheskih pokazatelej. Own calculations

In Astana, the situation is different. The index has almost no influence (from) the figure – only 8 % and curve has a negative slope. So, there is an indirect dependence, as the indicator falls.

Chart 17. Astana – respiratory disease and index IZA5
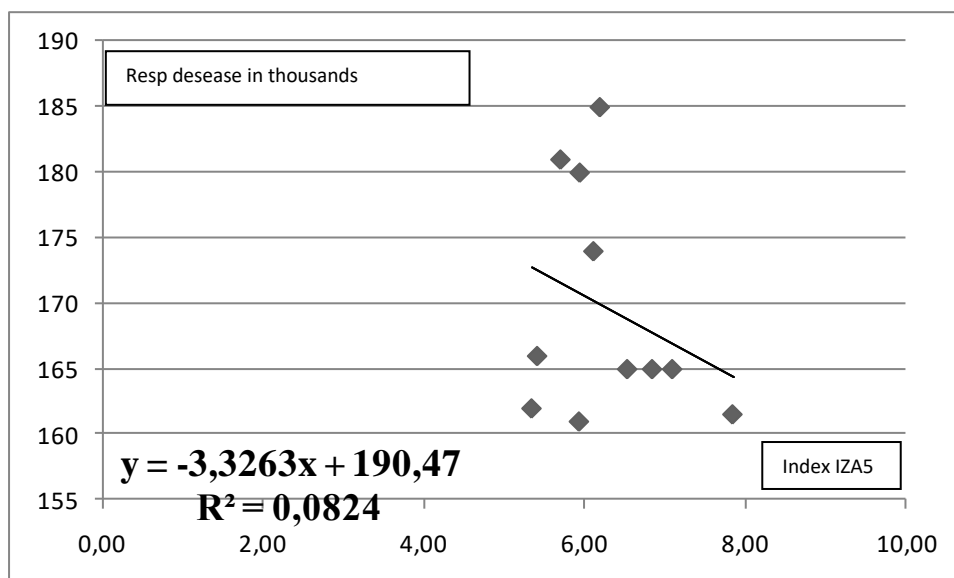
Chart showing scatter plot with trend line.
- Resp desease in thousands
- Index IZA5
- $y = -3{,}3263x + 190{,}47$
- $R^2 = 0{,}0824$

Y-axis values: 155, 160, 165, 170, 175, 180, 185, 190
X-axis values: 0,00, 2,00, 4,00, 6,00, 8,00, 10,00

Source: Ministry of national economy of the Republic of Kazakhstan. Committee on statistics. Dinamika osnovnyh socialno-ekonomicheskih pokazatelej. Own calculations

The same is confirmed by the following figure, which shows the incidence of diseases in the country does not increase, because of the machines. Number of cars significantly increased – from 310 to 360 thousand, however it has minimal effect on respiratory disease. As it obvious from the chart, regression model could explain only 7 % of disease. Moreover, as it could be dedicated from the curve, according to regression model, we see indirect dependence between number of cars and people with respiratory disease.

Chart 18. Astana – respiratory disease and number of cars
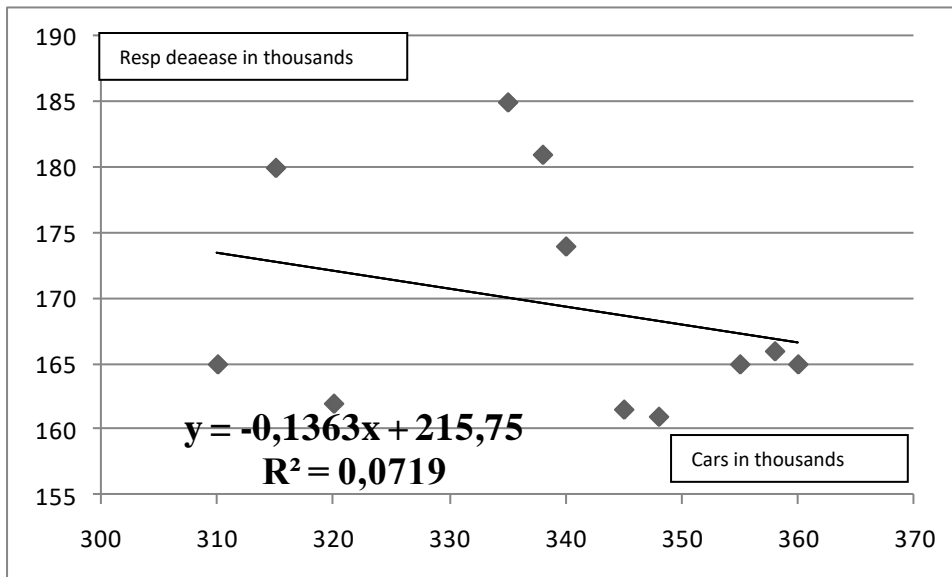
Resp deaease in thousands

$$y = -0,1363x + 215,75$$
$$R^2 = 0,0719$$

Cars in thousands

As already mentioned, the problem of air pollution in Almaty is fundamental, and its solution requires prompt actions from the local government. Otherwise, almost the whole Almaty population risks having problems with the respiratory tract. The first step in solving this problem is to promote public transport in the city. The state should draw the attention of citizens to the fact that preferring public transport, instead of a personal car, will help to improve the air condition in the city.

The next step is to perform the modernization of the fleet serving the population. Unfortunately, people use their cars instead of public transport, because the last is of low quality and this is the main reason.

The third step is to purchase buses that use more qualitative fuel - for example, gas or electricity. Besides, it is necessary to encourage people who utilize transport on gas or

electricity, for example, via tax breaks/advantages. Another possible solution could be the opening of new routes driving citizens directly from the outer-lying residential districts to the central city zone. This action could give the population the option of not driving their private transport.

4.6 Government policy

State expenditure on the environment is continuously increasing, by 5-10 percent per year, on average. Currently, there are 60 billion tenges (0.13 billion EUR), on average, spent on environmental problems (see table below). The main direction of the state policy in the field of ecology, when speaking about total costs, is the protection of atmospheric air and climate with 70% of the total costs. The second direction is waste management with 20–30% of total costs; the third direction takes over 6–10% for radiation protection, biodiversity protection and research (Ministry of Energy of the Republic of Kazakhstan, 2018).

Table 11. Government expenditures and government expenditures on ecology

	2014	2015	2016	2017	2018	2019
Overall government expenditures in bil EUR	44,05	44,48	36,10	26,57	37,30	34,23
Government expenditures on ecology in bil EUR	0,09	0,11	0,11	0,12	0,12	0,13
Share of ecological expenditures on overall government expenditures in %	0,20 %	0,24 %	0,31 %	0,44 %	0,33 %	0,38 %

Source: Ministry of national economy of the Republic of Kazakhstan. Committee on statistics. Dinamika osnovnyh socialno-ekonomicheskih pokazatelej. Own calculations

In the future government is planning to increase amount spent on ecology. According to government plan Kazakhstan 2025 local market of hot-smear materials should be in accordance with the new environmental standards (Government policy Kazakhstan – 2025).

The position of the country is crucial for the entire region because the country is a bridge between Europe and Asia. Also, the size of the country imposes a special imprint on its environmental policy in neighboring countries. Kazakhstan is very sensitive to the problem of desertification of its territory, and the government is struggling every way with this problem (Kulmamentov, 2018).

The next fundament of the state policy of the country is the transition to environmentally safe and sustainable development. Kazakhstan is undoubtedly a pioneer among neighboring states in this sphere. Kazakhstan is one of the first countries in the post-Soviet space, that adopted an environmental code. It happened in 2007. Thanks to the adoption of this code, there is inventory

occurring, greenhouse gas emissions and ozone-depleting substances are being rationed, in the country. This code has brought a lot of changes that have surely improved the environmental situation in the country: the number of granted licenses ad their types, for gas emissions, has decreased, the process of issuing permits related to greenhouse gases has changed, a system for classification and regulation of waste has been carried out, and this standard has been withdrawn from EU guidelines (Kulmamentov, 2018).

The next priority of the environmental policy of the country, is the implementation of economic and other activities, near the Caspian Sea. It is importantly related to the mining operations carried out in this region. Undoubtedly, it is a key region not only for Kazakhstan and neighboring countries but also for the whole world. In this region are located almost all world reserves of sturgeons (Ministry of Energy of the Republic of Kazakhstan, 2018).

Further, in Kazakhstan, there was introduced the replacement of payments for environmental taxes, and it was carried out considering the international experience. This tax is heeded from enterprises for negative environmental impact. For example, the tax on a very limited list of emissions, or the tax on energy consumption.

The country is paying a lot of attention to the monitoring of environmental conditions; the whole population is shown the real level of pollution and all the information is freely available (Kulmamentov, 2018).

Kazakhstan is also taking care of ecological situation in neighboring countries. For example, government initiated cross-border cooperation "Green bridge" with their neighbours (Galushko, 2019).

A priority in ecology is also the active international position of the country. The country is constantly trying to meet standards of international conventions and agreements on environmental protection and uses world experience (Ministry of Energy of the Republic of Kazakhstan, 2018).

Problem for application government policy is overall attitude of local people. Some of them do not perceive government policy as a key aspect of their own life. They still think that at this moment Kazakh government should concentrate on economical, not ecological area (Sevotjanova, 2019).

5 Conclusion

This diploma thesis is focused on ecology and economics, which is fundamental in today's world. These two domains always come along. Nothing comes for free and any success should be paid, as a rule, the economic growth should be repaid with something else.

On the other hand, nature is very sensitive to impacts and it requires a lot of time to recuperate.

The main indicators of environmental pollution were analyzed in the first part of the diploma work. We considered the diseases that are caused by pollution and are related to the following indicators: human biorhythms disorder, acceleration of development, allergy, and diseases transmitted via dirty air, sleep disturbance, insomnia, and dizziness. A lot of indices and calculations were used to measure the environment situation. They are divided into international indicators, consumption level, pollution level.

Most states support environmental policy. In this case, the following directions are usually considered – sustainable use of natural resources, pollution reduction, and conservation of nature for future generations and restoration.

The environmental situation in the country is not good at all. This situation is caused by both, the legacy of the past and the present situation. The negative inheritance includes, first, the ground trials at the Semipalatinsk, and the situation associated with the drying of the Aral Sea. The current problems of the country relate to the quickly growing industry, the growth of the population in the cities, and companion problems – garbage, exhaust gases, etc. The main problem of modern Kazakhstan is air quality. Unfortunately, in this Central Asian country, the number of cars is growing very quickly, which negatively affects the environment. There are 2 big problems: the wrong projection of cities and the regular traffic jams which altogether causes respiratory diseases.

As a result of the rapidly growing demand for gas and oil, the residents of the country could see unprecedented economic growth in all respects. The economic growth has also influenced the growth of the population's consumption. The wealth growth also has led to the population's life expectancy increase, because people improved their quality food and quantity, and afforded more expensive and more qualitative medicines.

Further, an analysis of air pollution was carried out, using the example of the two biggest cities of the country - Almaty, and Astana. The environmental situation in the first city is deplorable, here almost every resident goes to a doctor because of respiratory diseases, every year. There

are several reasons for poor health: a big number of cars, most cars are on the gasoline engine, the city is practically not ventilated by the winds. As a result, the air quality in Almaty is comparable to Cairo or New Delhi, where many more people live. Based on these arguments, it can be said that the hypothesis of diploma work was confirmed.

The diploma work demonstrated that the country's current environmental problems are associated with a negative environmental past - this is, above all, the drying up of the Aral Sea and the spillage of nuclear weapons. The current problems of the country are related to air quality arising from the rapid car number increase. All of the above causes, respiratory diseases and cancer.

The development of the economy of the country happens due to the development of the mining industry. On the other hand, this type of economy brings increased consumption of resources and generates a lot of garbage. The government is constantly struggling with this phenomenon. Based on this, it can be said that the second partial goal – to estimate the industrial sector work on the environmental situation in Kazakhstan – was performed.

Thanks to the steps taken by the Kazakh government, the level of pollution is gradually decreasing to normal. The current situation has greatly improved, compared to the state that was 10 years ago. The remaining problems in the country are the number of cars, already mentioned above, and the waste produced by agriculture. These proofs confirm that the last partial goal – to evaluate the government's actions regarding emissions reduction on the ecology of the country – can be considered fulfilled.

Based on all the above arguments, it can be affirmed that the purpose of this thesis – to assess and estimate the influence of the environmental situation in Kazakhstan, on the Kazakh population based on selected indicators: international indicators comparisons, level of consumption, level of pollution and other indicators – was achieved.

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