

**University of Bielsko-Biala**

**International economic relations  
and sustainable development**

**Monograph**

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Monograph is devoted to the research of theoretical and practical aspects of the sustainable development at the present stage of international economic relations. Innovative methodic approaches and economic mechanisms to provide sustainable development at the regional, national and international levels are considered. Scientifically grounded recommendations to achieve economic, social and ecological aims of the sustainable development through the strengthening of integration processes and international cooperation between countries of the world are given.

Key words: sustainable development, international economic relations, international trade, innovations, investment, integration, ecological management, marketing, ecological safety, economic mechanisms, “green” economy, renewable energy, energy efficiency.

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## **INTERNATIONAL ECONOMIC RELATIONS AND SUSTAINABLE DEVELOPMENT AS PERSPECTIVE SCIENTIFIC DIRECTION (INTRODUCTION)**

May 5-6, in Ukraine, I International Scientific and Practical Conference “International Economic Relations and Sustainable Development” was held. The conference was organized by Sumy State University and University of Bielsko-Biala, conference head was Olha Prokopenko.

The prospectivity of the scientific direction is confirmed by the fact that the conference gathered many participants from 14 countries of the world: Ukraine, the Federal Republic of Nigeria, the French Republic, the Great Britain, the Islam Republic of Afghanistan, the Republic of Armenia, the Republic of Belarus, the Republic of Bulgaria, the Republic of India, the Republic of Iraq, the Republic of Kazakhstan, the Republic of Poland, the State Israel and the USA. The conference scientific results were collected in the Conference Proceeding and this monograph.

Monograph is devoted to the research of theoretical and practical aspects of the sustainable development at the present stage of international economic relations. Innovative methodic approaches and economic mechanisms to provide sustainable development at the regional, national and international levels are considered. Scientifically grounded recommendations to achieve economic, social and ecological aims of the sustainable development through the strengthening of integration processes and international cooperation between countries of the world are given.

The first part of the monograph “Economic evaluation of the sustainable development mechanisms efficiency” analyzes theoretical fundamentals of sustainable development, evolution of the conception “greening” of innovative activity. The economic growing impact on the natural environment imbalance is outlined and measures to reduce anthropogenic load on the environment are defined.

The second part of the monograph “Foreign economic policy and sustainable development” deals with key vectors of the Ukrainian integration policy and its export potential. Position of Ukraine in the international trade global system and main directions to develop mechanisms of international trade procedures simplification are defined. Main challenges in the modern leadership sphere as one of the important tasks of the human resources international management are represented.

The third part of the monograph “Innovations for sustainable development” considers economic mechanisms and tools to stimulate ecological innovations considering resources fluctuations. The international organizations role in realization of innovative projects on sustainable development in Ukraine is analyzed.

The fourth part of the monograph “Ecological and economic security and investment” demonstrates conceptual approaches and ecological evaluation of regions’ security in the sustainable development context. Theoretical and methodic approach to manage ecological safety of the global economic system is proposed.

The fifth part of the monograph “Methodology of energy effective development” determines prerequisites of the national economy’s energy efficient development, systematizes main barriers in energy efficient changes, and outlines directions for further development of energy efficient changes in Ukraine. A number of economic mechanisms, oriented to stimulate development of renewable energy and to fasten involving of renewable energy sources to the Ukrainian energy balance is investigated.

The sixth part of the monograph “Countries’ and sectoral problems of sustainable development” focuses attention to achieve aims of the sustainable development in different sectors of economy and countries. Attention is concentrated on biodiversity of the ecosystem in Iraq. Actual problems of the agro-industrial complex sustainable development in Ukraine in general and agriculture particularly are analyzed. Key tendencies of the migration processes in the Republic of Armenia are described.

The seventh part of the monograph “Practical aspects of project management for sustainable development” considers key aspects of the integrated marketing management, practical and situational approaches to form strategic accounting.

The eighth part of the monograph “Universities and promotion of sustainable development idea” deals with role of universities in promoting the sustainable development idea, peculiarities of the technologies transfer and its internationalization in the universities’ sustainable development strategies.

The authors of the monograph are scholars and practitioners from six countries, including Republic of Armenia, Republic of Belarus, Republic of Iraq, Republic of Poland, Ukraine and USA.

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The monograph contains the results of research carried out within the framework of fundamental research topic of Sumy State University № 0115U000678 “**Methodology of forming mechanism of national economics innovative development based on alternative energy**”.

Sponsor of the monograph is **Merrit Group LLD** with managing director Robert Kornatowski. Company invites persons and entities interested in building foreign sales markets, business security, education and business support in a broad sense to become our partners. A dedicated team of experts, being part of our Group handles each area. Meritt Foreign Markets is a team of people that helps to create business projects of international scope. We provide consulting services in the sphere of expansion to foreign markets and government relations. Meritt Business Security is a team of people dedicated to reliability checking potential clients and business partners, both physical persons and legal entities. Meritt Education is team of people providing consulting services related to development and expansion of Polish higher education institutions in the Russian Federation, Ukraine, the Republic of Kazakhstan. Merrit Group LLD works in the Republic of Poland, Ukraine, the Republic of Belarus, the Russian Federation, the Republic of Kazakhstan, the European Union and the Sub-Saharan African countries.

## **PART 1 ECONOMIC EVALUATION OF THE SUSTAINABLE DEVELOPMENT MECHANISMS EFFICIENCY**

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### **1.1 ECOLOGICAL AND ECONOMIC MECHANISMS OF SUSTAINABLE DEVELOPMENT**

For thousands of years, mankind has been trying to create an environment in which it could fully realize itself. To achieve this dream, society constantly sets goals and tries to implement them. However, analysing the current international situation, we can say that humanity is not developing on the right path.

Civilization for thousands of years experienced many majestic blossoms and crushing falls. And on the ruins left after these crises, there never appeared new civilizations with the grandeur of the former, vivid examples of this are Babylon, Assyria, and Carthage. F. Engels wrote that the civilizations leave behind deserts.

In the twentieth century, the world developed at a rapid pace and now there are all the prerequisites for the emergence of another, global, destructive crisis. In order to avoid it, it is necessary to adjust and give a new direction to the development of modern society. From this point of view, it is very important to study economic cycles and their theories, as these theories study the causes and indicators that effect on the economic development, the business activity of society, giving the economic growth repeating pattern.

Economic development is the main and most important element of the society's development. In the current context, it is characterized by rapid scientific and technological progress (computerization and informatization of all aspects of life, the use of high technology), irreparable damage to natural ecosystems (irrational use of natural resources, pollution of the environment, climate change, disappearance of rare biological species, mass deforestation and etc.), the globalization of the economy, the stratification of the world community. All this is accompanied by an increase in the world population. We see all the characters of another global systemic crisis, so if not to take urgent measures to prevent, or mitigate the consequences, if not reduce the anthropogenic impact on the environment.

Economic crises in modern conditions should be considered taking into account environmental factors, otherwise the results of the study will not be correct. In the scenarios of the countercyclical policies of states, it is necessary to take into account the criteria and principles of sustainable development adopted by the world community in 1992 in Rio-Janeiro.

In this study, economic and natural cycles are studied, the relationship between them is shown, the concepts of sustainable development, global crises, cyclical development of society and economy, and indicators of sustainable development are also considered.

**Economic cycles.** The history of the human society development of clearly shows that the market economy is able to create more goods and services for more people than any other economic system. And this is explained by the fact that in the conditions of a market economy a high motivation for creative work, progress is provided, people themselves make choice what to do. Thus, there is a high degree of risk and responsibility in economic activities, which develops initiative, enterprise and leads to high results of development of social production.

The economic development of society is the evolution of its productive forces and relations, which takes place on the basis of expanded reproduction.

There are many indicators of the dynamics of economic development that cannot be estimated, and are divided into the following groups:

1. Indicators of economic growth;
2. Indicators of the development of life.

Graphically, the dynamics of the volume of production in the scale of a market economy over a long period can be represented in the form of an increasing straight line (see Fig. 1 below).

Under economic growth, it is customary to understand the increase in the volume of goods and services created over a certain period.

Economic growth is an increase in the scale of aggregate production and consumption in the country, which is characterized primarily by macroeconomic indicators such as gross national product, gross domestic product and national income. Economic growth is measured by the rates of growth and growth over a certain period of time (ratio of indicators at the end and at the beginning of the period or the ratio of the increase in the indicator to its initial value).

Economic growth is accompanied by an increase in gross product per capita and means an increase in the standard of living of the population.

Economic growth is a way to solve the problems of expanded reproduction.

Economic growth is the central economic problem facing all countries. According to its dynamics, it is judged about the development of national economies, the living standards of the population, as well how the problems of limited resources are solved.

Economic growth of the national economy can be realized in an extensive and intensive way.

An extensive type of economic growth presupposes an expansion in the scale of production. This means that economic growth is achieved through increase in the number of factors involved in production on the previous technical basis. Extensive factors of economic growth reflect the quantitative side of the increase in output due to an increase in the volume of used production resources. These include: the growth in the number of employees, in the volume of investments and growth of consumed raw materials.

An intensive type of economic growth involves more efficient means of production, technologies and processes. This means that economic growth is achieved by improving the use of production factors. The intensive factors of economic growth reflect the qualitative side of increasing output by improving the efficiency of the use of productive resources. These include: improving the skills of workers, the economy regime, scientific and technological progress, improving technology, labour and production organization, improving product quality.

In reality, there is no net extensive and pure intensive type of economic growth. They coexist side by side; the impact of extensive and intensive factors on economic growth is tightly intertwined. For a market economy, periods of predominantly extensive and predominantly intensive economic growth are characteristic.

There are two approaches of high rates of economic growth.

1. Arguments 'For' high rates of economic growth.

- The living standard of the population is growing.
- Equalisation of the population income.
- Infrastructure is developing.
- Opportunity of helping to underserved people.
- Labour productivity is raising.
- Production is expanding, etc.

In a situation when the economy is growing at a high rate, more goods are produced for society and more needs are met, so in this case two more indicators should be taken into account: product quality and product growth rates. If they are dominated by elements of capital, the population does not get benefits since the share of goods remains insignificant.

2. Arguments "Against" high rates of economic growth argue that there is a meaningless overspending of limited resources, since economic growth is provided solely through technical progress. As a result:

- The insignificant needs of the population are met.

- The environment is polluted, which leads to a deterioration in the health of the population.

- leads to a sharp stratification of the population according to income levels.

Negative rates are inherent to developing countries and indicate a crisis in the economy.

There is also a type of a zero rate of economic growth, which does not create negative consequences for the short-term period, since it helps to reduce resource intensity, due to higher labour productivity and reimbursement of funds.

Constant economic growth in a market economy has a number of significant shortcomings (inflation, unemployment, etc.), including cyclicity.

The economic system is characterized by two opposite states: equilibrium and disequilibrium.

The equilibrium state of the economy implies the coordinated development of market indicators. According to scientists, economic equilibrium is an objective indicator of economic growth. At the same time, economic growth is not always in a state of macroeconomic equilibrium. And macroeconomic equilibrium, in turn, does not always indicate a stable economy.

The economy comes to a disequilibrium state, when economic indicators, such as output, price level, employment level, rate of return, interest rate of credit and other indicators are distorted.

It can be concluded that the economy functions with certain regularities, like the development of the world. One of such regularities is the frequency of ups and downs in production. Economists call this phenomenon a cyclical economic growth.

Thus, the social and economic form of the disequilibrium development of social reproduction is called cyclicity or a cycle. The market economy is inherently prone to the periodic recurrence of phenomena, i.e. it develops cyclically.

There are many definitions of the cyclical nature of economic growth or the economic cycle.

Cyclicity is the universal form of the movement of national economies and world economy as a whole. It expresses the uneven functioning of various elements of the national economy, the replacement of the revolutionary and evolutionary stages of its development, economic progress.

Cyclicity is the most important factor in economic dynamics, one of the determinants of macroeconomic equilibrium. The most characteristic feature of cyclicity is that the movement doesn't go in a circle, but in a spiral.

Cyclicity is a form of progressive development.

Cyclicity is a movement from one macroeconomic equilibrium in scale of at least the national economy, to another.

Cyclicity can be considered as one of the ways of self-regulation of the economy.

Cyclicity is a social and economic form of expressing the unevenness of the functioning of the process of reproduction.

Cyclicity is characterized by periodic ups and downs of market conditions.

The cyclical nature of economic development or the economic cycle is the continuous fluctuations of the market economy, when production growth is replaced by a recession; an increase in business activity is a decrease.

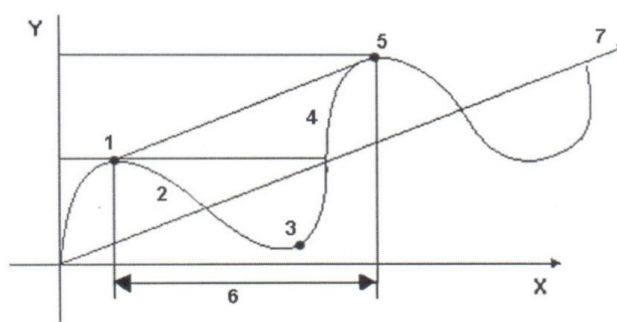
The economic cycle is a form of movement and development of the economy.

The economic cycle is the wave-like fluctuations of the economy around the general direct (trend) of economic equilibrium.

The economic cycle (wave) is a common feature in almost all areas of economic life and for all countries with a market economy.

The economic cycle (waves) are periodic fluctuations of business activity in a society.

ECONOMIC CYCLES, a term that indicates regular fluctuations in the level of business activity from the economic boom to the economic downturn. The cycle of business activity includes 4 phases: crisis, depression, surge and recovery (Fig. 1.1).



Y – GDM, X – time, 1 and 5 – surge, 2 – crisis, 3 – depression, 4 – recovery, 6 – cycle periods,  
7 – Pn const-long term trend of economic cycle.

Figure 1.1 – The industrial cycle scheme [3]

## 1. CRISIS

The mass of unrealized products is increasing; profits decrease; the loan interest grows; loans are reduced, non-payment crises; massive bankruptcies, rising unemployment; falling of stock quotes; depreciation of fixed capital. In other words, there is a decline in business activity.

## 2. DEPRESSION

Decrease in the rate of production decline (stagnation); unrealized commodity stocks are coming to the end; the fall of investment and consumer demand is damping; mass unemployment and low prices are persisting; in the economy begins the accumulation of capital and the emergence of growth points.

## 3. RECOVERY

Growth of production volumes to pre-critical level; increase in demand for consumer goods and services as well as factors of production; renewal of fixed capital, higher prices, lower unemployment.

## 4. SURGE

Continued growth in production and renewal of fixed capital; increase in investment and consumer demand; increase of prices and incomes, reduction of unemployment, that is, business activity is increasing.

Each crisis ripens in the phases of recovery and recovery. Reproduction takes place on an essentially extensive basis. Then the growth rates of production begin to outstrip the growth rates of effective demand, and the overproduction of goods begins.

The depth of the process, which affects the duration and depth of cyclical fluctuations, is the movement of investment [1]. The crisis forms the starting point for new mass capital investments. Firstly, because it provides the basic capital that create the conditions for the renewal of the production.

Secondly, it urges that such update has taken place on a new technical basis which allowed reducing production costs and restoring the pre-crisis, and then providing a higher level of profit.

Thus, the economic crisis epicentre of the cyclical movement reveals not only a limit, but also an impulse in the development of the economy, performing a stimulating function (production costs are reduced, profit increases, competition grows, morally obsolete means of production are replaced, capital is renewed on a new technical basis). This crisis gives rise to a predominantly intensive development of the economy.

During the crisis, the moral wear of machinery and the dynamics of scientific and technological progress are such that the updating of fixed capital is made asynchronous with respect to the scale of the entire economy. An additional unevenness gives the mass renewal of fixed capital the volatility of the conjuncture. Therefore, a real cyclical process is a complex phenomenon, conditioned by interrelated factors – the turnover of fixed capital, scientific and technological progress, and the dynamics of the conjuncture. Accordingly, in order to understand this cycle, all these factors must be studied in their conjuncture values and dynamics.

Although it is commonly believed that changes in business activity are directly or indirectly related to the economic cycle, there are other factors affecting the state of the economy. The most important of these are seasonal fluctuations and long-term trends. The influence of seasonal fluctuations can be traced at certain times of the year, for example, shortly before Christmas or Easter, when business activity increases, especially in retail trade. In other sectors of the economy, for example, in agriculture, automotive industry and construction, there are also seasonal fluctuations. Centuries tends determine the long-term increase or decline in economic growth.

The cyclical essence of social reproduction is not limited to economic or business cycles. In the economy there are many objective fluctuations that are associated with the renewal of different elements of capital or have a social essence [3]. Based on this, the following types of cycles are distinguished:

- Short-term cycles or Kitchin cycles lasting 3-5 years, generated by the dynamics of the relative value of inventories in enterprises. E. Hansen associates “cycles of Kitchin” with the uneven reproduction of working capital, and U. Mitchell associates them with fluctuations in money turnover.

- Medium-term cycles (industrial cycles) associated with fluctuations in demand for equipment and building materials, which last 7-25 years.

- Cycles of S. Kuznitsa. Their duration is limited to 18-25 years, and the driving forces are changes in the reproductive structure of production (often these cycles are called reproductive or building);

- Cycles of K. Zhuglyar, periodicity of 7-11 years, which are the result of interaction of diverse monetary factors.

- Long-term cycles or Kondratieff cycles, lasting 40-60 years. Their main driving force is a radical change in the technical basis of social production, its structural reorganization associated with the introduction of new technologies in production.



In this connection, the time intervals for the flow of long waves were specified:

1st wave: from depression in 1772-1783 till the instability of 1812-1825;

2nd wave: from the depression of 1825-1838 till the instability of 1866-1873;

3rd wave: from the depression of 1873 – till the instability of of 1913-1929;

4th wave: from the depression of 1929-1938 till the instability of 1966-1974;

5th wave: from the depression of 1974-1982.

- Frequent business cycles, covering a period of 1 to 12 years and existing due to fluctuations in investment activity.

Modern theories of economics consider important to study the connections of different types of economic cycles. Theories of economic cycles occupy an important place in economic science. These theories study the principles and indicators that cause changes in business activity. There are different directions of economic cycle theories (K. Marx, K. Zhuglyar, Tugan-Baranovsky, P. Samuelson, Houtry, Schumpeter, Hansen, Ligue, Bedgoth, Hobson, Foster, Cutchings, Hayek, Mises, Jevans, Moore, and Keynes). Despite the great difference in views and different approaches in the development of countercyclical policies, all the concepts of regulating cycles can be divided into 2 directions developing on the basis of a classical school: neo-Keynesian theory and neo-conservative (Tab. 1.1).

Table 1.1

Regulating cycles concepts [Author's research]

Characters	neo-Keynesian theory	neo-conservative
Orientation	On demand	On Supply
Aims	Regulation of the economy as a whole (macroeconomics)	Creation of incentives for the activities of individual firms (microeconomics)
Regulatory Priorities	– Fiscal policy (associated with an increase or decrease in state spending, and tax policy (manipulation of tax rates, depending on the state of the economy)) – Monetary Policy	– Credit-monetary policy (based on monetarist theories, which primarily focus on the volume of the money supply and its regulation) – Fiscal policy
The state role assessment	Encouragement	Limitations

Despite such significant differences, there is a common understanding of these concepts:

- the state is able to smooth out cyclical fluctuations.
- the state should do this in order to achieve and maintain economic stability.

• the state's line of conduct aimed at overcoming cyclical fluctuations. In the recession phase, state events should be aimed at stimulating business activity. In the field of tax policy this means:

- reduction of rates;
- granting tax benefits for new investments;
- accelerated depreciation.

### **Economic and natural cycles**

Scientists believe that cyclicity is a universal form of movement of nature and society. In natural cycles, change occurs with the objective necessity at the same time, with constant duration, rhythmically and inevitably (day and night, change of seasons). The cyclical nature of economic development is less pronounced and more controversial. In nature, significant changes in cyclicity are the result of millennia. In the development of society, the duration of cycles can change in a very short time. All these features are caused by the fact that economic cycles are associated with human activity, with its specific goals and methods of implementation.

However, man in the creation of artificial processes must proceed from the possibility of forming a relatively stable and equilibrium state of the geosystems. In this case, interval theories describe the economic cycle, taking into account the appearance of internal factors inherent in the very structure of economic systems, while external theories taking into account external factors reflecting the state of the environment in which the system moves. The combination of these factors causes changes in the parameters of the formation of systems during the rise and fall of their economic activity, as well as in the destruction of systems and connections, makes it possible to classify factors in terms of functional orientation into two groups that create a certain economic background for the development of cycles over time along the entire set of directions Human activity. The first group of factors characterizes the natural background, as we know, aimed at the self-structuring of systems, and, therefore, proceeding with the predominance of structured results over degrading ones, and the second is the economic background created under the influence of unconscious and conscious human actions. The first, basic, natural and most significant economic background is created by the natural state of nature in the joint functioning of geo, hydro, and biospheres. The effectiveness of natural processes is inherent in their purposeful self-organization. Therefore, the natural environment is basic, economic and effective. As noted earlier, in the conceptual foundations of the functioning of nature, the environment acts as the basis for the development of the entire body of natural processes. The natural background provides the processes and results of the development of all kinds and resources. On the basis of these resources, a person receives natural benefits and on the basis of them creates an artificial

production of goods and services. It is clear that the natural background is in self-regulation, relative equilibrium and nonequilibrium, stable and unstable states. The processes of the main effective natural background of a person and evolutionarily develop it, in order to delegate the basic economic functions of exchange artificial processes. By creating artificial exchange processes, a person helps the self-organization of the universe structures by searching for an alternative choice of resources, the production of structured compounds, their consumption and distribution in those spaces that the nature itself can perform these functions economically only with actions that are ineffective for it [8].

But at the same time, the economic natural background creates its economic agent (person) and transmits through his genome the makings of hereditary development in the form of ensuring effective and purposeful actions combined with the actions of nature. Therefore, the evolution of human development is based on the genotype and the formation of a phenotype under the influence of human contacts with the environment. In the biological world were created and strengthened with certain lags actions functional from the cellular level to the level of highly developed structures of animals and humans, thus forming distinctive layers of genotypes. Thus, the economic background of human activity (1-5) is subdivided into several subfields,

- Reproduction background (5) – action functional. It is based on the combination of several functions forming a single whole, which is aimed at ensuring its characteristic goal, in this case, offspring. This subfield is the main one. It determines the viability of any population, including the human community.

- Spiritual subfield (4) is the functional of actions. It is characterized by the sensuality of the systems to all the effects that arise in the course of functioning, and also by the ability of the system to increase its readiness for various actions.

- Communicative-informational subfield (3) – the functional of actions. It ensures the orientation of the person in space and time, gathering information about the environment, the presence of resources, and the possibilities of using them for direct life support.

- Subfield of mind (2) – functional. Strengthening the functional of the person is supplemented by results due to the knowledge of the phenomena and experience of all other subfields. It is a well of fundamental knowledge of a person who uses it in his life's practice.

- Subfield of production (1) – the functional of actions – represents a part of the functional and economic background, a set of the experience compressed and repeatedly tested by mankind, received by it and constantly used in practice with unquestionable scientific and experimental results in all directions of human activity, which are aimed at obtaining productive results.

With (1-5) subfields, which are the basis of artificial exchange and are necessary for life cycles and continuation of artificial processes in the country, etc. The equilibrium and stable state of the economic background can be disrupted by the influence of both natural and artificial processes.

Most likely, the basis for determining the magnitude of the economic cycle is the speed of motion along the trajectories, development of the focal points of equilibrium and instability along the spiral, i.e. the development of processes of approximating C1 to a stable equilibrium A and the process of removing C2 from it (Fig. 1.2).

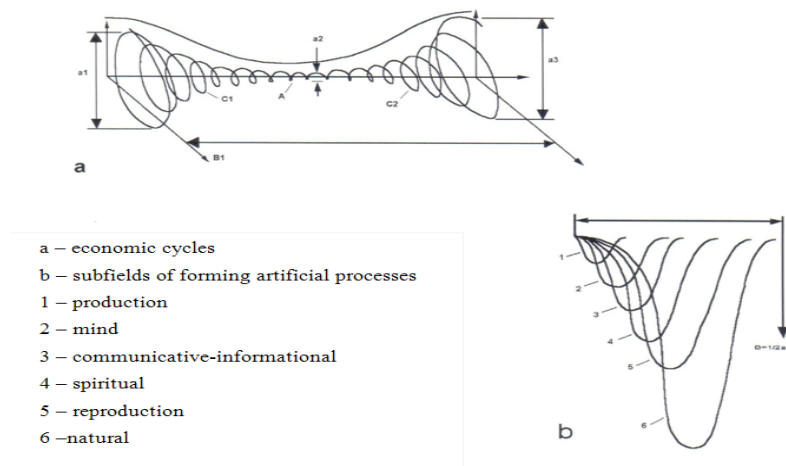


Figure 1.2 – The economic background of the equilibrium and steady state of systems [3]

The economic cycle is regarded as a recurring real increase in production relative to its average value against the background of the contraction of the equilibrium region from its maximum value  $a_1$  for the minimum  $a_2$ , and then increasing again to the maximum value  $a_3$  during the trends of decline in production to a depth  $(a_1 - a_2) \setminus 2$ . Such a continuous cyclical process of recession-recovery is called a crisis arising on the background of interactions of the structure of the system and the parameters of the environment at the allowed rates of development.

If, however, these speeds are reached critical values, causing discontinuities in the integrity of the system and in its cycles, then a catastrophe occurs with the disruption of ties between destruction, elements, and even the living world. Catastrophes and crises are of a local or global nature and are associated with the depth of the instabilities.

If the system of material-energy exchange under appropriate conditions is able to restore equilibrium in the state itself without external assistance, such a system will continue to develop.

In the worst conditions, there are artificial processes that require regulatory actions on the part of a person with the manifestation of his unconscious and conscious actions [9].

The concentration of actions in the economy, as in any combination of the processes of natural and artificial exchange, has two consequences: structured, leading to self-organization of systems, and degrading, causing their destruction. Everything depends on the magnitude of the concentration of elements and causes actions-power stresses and deformations, pressure of ownership, monopoly in production, on the market, in political power, etc.

The choice of harmony between structuring and degrading actions is the main task, both natural selection and forced choice in the areas of economic decision-making.

With natural selection of actions and results, nature has been coping for billions of years. Mankind, considering its small geological history, is still learning to make rational decisions against the background of scientific and practical knowledge of the world. And he succeeded in this, if a person did not leave the natural background of the binding energy of the systems. But as soon as this boundary is broken, the higher levels of the hierarchy of the geosystem include corrective actions, the consequences of which are increasingly experienced by mankind.

The equilibrium and stable state of the economic system can be broken, and can serve development, crisis phenomena under the influence of irrationally made decisions in the field of entrepreneurship, the organization of the market, in the field of technical and social solutions, etc.

For example, inadequate consideration of the physical and moral wear and tear of technical systems during the approbation period can initially cause a boom with an increase in the demand for innovations every 10-15 years or lead to the rejection of these systems with a decrease in their proposals every 3-5 years if the expected built-in effects are not confirmed. On the other hand, there can be a boom and a recovery of the economic cycle curve under the influence of a breakthrough in new high technologies, inventions that have radically changed the structure of production.

The most serious problem arises from the inability of human behaviour in economic cycles. Note that in this situation, a person is formed and characterizes in its economic and economic activities the unity of the five components:

- as an element that is reproduced on the basis of the natural background regularities and these regularities are manifested in its behaviour;
- as a representative of the natural environment, he absorbs its results, and through them perceives the objectivity of natural background factors;
- as a subject, who all creative and spiritual needs, including qualitative and quantitative changes of any product with the help of artificial processes created by it, bases only on natural processes resources;

- as the creator of the results, which are described by the factors of the artificial background.

The testimony, behaviour of the economic person should proceed primarily from the search for and provision of equilibrium and stable systems on the boundaries of the interconnection of artificial economic systems and natural background factors, taking into account the long-term life cycle to mankind, and in the second place-out of their needs.

### **Limits of growth and sustainable development**

In 1972, the well-known book of experts of the Club of Rome Donella and Denis Meadows and Jorgen Rengers “Outside Growth” was published, which gave a theoretical description of the collapse of the economy that has reached the limits of its growth. This book predicts a crisis in the limits of growth of the world economic system for 2015-2020 periods. The authors of the book conducted a computer calculation, in which the cause of the collapse is the depletion of natural non-renewable natural resources. The costs of industrial capital increase to such a level that the colossal expenditure of resources is required for exploitation. When resource prices start to increase and their deposits are depleted, it becomes necessary to use increasing volumes of capital in resource industries, which reduces the share of investments in other industries. Investments are reduced to such an extent that they no longer cover the depreciation of capital, and the crisis of the industrial production base is coming. Over time, other branches of the economy come to the same state. The population begins to decline when the death rate grows due to a lack of products and medicines [5].

All socio-economic and political processes are accelerating (the globalization of the economy, the flow of influence into the hands of TNC management). Humanity continues to deplete the reserves of fossil resources and damage natural ecosystems. At the same time, computer technologies are developing, and informatization of all aspects of life continues. The stratification of the world community into prosperous and impoverished nations is deepening. Similar processes take place within individual countries. Considering all of the above, and considering the analytical materials of the financial crises of recent years, we can conclude that we will not be at the apex of the economic growth curve in 2015-2020, but now we are in 1995-2000. Conclusion: the global systemic (socio-economic) crisis can develop on any day.

The most obvious consequences of the immediate crisis are:

- Deeper de-globalization of the economy of the widened range of its growth (the rapid restoration of the full sub-statehood of states and the strengthening of interstate borders and barriers, that is, the collapse of the world into many closed state systems with varying degrees of self-sufficiency).

- The world market will disappear as a phenomenon, most of the industries oriented to export, and enterprises scattered in different countries will collapse.

- International bodies (UN, World Bank) will disappear from the political arena, the notion of “international law”.

- States renounce obligations for the social protection of citizens, the content of education, science and public health. This will lead to the emergence of authoritarian regimes.

- Inequality of opportunities can cause a surge of armed international conflicts for a new re-division of the world (poisoning of the biosphere by radioactive and chemical substances).

- There is no organized counteraction to the crisis development of the world civilization.

In the “peaceful” development of events, technological decline will lead to an escalation of the processes of anthropogenic climate change, which can stop with the decline of global paper production and, consequently, trade in forests.

The term “sustainable development” was introduced into political circulation by the report of the commission Gro Harlem Brundtland “Our Common Future” in 1987. Sustainable development is, firstly, a development in which anthropogenic impact on the biosphere does not exceed the limit beyond which it begins to degrade. Secondly, it is a development in which a person is preserved and reproduced as a biological species, without exerting a destructive influence on him, for example, drugs, alcohol, chemical toxicants, information noise, etc. And, thirdly, this development, in which there is no destruction of the stabilization mechanisms of civilization (judicial and law enforcement systems, political organizations) [13].

Experts of the Rome Club characterize the current situation as a crisis of civilization, one of the components of which is the ecological crisis. And in order to understand what development is sustainable, it is necessary to study the causes and consequences of crises.

In 1992, the Rio Declaration, Agenda 21, the Convention on Biodiversity and Climate Change, forest principles were adopted in Rio de Janeiro. However, these ideas could not be realized, as indicated by indicators that record progress after the Rio: the increase in the concentration of greenhouse gases in the atmosphere, the continuing processes of desertification, deforestation and depletion of soils, the increase in the level of contamination of the high-level waters and the world’s oceans, the reduction of biodiversity. The political structure of the world as a whole declined.

The World Summit on Sustainable Development Rio + 10 was conceived back in 1994, to take stock of development after the Rio. However, the draft political declaration “Rio + 10” does not contain anything new in comparison with the Rio Declaration and Agenda 21 [11].

The Rio underestimated the inertia of economic development, the reluctance of the third world to abandon the goals dictated by the current level of consumption in developed countries, and internal resistance in developed countries to everything that is associated with a decrease in the rate of growth of material well-being.

To address current global problems, it is necessary for the countries participating in the Summit in Johannesburg to commit themselves in the following priority areas [12]:

1. Spreading the ideas of sustainable development and increasing the effectiveness of education for sustainable development (Developing global and regional education strategies and programs);

2. Creation of models for sustainable production and consumption (increase in energy conservation, restoration of destroyed ecosystems, etc.);

3. Weakening of the economic, social and environmental causes of poverty (internal and external). Strengthening control over factors that increase polarization in the development of civilization;

4. Enhance public participation in addressing sustainable development issues at the international and national levels;

5. Establish an effective and transparent system of environmental management and sustainable development at the national and global levels;

6. Use of financial and economic mechanisms for sustainable development, in particular:

- Ensure the openness of distribution and expenditure of international financial assistance to sustainable development; International organizations need to improve aid delivery; Recipient countries should ensure effective use of international resources and openness for monitoring by various sectors of society;

- Ensure that the environmental factor, based on socio-economic development indicators, is taken into account to determine the strategy for economic development;

- Facilitate further restructuring of the external debt of developing countries with economies in transition, taking into account the obligations of these countries to preserve and restore the environment and implement social programs for sustainable development;

- Develop mechanisms for international compensation for providing ecosystem services to some countries (i.e. for minimized economic use of natural ecosystems of global or regional importance);

7. Accounting for environmental principles in international trade and economic interactions of different countries;



8. To negotiate the mutual obligations of developed and developing countries, as well as countries with economies in transition, with a view to achieving sustainable development in the world (the “global compact”);

9. To develop the concept of sustainable development, identify indicators and mechanisms for maintaining the health of the environment, as a necessary condition for ensuring human health.

For the transition to sustainable development, it is necessary to include the environmental factor in the system of basic socio-economic development indicators. In this regard, the development of criteria and indicators for sustainable development is performed. There are 2 approaches in this area:

- Construction of an integrated indicator on the basis of which one can judge the degree of environmental sustainability of social and economic development;
- Building a system of indicators, each of which reflects individual aspects of sustainable development, with the allocation of economic, social and institutional subsystems of indicators.

There is also an index of “living planet” and an index on nature, as well as indicators proposed in the annual report of the World Bank “World Development Indicators”, etc.

### **Ecological and economic indicators of sustainable development**

For a country to move towards sustainable development that does not destroy nature, it is necessary to move from the modern economic paradigm, which considers the effectiveness of the economy and nature protection as automotive problems, to an integral ecological and economic approach that integrates nature and economy as two interrelated components of the socio-ecosystem. With this approach, any decisions at the macroeconomic level should provide a double effect-economic and environmental.

Ecological and economic approach determines the need to consider economic mechanisms of conservation of wildlife on two levels:

#### **1. Macroeconomic level**

The key tasks are:

- Ecologization of economic restructuring and changes in export-import policies;
- Decrease in the national economy of the share of nature exploiting and resource-extracting industries; increasing the share of production and technological chains, oriented to a high degree of processing of raw materials and the production of the final product;
- Decrease in the share of energy and resource-intensive industries; increase the share of high-tech industries, development of energy and resource-saving technologies; reduction of resource consumption per unit of output;

- Abandoning technologies and industries that damage biodiversity in favour of environmentally friendly production and technology;

- Changes in the structure of exports, a reduction in exports of natural raw materials and products with a low degree of processing, and an increase in exports of high-tech goods.

For the restructuring of the economy, an investment policy is needed that focuses on the priority development of high-tech and environmentally-friendly industries, as well as an increase in the country's investment attractiveness in these areas. Consistent environmental policy, the country's fulfilment of its obligations under international agreements, including the Convention on Biological Diversity, in the modern world is regarded as a factor of increasing investment attractiveness; these are indicators of civilized and legal business (in contrast to environmentally harmful industries).

Formation of environmentally-oriented national accounts, binding the value of biodiversity in the country's macroeconomic indicators (including GDP-gross domestic product, GNP-gross national product) and the system of international mutual settlements.

Ecologically-oriented accounts should provide:

- record of increment and loss of biodiversity, record of changes in the quality of natural objects under the influence of anthropogenic load and natural measures;

- evaluation of environmental parameters of the country's development and the degree of its sustainability in macroeconomic indicators;

- comparison of the effectiveness of the country's development alternatives taking into account the environmental factor;

- orientation of the indicators of the country's economic development on the volumes of used resources and raw materials which should be minimized;

- consideration of environmental and environmental costs in accordance with the recommendations of the UN Statistical Commission;

- calculation of the net domestic product, which is a gross domestic product deducting consumption of fixed capital, including its reduction due to depletion of natural resources and environmental degradation;

- reforming the taxation system (raising taxes for environmentally exploiting resource industries and reducing for high-tech industries;

- reinforcement of depreciation rates for environmentally harmful production and technology; consideration of the impact of technologies on biodiversity;

- introduction of taxes on environmentally hazardous products, taking into account its potential harm to biodiversity;

– increase of payment for use of natural resources, increase of payment for normalized and collated pollution emissions;

– submission of tax incentives to organizations reinvesting profits for the implementation of measures for the conservation and restoration of biodiversity;

– ensuring targeted use of funds from natural resource taxes for environmental purposes).

- Establishment of a national system for the economic valuation of biodiversity as a national asset.

- Development of a system for the economic valuation of genetic resources.

Environmental and economic regulation systems include incentives (taxes and payments for the use of natural resources, tax incentives for environmental protection, etc.) and enforcement (administrative prohibitions, enforcement, fines) mechanisms. The effectiveness and expediency of applying economic incentives or administrative prohibitions depends on the state of the natural environment, the level of anthropogenic load, the characteristics of the economic complex and regional conditions [7].

The main directions of work at the level of special ecological and economic mechanisms are the following:

- Correction of the system of payments and penalties for all-legal or illegal impact on nature;

- Introduction of standards for the environmental management of enterprises, taking into account the requirements of biodiversity conservation;

- Creation of targeted innovation funds for the development of resource-saving agriculture;

- Stimulating the creation of markets for environmentally friendly products, technologies and equipment, disseminating environmental safety requirements for production as one of the main tools of market competition;

- Taking into account the environmental factor, including the requirement of conservation of biodiversity, during privatization;

- Development of an environmental insurance system taking into account the risk to biodiversity;

- Development of environmental certification and licensing systems, taking into account biodiversity indicators;

- Introduction of biodiversity conservation objectives in the system of basic principles of economic organization and economic activities of industries exploiting natural bio systems (forestry, fishing for seafood), creation of an economic system aimed at their sustainable use;

- Support of commodity producers engaged in activities using traditional forms of management, adapted to the specific features of the natural and socio-economic conditions of different regions.

It is also necessary to consider the relationship between environmental and economic indicators and financial support. Indicators of sustainable development should reflect the economic, social and environmental aspects of meeting the needs of the modern generation without limiting the needs of future generations to meet their own needs.

Currently, the environmental and economic analysis difficult areas account social and environmental factors. This is due not only to the underdevelopment, but also to the incompatibility of a number of indicators characterizing the economic, social and environmental effects from the use of natural resources and the implementation of environmental measures.

Transition to sustainable development has been widely discussed by economists. In Robertson's vision, it consists in the transformation of the economic system, taking into account the growing importance of the "human and environmental" factors, which should be based on the desire to create favourable conditions for people's lives and the natural environment. Needs of local consumption will be facilitated by the transfer of the tax burden to rental value and natural resources [3].

Other western economists also point the social nature of rents: R. Andellson, N. Tideman, M. Gaffney, E. Dodson, K. Feder, R. Banks, D. Picard, D. Miller, and M. Hudson. In Russia in this direction it is possible to note the works of G. Titova, T. Roskoshnaya and others. The problem of the correct distribution of rental income is at the heart of many social issues and environmental problems. M. Hoffman recommends that authorities and scientists think about how to better extract revenues from various sources of rent for public needs or equal distribution. He notes that in each case there are technical problems. However, once resources are assessed in free world markets, the price indicators necessary to determine the amount of taxable surplus will appear [4]. Other economists indicate that the greatest difficulties arise when calculating rents when using resources of multi-purpose (land, forest water resources) [8]. The conclusion is drawn on the need for a monetary evaluation of the natural resources for the study of rent movements.

Particularly difficult management task now is the protection of the environment near populated points. Compliance with the regime of necessary restrictions entails the alienation of a part of the population who has found themselves in the protection zone from the habitual

environment and the deterioration of his social status [7]. The reaction of the population to these restrictions, as a rule, is an even more intensive, illegal exploitation of natural resources. It is necessary to search for methods of state regulation of nature management, based on fundamentally new approaches to the protection of natural areas. In this case, an important task is to integrate social, environmental factors in the system of indicators of environmental sustainability. There is a need for indicators of sustainability. The results of adapting the UN methodological approaches to the monetary valuation of natural resources, taking into account social and environmental factors in some regions, have shown that monetary estimates can be used as indicators of capital measurement and the sustainability of the nature use of territories.

Currently, the environmental factor is given little attention in the structures of power at various levels.

Information and methodological basis for obtaining environmental and economic indicators, as well as procedures for calculating indicators of sustainable development based on them and their subsequent use in the decision-making process at different levels can be:

- a) available state statistical information;
- b) departmental information;
- c) methodical developments, both approved and under preparation, to take into account environmental parameters in documents that determine the strategic directions for the development of industries.

Limitations and barriers to the registration of the environmental factor in the system of basic socio-economic indicators of the country's development are largely due to a lack of necessary environmental and economic information. This deficit can be generated both by an objective lack of necessary information and by its closeness due to trade secrets (which is typical for most environmentally exploiting companies and organizations) and state restrictions on access to information of an official nature [4].

Development of indicators of sustainable development is quite complex and expensive procedure, requiring a lot of information, which is difficult or impossible to obtain (for example, for many environmental parameters). Summarizing the existing world experience in this field, two approaches can be distinguished:

- Construction of an integrated, aggregated indicator on the basis of which one can judge the degree of sustainability of social and economic development;
- Building a system of indicators, each of which reflects individual aspects of sustainable development (economic, environmental, social or institutional).

Ecological and economic indicators should meet the following basic criteria:

- the possibility of using at the macro level on a national scale;
- combine environmental and economic aspects;
- understandable and have unambiguous interpretation for decision-makers;
- have a quantitative expression;
- rely on the existing system of national statistics and do not require significant expenditures for the collection of information and calculations;
- representativeness for international comparisons;
- the possibility of evaluation in time dynamics;
- cross-cutting representation by level (federal, regional) and sectors;
- correspond to the current features of decision-making;
- be flexible.

There are proposed 7 priority basic ecological and economic indicators, constructed according to the structure of “problems-indicators” (Tab. 1.2).

Table 1.2

Priority basic ecological and economic indicators, constructed according to the structure of “problems-indicators” [Author’s research]

<b>Problems</b>	<b>Indicators</b>
Consumption of natural resources Structure of the economy Technological level	1. Energy intensity
Accidents and disasters Environmental damage Renewal of fixed capital Technological level	2. Coefficient of fixed assets renewal
Environmental pollution Health of the population Technological level	3. Emissions of pollutants into water per unit of GDP 4. Formation and use of toxic waste
Waste Technological level	5. Formation and use of toxic waste
Conservation of biodiversity	6. Areas of specially protected natural areas
Global climate change (market of greenhouse gas emission quotas)	7. Emissions of greenhouse gases (Hydromet)

Among the statistics that are needed for individual basic environmental and economic indicators, the following should be highlighted, which are not included in official statistical information:

- Greenhouse gas emissions;
- Growth of eroded lands;
- Violation of the balance of organic matter in the kidneys;
- Degree of loss of topsoil;
- Risk index for forest resources;
- Fishing.

A difficult problem is the assessment of the benefits and costs associated with the development and use of environmental and economic indicators. The experience of international organizations and individual countries shows that the development of systems of indicators for sustainable development requires efforts and hundreds of qualified specialists and huge costs.

The twentieth century brought to humanity a lot of benefits associated with the rapid development of scientific and technological progress, and at that time put life on the Earth on the brink of an ecological catastrophe. Population growth, intensification of production and emissions polluting the Earth, lead to radical changes in nature and affect the very existence of man. Some of these changes are extremely strong and so widespread that global environmental problems arise. There are serious problems of pollution (atmosphere, water, soil), acid rain, radiation damage to the territory, as well as loss of certain species of plants and living organisms, impoverishment of bio resources, deforestation and desertification of territories.

Problems arise as a result of such interaction of nature and man, in which the anthropogenic load on the territory (it is determined through the technology related load and population density) exceeds the ecological possibilities of this territory, due mainly to its natural resource potential and the general stability of natural landscapes (complexes, geosystems) to anthropogenic impacts.

Economic and environmental approaches to assessing the results of human activities on the planet are directly opposite: economists evaluate these results in terms of increasing production and consumption growth, in environmental terms in terms of damage to nature and human health. Meanwhile, for an adequate assessment of the degree of human impact on nature, combined environmental and economic indicators should be used.

For many generations of people, progressive social development has been strongly associated with economic growth. But, developing industry mankind inevitably violates the natural balance in the natural environment. This can ultimately lead to self-destruction, because the dependence of mankind on nature does not decrease, but, on the contrary, it increases year by year. But the opposition to the progress of production is just as harmful to the human race:

production and consumption in the sense of human reproduction, their inseparable connection is fixed in the economic categories “productive consumption” and “consumer production”. The way out of this vicious circle may be to revise the strategy of economic growth in favor of a sustainable development strategy and create a new progressive technology [13].

Under the rational organization of nature management (sustainable development of the “society-nature” system), it is necessary to understand the system of activities ensuring the efficient, economic use and production of natural resources (raw materials and energy), as well as the most complete technological scheme for processing waste products, taking into account the interests of the developing economy and conservation Health of people.

The slogan proclaimed by Western experts on the rational organization of nature management by reducing the energy intensity of production is ultimately utopian. Energy saving is impossible in principle, and the savings are at the expense of environmental interests. It remains to be admitted that the ecological economy will never be economically efficient, and it will be necessary to seek new approaches to the rational organization of nature management.

Given all of the above, it becomes clear that the consequences of violations of natural phenomena cross the boundaries of individual states and require international efforts to protect not only individual ecosystems (forests, ponds, marshes, etc.) but the entire biosphere as a whole. All states are concerned about the fate of the biosphere and the existence of mankind, and are trying to create mechanisms for sustainable development.

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## **1.2 EFFICIENCY OF GREENING OF INNOVATIVE ACTIVITY AT THE LEVEL OF ENTERPRISE, COUNTRY, INTERNATIONAL LEVEL**

In conditions when one has to take into account ecological aspects for achievement of economic results while solving the problems of economic development and even has to make them priority, the urgent problem is to evaluate the effectiveness of greening stimulation for innovative development. Evaluation of the effectiveness of the greening of innovation activities at various levels (enterprise, country, international level) is especially important for the formation of its policies. Such information will allow determining the areas of responsibility for its formation and implementation, as well as optimizing investment costs and government costs for the greening of innovation activities. The author makes an attempt to evaluate its effectiveness against the background of analysis of various concepts of greening. For their realization one needs different kinds of innovations, implementation of which is connected with different effectiveness.

**The evolution of concept of greening of innovative activity.** With the evolution of social, personal motivation and motivation of innovative process subjects there are changed concept of greening: 1) the concept of protection from the ecodestructive influence of production and consumption processes and liquidation of its consequences; 2) the concept of ecological improvement of manufacturing technologies; 3) the concept of reduction of material and energy content of production and consumption; 4) the concept of greening of all stages of ecologic-economic innovative cycle.

Each forthcoming concept is realized by innovations of higher level of ecological compatibility. The author proposes to determine it through cumulative influence on environment (both positive and negative), that takes into account the direction and level of each kind of influence on a recipient at every stage of ecologic-economic cycle.

**Concept 1 – the concept for liquidation of consequences of ecodestructive influence of production and consumption processes.** The concept 1 develops together with formation and development of demand for the means of environmental protection from the destructive processes. It presupposes the usage of nature protection means to compensate ecological incompleteness of existing manufacturing technologies and consumer goods. It corresponds to the state (social) interests and is motivated by the necessity to liquidate the consequences of high level of destructive influence on environment, which have already caused ecological catastrophes in a number of regions and even the existence of human civilization. The ecological motivation, on which this concept is based, is quite urgent for population in many countries of the world. However, not everybody agrees (or is able) to pay for ecological innovation that is realized. That is, the percentage of such needs, which move to the category of requests without corresponding stimulation (needs reinforced by purchasing power of consumers), is low. The author considers that they must be stimulated both at the level of separate states and their regions and at the international level mainly economically and legislatively (bringing forward the definite ecological requirements to the candidates of influential international organizations). One should apply the methods of ecologically oriented popularization. While using this concept there are developed treatment facilities, equipment for neutralization and utilization of harmful wastes and emissions.

Ecologic-economic effectiveness of greening stimulation of innovative activity *at the country level and international level* while using the concept 1 is determined via ecologic-economic estimation of results after liquidation of consequences of destructive influence of motivated enterprises on environment. It can be expressed by comparison of differences between economic ratings of losses from enterprises' ecodestructive influence without application of protective means and in case of their usage with expenses on stimulation of enterprises-innovators to implement ecological innovations. Mainly negative methods of stimulation are used.

Ecologic-economic effectiveness of innovative activity greening *at the level of an enterprise-innovator* while using the concept 1 is determined via estimation of the sum of ecological payments, that is avoided by an enterprise in case of greening of innovative activity. It is determined also via ecologic-economic estimation of results after liquidation of consequences of the enterprise's ecodestructive influence that can be expressed by comparison of differences between economic evaluations of losses from ecodestructive influence of enterprise without application of protective facilities and in case of their application with charges on acquisition, exploitation, service, repair of protective means.

Ecologic-economic effectiveness of innovative activity greening in respect to the society, as well as in respect to the enterprise without taking into account the factors of stimulation, firstly grows at rapid rates, then its growth slows down.

Ecodestructive influence of an enterprise and its consequences consist of two parts:

1) one that influences the effectiveness of an enterprise's activity (and efficiency of implementation of ecological innovations) and that should be ecologized by the enterprise;

2) one that does not influence the effectiveness of an enterprise's activity and that is not economically reasonable to ecologize (this part, in turn, is divided into two, one of which should be ecologized if the instruments of outer stimulation are applied to it).

For instance, if the chemical industrial enterprise pollutes air, this contamination spreads and disperses in the environment. In consequence of air pollution by an enterprise the city population suffers from diseases, only a part of population are workers of this enterprise and their children. The enterprise bears expenses on their treatment and as a result of their absence at work it has underproduction or other negative consequences that straight influences the effectiveness of enterprise's activity. Another part of population can decrease the volumes of purchase of enterprise's products because of illness or can indirectly reduce enterprise's effectiveness. It influences the effectiveness of enterprise's activity, and therefore motivates the greening of its activity. The disease of other part of population influences the effectiveness of this enterprise's activity neither straight, nor indirectly.

However the problem with disease of this part of population must be solved by the society. The society must influence this enterprise of chemical industry, inducing it to implementation of ecological innovations. In this case distribution of negative ecologic-economic influence of contamination between an enterprise and society depends on the part of workers and their children in the general amount of city inhabitants, distribution of contamination through the city etc.

Similarly while using imperfect farming technologies by an agrarian enterprise not only cultivated lands are broken (an enterprise has economic sense to renew them) but also adherent territories and biocenosis are violated, a microclimate may also change etc. (to liquidate these ecodestructive consequences of activity is not economically reasonable for an enterprise). The application of concept 1 of greening of innovative activity foresees not improvement of agricultural technology, but revegetation of the broken soils etc. Therefore, while using this concept the consequences of ecodestructive influence are liquidated only partly.

### **Concept 2 – the concept of ecological improvement of production technologies.**

Concept 2 presupposes ecological improvement of production technologies without changing the structure of produced kinds of goods. The main ecological interests, on which this concept is based, are aimed at technological systems that modernize the existing productive-consumer base. This group of ecological interests represents the interests of commodity producers, intensified or even artificially created at the state or regional level, when turning “dirty technologies” into “ecologically pure” there are reduced the rates of ecological fines and payments, expenses on neutralization and utilization of wastes, protective means.

Ecologic-economic effectiveness of stimulation of innovative activity greening *at the country level and international level* while using the concept 2 is determined on the basis of ecologic-economic estimation of results after reduction of destructive influence of the motivated enterprises on the environment, that can be expressed by the comparison of the differences between economic ratings of losses from ecodestructive influence of enterprises without implementation of new technologies and in case of their application with charges on stimulation of enterprises-innovators.. Since the change of technologies in many cases is related to the considerable investments, on which the enterprises do not have enough money, there can be used positive methods of stimulation together with the negative methods.

*At the level of an enterprise-innovator* while using the concept 2 of greening of innovative activity there is compared ecologic-economic effectiveness of production applying different manufacturing technologies and then the best alternative variant is chosen.

If one technology is substituted by another there is determined ecologic-economic effectiveness of its substitution (implementation of the ecological innovation).

If the concept 1 of innovative activity greening is aimed mainly at the reduction of destructive influence on environment via liquidation of its consequences (in fact their particular part), the usage of the concept 2 aims at the liquidation of direct source of ecodestructive influence by the means of technical and technological improvement. In other words it is based not on the liquidation of consequences of econestructive influence, but on its prevention.

Correspondingly, if using the concept 1 of innovative activity greening, the source of ecodestructive influence does not change and ecological innovations are aimed at the liquidation of its consequences (the urgent tasks are solved and as a rule a great part of consequences remains unliquidated). But while using the concept 2 of greening the recipients may not suffer a negative influence of production at all, having the same expenses on greening.

**Concept 3 – the concept of reduction of material and energy content of production and consumption.** The concept is based on the reduction of expenses via economy of material

and energy resources (also using waste-free technologies) in within the bounds of existing life style. I particular, new materials and goods have to reduce energy consumption of human life support system. The harmful materials and goods (the production of which is connected with a considerable ecodestructive influence) must be substituted by others, the production of which is more ecological. This group of interests represents the interests of producers and consumers. They are satisfied by goods, which facilitate the economy of material and energy resources, provide with the reduction of resource capacity of manufacture and consumption. The formation of this group of needs can move at an accelerated pace, when there are suitable conditions. For instance, the energy crisis in 1970s was caused by the policy of Organization of Petroleum-Exporting Countries (OPEC), stipulated the sudden growth of needs of economically developed countries in energy-saving technologies. This may be also caused by the increase of openness rate of national economies, so far as its consequence is aggravation of competitive activity. The winners are those, who ensure more effective satisfaction of consumers' needs selling goods, which are more economical in consumption, provide with better quality of life etc. For example, electrical household appliances with low power inputs provide consumers with cost savings, the consumption of ecologically clean foodstuff reduces expenses on medicine and favours better health.

At the calculation of ecologic-economic effectiveness of stimulation of innovative activity greening *at the country level and international level* while using the concept 3, there are taken into account, except the constituents of ecologic-economic effectiveness of implementation of ecological innovations from the concept 2, the social result of reduction of material and energy content of production and consumption, and also the social results of waste utilization (recirculation) from production and consumption. Negative and positive methods of stimulation are used in order to realize this concept.

Ecologic-economic effectiveness of greening of innovative activity *at the level of an enterprise-innovator* while using the concept 3 is determined via taking into account not only positive ecologic-economic result, characteristic for the realization of greening concept 2 of innovative activity, but also the reduction of enterprises' costs on resource involvement in production and the results of waste utilization (recirculation) of manufacture and consumption.

As we may see, in the view of the society, as well as in the view of an enterprise innovator the usage of the concept 3 differs from the previous greening concept of innovative activity by taking into account the positive results of reduction of material and energy resources used in production and also by the positive results of waste utilization (recirculation) of manufacture and production.

#### **Concept 4 – greening concept of all stages of ecologic-economic innovation cycle.**

The concept is characterized by a production and consumption of goods and services that change a lifestyle, and is based on replacement of ecologically unfavorable goods and services by their more ecological equivalents. A basic task of such replacement is to increase considerably the effectiveness of all stages of ecologic-economic cycle of a product or service. This concept is based on total interests of all subjects of innovative process (from the national interests to consumer's interests), for satisfaction of which it is necessary to increase the specific weight of informational commodities and services in the general volume of consumption and to move to the pattern of consumption, that facilitates the steady development of a society. It began to form up for quite a long while, but only in last decades they started to develop it purposely in order to realize the concept of sustained development. Thus, the needs in natural reserves, works for maintenance of variety of the vegetable and animal world, etc. began to show up several centuries ago. But the needs in ecological education, goods and services that orient an economy on steady development, began to form only at the last stage of social development.

And though nowadays the mankind starts to comprehend its unity with nature, that people could not exist without nature environment, however the needs of this group would grow only under appropriate economic, legal, cultural conditions, i.e. only at a particular stage of social-economic development, when mainly the first three greening concepts of innovative development would be realized and ecological motivation of each personality and subject of innovative process would be actualized. During realization of this concept there are developed and implemented such goods in the market that assist the receipt of positive ecological influence on an environment and receipt of positive ecologic-economic result at each stage of ecologic-economic cycle of innovation (it is partly realized by application of waste recirculation technologies in the previous concept).

During calculation of ecologic-economic effectiveness of stimulation of innovative activity greening *at the country level and international level* while using the concept 4, merely positive results of ecological improvement are taken into account, except the constituents of ecologic-economic effectiveness of implementation of ecological innovations from the previous concepts. Thus, there is taken into consideration ecologic-economic estimation of positive and negative influence on environment of each stage of ecologic-economic innovative cycle – from resource mining to waste utilization. Mainly positive and to some extent negative methods of stimulation are used in order to realize this concept.

While determining ecologic-economic effectiveness of greening of innovative activity *at the level of an enterprise-innovator* using the concept 4, one should take into account the results of ecological improvement, characteristic for realization of this concept of greening.

While realizing concept of greening 4 of innovative activity one should focus on innovations of the highest level of ecological compatibility. As the author considers, the comprehension of *ecological innovation* as ecologically oriented technology that is less harmful for an environment than others [2] has a comparative character and cannot be a guideline for management of greening of innovative activity.

**Results of the calculation of the effectiveness of innovative activity greening.**

The modern condition of social-ecologic-economic development is characterized by the wide usage of the concept 1, less wide usage of the concept 2 and by the beginning of application of the concept 3 by enterprises. At the same time the social ecologic motivation (state and international level in particular) is actualized for perception and, respectively, the stimulation of enterprises for implementation of ecological innovations that correspond to the concept 4.

In previous studies [3] the author calculated the efficiency of greening of innovation activity at the state level and enterprise level.

Ecological motivation of the society, actualized earlier than ecological motivation of an enterprise, naturally has to induce to apply measures that stimulate enterprises, ecological motivation of which is actualized at considerably lower level.

Actualization of next concepts of greening of innovative activity from in the view of an enterprise is possible at state stimulation. Thus, if concept of greening 1 is urgent for an enterprise, the concept 2 can be actualized by the stimulation on the part of the state (society). There is a particular lead of actualization of rational motivation of the society as compared with rational motivation of an enterprise concerning the application of concepts of greening of innovative activity. The level of ecodestruction that actualizes greening of innovative activity in different ways influences the social welfare and results of the enterprise's activity.

Such a lead increases while focusing on each next concept of greening. Fig. 1.3 shows how at a definite level *A* of ecodestructive influence it increases by concepts from the value  $\Delta E_1 = E_{c1} - E_{n1}$  to higher values  $\Delta E_2 = E_{c2} - E_{n2}$ ,  $\Delta E_3 = E_{c3} - E_{n3}$ ,  $\Delta E_4 = E_{c4} - E_{n4}$ .

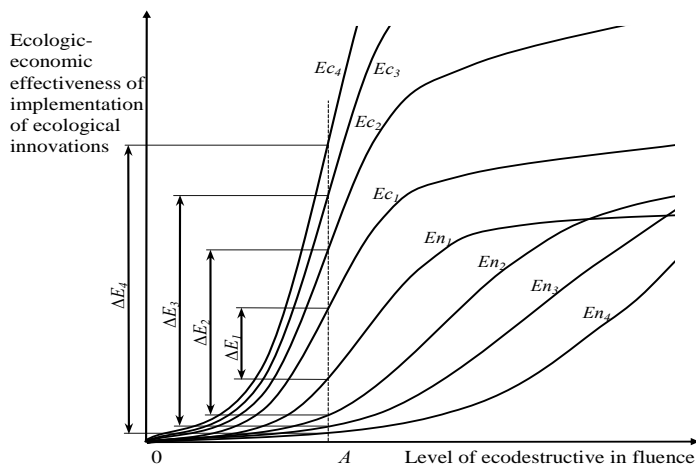


Figure 1.3 – The lead of the ecologic-economic effectiveness of ecological innovative implementation at the country level as compared with ecologic economic effectiveness at the level of an enterprise [Author’s research]

At modern increase of ecodestructive influence the level of development of motivation as to greening of innovative activity at the country level strongly advances the level of development of motivation as to greening of concrete enterprises-innovators. The fact that the usage of each next concept of greening is more reasonable for the society and that enterprises have lesser appropriate rational motivation, points at the growth of the role of external stimulation of greening of enterprises’ innovative activity.

The revealed lead of development of ecological motivation at the country level as compared with the enterprise’s motivation predetermines the necessity and ecologic-economic expediency to stimulate greening of enterprises’ innovative activity in outward.

Also, the obtained results allow us to make assumptions about the higher efficiency of greening of innovation activity at the international level. The author is currently collecting materials for appropriate calculations, although their collection is quite problematic.

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### **1.3 PRACTICAL ASPECTS OF AGRICULTURAL LANDS EVALUATION IN ORDER TO ESTABLISH THE SUSTAINABLE DEVELOPMENT**

Land resources diversity evokes several uncontrollable problems and discussions, which belong to the sustainable development, especially in a context of their usage, disposal, possession, preservation, and reproduction. It is important to implement land reform tasks, which make a development of agricultural, forestry, sanative, reserved, recreational, water territories more actual in order to achieve the sustainable development. That is why a necessity to explore a modern condition of a land resources potential arises, as well as to explore tendencies and perspective directions of land resources regulation, which assist the sustainable development.

A lot of prominent scientists have devoted their work to investigate land resources evaluation, some of them are [Holian, Cherniuk, Zaremba, Koreniuk, Kniaz'kov [1], Herasymchuk, Vahovych, Holian, Oleksiuk [2], Danylyshyn, Hvesyk, Holian [3], Dobriak, Martyn [4, pp. 5-10], Mesel'-Veseliak [5, pp. 3-8], Mishenin, Pizniak [6], Rusnak, Zhebka, Rudyi, Chalyi [7], Sabluk [8, pp. 3-8], Stupen, Bohira [9, pp. 33-36], A. Tretiak, R. Tretiak, Shkvyr [10], Hvesyk [11], Hlobystov [12, pp. 190-192].

Most of the provided researches are based on theoretical grounds of the land rational usage and protection, but a further reform of land property relations and dynamic of social, economic, institutional, and legal conditions of usage, disposal, possession, preservation and reproduction of land resources requires more detailed analysis, complex identification of problems and their solutions, which are oriented to provide a balanced development of the land relations sphere considering interests of all members of the society.

The purpose of this research is to provide an analytical evaluation of agricultural lands in the context of following principles of individual land relations in order to maintain the sustainable development.

Land resources evaluation is one of the stages of the land relations regulation efficiency evaluation. Under this, land resources are the basic section of land relations regulation within the circumstances of the sustainable development. The agricultural lands evaluation allows to highlight a long-distance vector of land relations development and directions of its regulation in the agrarian sector.

Statistical indicators are considered to be the primary sources of our evaluation, they are reflected by the Ukrainian State committee of statistics in annual statistical and branch oriented digests, by State geological cadaster of Ukraine in 6-zem and 2-zem forms of statistical reports, in the “Environment of Ukraine” catalogue. Under this, Ukraine has an area of 60354.8 thousand hectares [13]. The land fund of Ukraine as of January 1, 2016 distributed according to main types of land territories and economic activity consists of agricultural lands (42712.1 thousand hectares), forests and other territories covered by the forest (10624.4 thousand hectares), built up areas (2542.6 thousand hectares), open marshlands (981.6 thousand hectares), open lands without vegetation or with a minor vegetation (1021 thousand hectares), water territories (2422.9 thousand hectares) (Fig. 1.4).

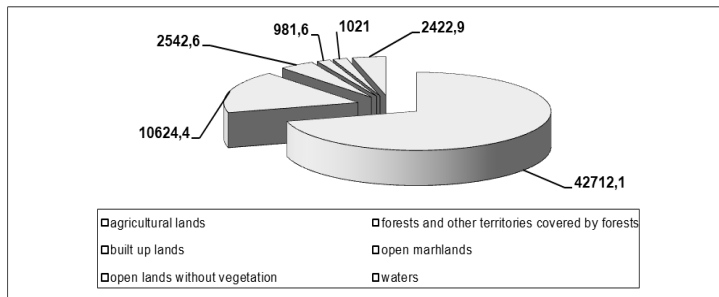


Figure 1.4 – Land resources of Ukraine as to January 1, 2016, thousand hectares [13]

Let us consider the dynamics of change of lands area in different regions of Ukraine, and let us see if particular principles of land relations regulation are respected and to what extent in order to provide the sustainable development for agricultural lands usage, possession, disposal, preservation, and reproduction. Land relations regulation principles represent basics, rules and objective behavioral norms, according to which the land relations are managed considering existing social, economic and ecological factors.

The principle of sufficiency consists a possibility to grant basic needs for tenants in consequence of land resources usage (places to apply a labor, nutrition, recreation, etc.), so the

criteria of evaluation is determined as the availability of lands in a certain category in hectares or percentages comparing to the general land fund.

The principle of accessibility of different stratum of population to use land resources and receive an authentic information about the quality and quantity of lands is reflected by the development of the transporting chain (its length; roads conditions; time required to get to the wanted place, etc.), and it is calculated in kilometers.

The principle of reproduction is actualized via the organizing of lands in the land managing system thanks to the applying of seed rotation on the agricultural lands, liming, gypsum of soils, recultivation of the exhausted lands under the industrial objects, resettlement of the locality landscapes according to the general plans and well-grounded town planning norms, reforestation, meadows reproduction, conservation of less productive and degraded lands, and we can choose a distinctive measure to adhere this principle, which can be represented either by a destimulant factor such as a level of plowed lands, or by a stimulant factor such as a lands recultivation, in hectares or in percentages comparing to the general area of a particular territory (Tab. 1.3).

Table 1.3

Land resources potential according to particular principles of land relations regulation  
[Author's research]

<b>Principle</b>	<b>Criteria of measuring</b>	<b>Measure</b>
Sufficiency	Level of availability	Percentage
Accessibility	Length of high-speed roads	Thousand kilometers
Reproduction	Level of plowed lands	Percentage

First of all, let us analyze dynamics of change of lands area and to what extent particular principles are followed in an economic component of land resources, which includes agricultural lands. Because it is a well-known fact, that the land resources are the most important productive force in the agrarian sphere, thanks to which the whole process of production is executed, and they appear to be the dimensional basis, and object, and instrument of the production.

There was a tendency of agricultural lands area reduction in 2000-2013. It included 43024 thousand hectares in 2000, but lost 311.9 thousand hectares and reduced to 42712.1 thousand hectares in 2013, in particular it lost 189 thousand hectares in 2008 comparing to 2000, and 122.9 thousand hectares in 2013 comparing to 2008 (Fig. 1.5, Tab. 1.4).

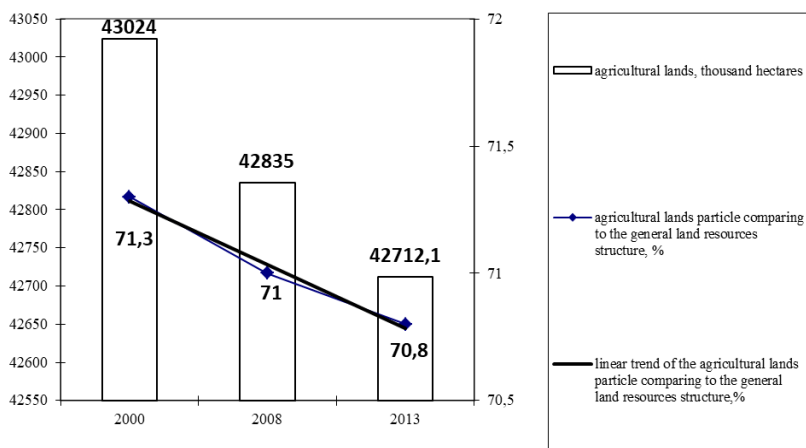


Figure – 1.5 Dynamic of the agricultural lands area and its particle in the general structure of land resources of Ukraine [13]

Table 1.4

Agricultural lands area in 2000, 2008, 2013, thousand hectares [13]

Region, oblast	2000	2008	2013
Autonomous Republic of Crimea	1861.1	1858.4	1853.3
Vinnitsya oblast	2069.6	2066.9	2064.2
Volyn oblast	1092	1084.8	1080.8
Dnipropetrovsk oblast	2582.4	2583.9	2581.8
Donetsk oblast	2099.7	2096.4	2094.5
Zhytomyr oblast	1675.5	1601	1583.1
Zakarpattia oblast	479.7	471.7	469.7
Zaporizhia oblast	2305.8	2305.1	2298.4
Ivano-Frankivsk oblast	650.3	647.3	645.4
Kyiv oblast	1807	1800.5	1793.4
Kirovohrad oblast	2092.7	2089.1	2082.2
Luhansk oblast	1966.7	1958.3	1956
Lviv oblast	1304.2	1296.8	1292
Mykolayiv oblast	2062.7	2058.3	2054.9
Odessa oblast	2660.7	2661.9	2659.4
Poltava oblast	2244.4	2235.3	2224.9
Rivne oblast	973.1	967.6	961.8
Sumy oblast	1750.7	1743.9	1739.1
Ternopil oblast	1080	1077.2	1073.7
Kharkiv oblast	2484.1	2479	2474.1
Herson oblast	2033.5	2033.6	2031.7
Khmelnytskyi oblast	1607	1605	1603.9
Cherkasy oblast	1492.9	1488.1	1486.9
Chernivci oblast	484.4	483.8	482
Chernihiv oblast	2163.8	2141.1	2124.9
Ukraine	43024	42835	42712.1

This is related to the further selling of former agricultural lands, which are based near massive urban agglomerations, to citizens, who change the purpose of the land in many cases. The elemental reforestation still takes place on a large amount of territories, which compels to transfer these lands to the category of forestry lands. Partly it is done due to the purposeful activity of the state in order to provide the reforestation of less productive lands and reproduction of meadows on the drained lands, which lost the ability to provide the agricultural production because of the deformation and dismantling of hydro technical buildings, which served them.

Agricultural grounds hold the biggest particle in the structure of agricultural lands. Its particle remains constant during the analyzed period; however there is even some reduction. Thus, its particle formed 97.2 % as of January 1, 2001 but reduced to 97.15 % as of January 1, 2014 (Tab. 1.5). This is a negative moment, because even more agricultural land resources will remain outside of the production.

Table 1.5

Structure of agricultural lands in 2000, 2008, 2013 [13]

Agricultural lands	Structure of agricultural lands, %								
	2000	2008	+	2008	2013	+	2000	2013	+
Agricultural grounds	97.2	97.16	-0.04	97.16	97.15	-0.01	97.2	97.15	-0.05
Including arable lands	78	78.1	+0.1	78.1	78.32	+0.22	78	78.32	+0.32
pastures	12.98	13.2	+0.22	13.2	13.12	-0.08	12.98	13.12	+0.14
hay lands	5.7	5.8	+0.1	5.8	5.8	-	5.7	5.8	+0.1
perennials	2.23	2.16	-0.07	2.16	2.15	-0.01	2.23	2.15	-0.08
fallows	1.1	0.9	-0.2	0.9	0.6	-0.3	1.1	0.6	-0.5
Other agricultural lands	2.8	2.84	+0.04	2.84	2.85	+0.01	2.8	2.85	+0.05

The particle of arable lands in the structure of agricultural grounds increased by 0.32 % from 78 % in 2001 to 78.32 during the period between January 1, 2001 and January 1, 2014, which indicates a high level of plowed lands, therefore a high probability of wind and water erosions on considerable areas of territories at risk. The particle of pastures and hay lands demonstrates some increase that pleases and reveals a gradual growth of a stockbreeding development potential. A mechanism of fiscal stimulation and credit assistance of a fodder base should be developed on the state level, and this can be done by expansion of pastures and hay lands.

The level of plowed lands forms 53.9 % of all territories of the country as of January 1, 2016, which is the highest indicator in Europe. Thus, this indicator stands at 33.1 % in France and Germany, 25.5 % in Spain, 24.1 % in Netherlands. Comparing to Western and Central Europe countries, which might be acknowledged as the most familiar to countries of the sustainable development, only three regions (Zakarpattia oblast, Ivano-Frankivsk oblast, and Rivne oblast) don't exceed the European level of plowed lands.

Such Ukrainian scientists as V. Dokuchaev and N. Reymers recommended scientifically grounded parameters of the land resources structure: optimal level of plowed lands – 40-45 %, maximum permissible – 60 %. The process of analysis of plowed lands level in regions of Ukraine reveals that 13 of them exceed the maximum permissible level, which exposes an ecological danger in particular an inefficient usage of land and natural resources in these regions (Tab. 1.6).

Consequently, an ecologically unbalanced farming take place, because soil fertility indicators get lower, the condition of the soil of Ukraine is considered to be threatening, which is represented by the spreading of the erosion, flooding and other degrading processes, it is a negative tendency, which reflects the sustainability of land resources development in Ukraine.

Therefore, we can affirm that, considering the sufficiency, which reflects the principle of sufficiency in the theoretical approach of our research, Ukraine holds enough land resources to serve an agricultural purpose in economic structure of land resources, because there are a lot of them in the land fund structure, there is a big particle of fertile black soils (approximately 25 % of worlds reserve), the level of plowed lands is high, and these lands appear to be the main remedy of the production in the agricultural household and they are involved into the economy, granting a valid deposit to the GDP of the country.

According to the accessibility criterion, which reflects the condition of the transport chain in the economic structure of land resources, it is possible to affirm that in general the transport chain of Ukraine in these days satisfies only basic needs of the economy and population in transportations. The level of security, quality and efficiency indicators of passengers and cargo transportations, energy efficiency, industrial impact on the environment do not comply with the modern requirements. There is retardation in the transport chain development, first of all this refers to roads of a general usage, comparing to the pace of the country motorization.

Their length has not been changed during the last twenty years, at the same time highways have been built in Europe at a fast pace. Consequently, the density of roads in Ukraine is 5.9 times less comparing to France (0.28 and 1.65 kilometers accordingly to 1 square kilometer of the state area). The length of highways in Ukraine reaches 0.28 thousand kilometers, in Germany – 10.9 thousand kilometers, in France – 7.1 thousand kilometers, and the level of funding of one kilometer of roads in Ukraine is 5.5 – 6 times less accordingly comparing to mentioned countries.

Table 1.6

Plowed lands level of the Ukrainian land fund in administrative territories  
as of January 1, 2016 [13]

Region, oblast	General area, thousand hectares	Plow lands particle, %, comparing to the general area	
		all lands	agricultural lands
Autonomous Republic of Crimea	2608.1	48.8	68.6
Vinnitsia oblast	2649.2	65.1	83.6
Volyn oblast	2014.4	33.4	62.3
Dnipropetrovsk oblast	3192.3	66.6	82.4
Donetsk oblast	2651.7	62.3	78.9
Zhytomyr oblast	2982.7	37.3	70.2
Zakarpattia oblast	1275.3	15.7	42.6
Zaporizhia oblast	2718.3	70.0	82.8
Ivano-Frankivsk oblast	1392.7	28.4	61.4
Kyiv oblast	2812.1	48.2	75.6
Kirovohrad oblast	2458.8	71.8	84.8
Luhansk oblast	2668.3	47.9	65.3
Lviv oblast	2183.1	36.4	61.5
Mykolayiv oblast	2458.5	69.1	82.7
Odessa oblast	3331.4	62.3	78.0
Poltava oblast	2875.0	61.7	79.7
Rivne oblast	2005.1	32.8	68.5
Sumy oblast	2383.2	51.5	70.5
Ternopil oblast	1382.4	61.9	79.8
Kharkiv oblast	3141.8	61.5	78.1
Herson oblast	2846.1	62.5	87.5
Khmelnyskyi oblast	2062.9	60.7	78.1
Cherkasy oblast	2091.6	60.8	85.5
Chernivci oblast	809.6	40.9	68.7
Chernihiv oblast	3190.3	44.4	66.7
Ukraine	60354.9	53.9	76.1

There are a lot of objective reasons to explain this, in particular such as a big burden of the transporting chain maintenance per capita comparing to European countries, because of a relatively low density of a population (78 man to 1 square kilometer), low purchasing power of citizens (1/5 of Eurozone purchasing power), comparatively low automobile park, and considerable state territory [14].

Speaking of accessibility criteria of agricultural lands, it is worth noticing that nowadays the processes of massive privatization of land particles (shares) caused a granulation of land massifs, which led to a necessity of project decisions execution as to the transport infrastructure development toward separate privatized land territories, which were individually exploited, but this does not always satisfy tenants of neighboring lands, that is why it is important to establish a possibility of land exchange in this case to improve the communication and eliminate gaps (so called chess structure) in the integrity of bulky areas cultivated by tenants. Besides that, the condition of existing roads requires improvements, and the length of roads – its optimization.

Let us consider the land resources evaluation according to the criteria of reproduction, which is going to reflect the level to which the principle of reproduction is respected in land relations regulation together with the accessibility, the highways existence, and comparing to the foreign experience. This factor calls a problem of an environmental protection and economic balance natural preservation for agricultural land resources, because of a considerable level of plowed territories – 54 %, failure to follow the crop rotations to the sufficient degree (humus reduction in the soil), highly slight area of agricultural lands recultivation.

Let us combine all of the comparative indicators (Tab. 1.7) that take place in foreign countries, which might be considered as the most familiar to countries of the sustainable development, generalizing results of land resources evaluation in order to achieve the sustainable development.

The analysis of the Tab. 1.7 demonstrates that agricultural resources lands evaluation is characterized by a high level of the sufficiency and economic usage. That is why the resource saving and resource retaining technologies should be applied to the economic activity on these lands. The highways length, which reflects the accessibility principle has an extremely low indicator in the structure of agricultural lands, that is why the infrastructure should be developed by at least one rank to 3 %, mainly thanks to the less productive and unproductive agricultural lands. It is important to alter indicators, which reflect the sustainability norms in developed foreign countries to the admitted level in order to follow the



principle of reproduction in this component of land resources, for example to reduce the level of plowed lands to 30 %.

Table 1.7

Comparative evaluation of agricultural lands in Ukraine and foreign countries according to particular principles of land relations regulation in order to achieve the sustainable development as of January 1, 2016 p. [Compiled by the author: according to 15]

Principles Land category	Sufficiency, %		Accessibility, thousand kilometers		Reproduction, %	
	Ukraine	Developed countries	Ukraine	Developed countries	Ukraine	Developed countries
Agricultural lands	69,9	≤ 50	0,28	7-10	54	25-30

The structure of agricultural lands still does not satisfy sustainability norms of developed foreign countries considering the sustainable development of these lands and despite of some positive dynamics, a better state ecological and economic regulation is required, which would reflect the normalization of the land resources structure and perfect regulation of land relations, which satisfies modern requirements.

That is why it is important for the sustainable development of land resources of Ukraine to improve a land registration system and methods of their ecological and economic evaluation; to provide a land inventory; to elaborate soil fertility increase programs; to provide a rational system of land usage and organizing; to implement soil preservation technologies in different branches; to develop a procedure of a land impart; to improve remedies of contaminated and broken lands recultivation; to optimize the areas of natural and anthropogenic lands; to improve lands ecological monitoring and agrochemical passports emitting; to eliminate and prevent negative anthropogenic and natural remedies and processes as to land degrading; to control and improve radioactively contaminated lands; to minimize the usage of especially valuable lands and soils.

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**2.1 MODERN IMPERATIVES OF THE DEVELOPMENT OF THE INTEGRATION  
OF UKRAINE'S FOREIGN ECONOMIC POLICY IN THE MODERN WORLD  
ECONOMIC SPACE**

The development of Ukraine's integration policy largely depends on the development of integration processes in the context of the globalization of the world economy and the domination of open economic systems. As one of the members of the world community, Ukraine cannot be separated from the transformation of the integration processes, which have happened recently. Historical relations of cooperation, which connect Ukraine with the post-Soviet countries, in particular, Russia, are undergoing serious changes caused by the socio-political situation of our country over the last two years.

Integration processes are an important part of the country's foreign policy in the global system of international trade. Foreign trade is under the influence of various factors, one of which is export, which determines the strategic direction of international economic integration. As stated in the Concept of the establishment of a system of state support for the export of Ukraine, "an important part of the successful integration of Ukraine into the world economic space is the creation of a system of state support for export and favorable conditions for domestic manufactures of competitive products in the foreign market" [1].

Over the past few years, Ukraine has been engaged in the foreign trade activities with many countries around the world, in particular with the CIS, EU, Asia-Pacific region, African region, Middle East, North and Latin America. But at the end of 2014 – early 2016 Ukraine's foreign trade has developed under difficult political conditions that have clearly demonstrated a number of problems that exist in the field of domestic trade and economic activity. The problem of the imbalance of Ukraine's exports, where is products with a low degree of processing prevail, requires the state to introduce new approaches to create a national export policy aimed at diversifying export and increasing its structure of goods with high added value and the choice of external trade and economic vector of integration in the system of international trade. This is especially true in the agroindustrial field, as the agrarian sector is a significant part of the Ukrainian economy.

This is also confirmed at the legislative level. Thus, according to the Strategy for Sustainable Development "Ukraine-2020" [2], development of the domestic agricultural sector of the economy and the sphere of processing of agricultural raw materials are foreseen in order to

increase its export volumes. The share of the AIC processing sector in the total export volume tends to increase (Fig. 2.1) [3].

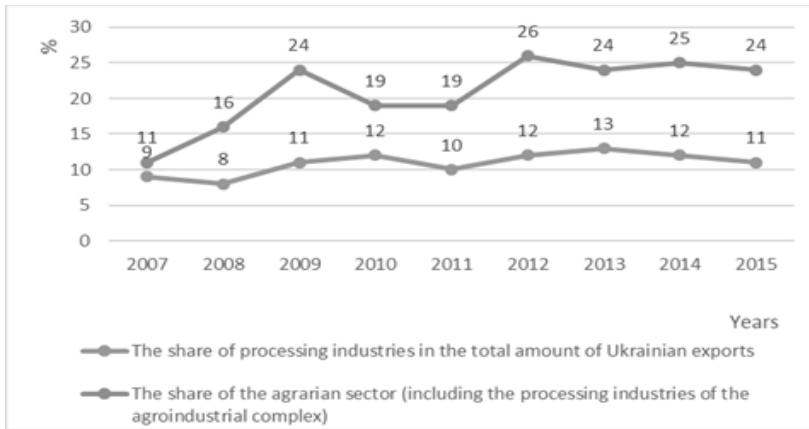


Figure 2.1 – The share of production of the agroindustrial complex in the total volume of Ukraine’s export [4]

At the same time, the gross value added associated with the production of agricultural raw materials, although decreasing, but forming at least 10 % (2014: – 12.1 %, 2015 – 11.2 %) and this is one of the largest indicators in the structure of domestic GDP. But in spite of this, in the area of agricultural production, the lowest indicators of gross value added are observed, namely approximately one percent in the structure of GDP, which indicates the significant export potential of our country, which needs to be developed for the output of agricultural products on international trading markets.

Consequently, the development and activation of the vector of integration of foreign economic policy of Ukraine into the global system of international trade is possible only through the formation of a strong economic interest of Ukraine's foreign trade partners. The convergence of political and economic interests of Ukraine should be based on the opportunities of the domestic agricultural sector and the production of goods of processing of rural raw materials which have guaranteed consumers. That is, the strategic synthesis of the foreign trade configuration of Ukraine and other countries should appeal to the fact that Ukraine has an autonomous agricultural and raw material base of AIC.

Promotion of products to the world trading markets of agricultural products involves reforming the system of state support for agricultural production and attracting financial flows to this field. Thus, according to the Tax Code of Ukraine value added tax on exports of

agricultural products would be reimbursed that will stimulate the development of agricultural production and its access to international trade markets, and will promote the attraction of investments of international financial institutions and states – Ukraine’s strategic partners for realization projects in the agroindustrial complex, promotion of domestic producers of agricultural products and food products to foreign markets. Also, the commodity structure of export has to be optimized in order to increase the share of products with high added value, in particular, the processing sub-sector of AIC.

Thus, integration processes should primarily focus on the export potential of Ukraine [5]. Integration of our country into the economic world space on the basis of the formation of a system of state export support will promote the development of export-oriented domestic industries and increase the level of quality and competitiveness of Ukrainian products.

Other pressing issues which prevent Ukraine to realize the full export potential are the low commodity and geographical diversification of Ukrainian export, unfavorable conditions for export credit and high risks of loss of resources during export operations, low competitiveness of domestic products, insufficient level of investment in modernization and creation of export-oriented productions and the absence of effective system of state support for exporters etc [6].

According to sustainable development strategy “Ukraine-2020” and other recent legislative acts, in particular [7; 2; 8] provides for the conduct of Ukraine's foreign trade policy, in particular:

1) The negotiation on Ukraine's accession to the WTO Agreement on Government Procurement.

2) The implementation of internal procedures for ratification of the WTO Agreement on Trade Facilitation.

3) The negotiations on improving access to the markets for goods and services most active in gaining WTO membership on terms that are in line with the economic interests of Ukraine.

4) Further strengthening Ukraine’s institutional capacity for notifications in order to ensure compliance with Ukraine's WTO transparency principle and relevant provisions of the EU-Ukraine Agreement on Transparency in the Field of Technical Barriers in Trade and Other Measures [9].

Thus, the measures of the strategic policy of sustainable development of Ukraine have clear intentions regarding international integration with the WTO member states. The necessity to solve these problems requires the usage of effective measures to create a system of state policy of foreign economic activity concerning international integration, based on effective interaction

between state authorities and business environment, as well as optimal usage of modern mechanism and tools for stimulating export activities in order to integrate effectively into the global system of international trade.

In order to participate in the structure of international trade, let's consider the geographical diversification of the export and import component of the domestic economy. We will analyze the annual changes in volumes of the export-import component of Ukraine during the period 1995-2015 (fig. 2.2). Analysis of the rates of export and import of Ukraine over the past decade shows that these changes generally have a cyclical nature of growth and decrease in volumes with upward trend.



Figure 2.2 – Growth rates of export and import of Ukraine for the period 1995-2015  
[Authors' research]

At the end of 2008 – early 2009, there has been a sharp drop in the volumes of these indicators, which can be explained by the global economic crisis at the same time. In 2010, the pace of domestic export and import into the country was restored to the previous level and a slight increase of these values was continued, practically entering the position of the beginning of 2008. Starting from 2011, the rates of export and import tended to decrease, showing the corresponding section on the Fig. 2.2. Unfortunately, according to official statistics, only during the last year domestic export decreased by 30 %, and its difference was – 15.759 million dollars in 2014 compared with 2013 and -30.1488 million dollar in 2015 compared to 2014 [4].

Imports decreased by about 32 % over the past year, but its rates also dropped from – 29.246 million dollars in 2014 to 33.154 million dollars in 2015 compared to the corresponding

previous years [10], which can partly be explained by the difficult socio-political situation in our country in recent times, as well as the change of the domestic course concerning trade partnership.

In order to determine the integration of Ukraine’s foreign economic policy into the global system of international trade, consider the main trading partners of Ukraine in relation to domestic export during the last five years.

The analysis of our country's export partners over the past five years has shown that the main countries that receive Ukrainian export are countries such as Russia, Turkey, China, Egypt, Poland, Italy, India and Belarus. Kazakhstan dropped out of the top ten domestic export leaders in 2015, although all previous years from the investigated period was the past of it. Russia traditionally dominates in the volumes of export from Ukraine, although its volumes decreased steadily, starting from 2012 (19819713.34 thousand dollars), and compared with it has been cut in more than half in 2015 (9799143.633 thousand dollars).

Let us compare the position of Ukraine with regard to the export component with the countries with which it has the largest trade relations. Consider the volumes of export of goods and services of major trading partners of Ukraine on the basis of retrospective data for the period 1995-2015 (Fig. 2.3) [4].

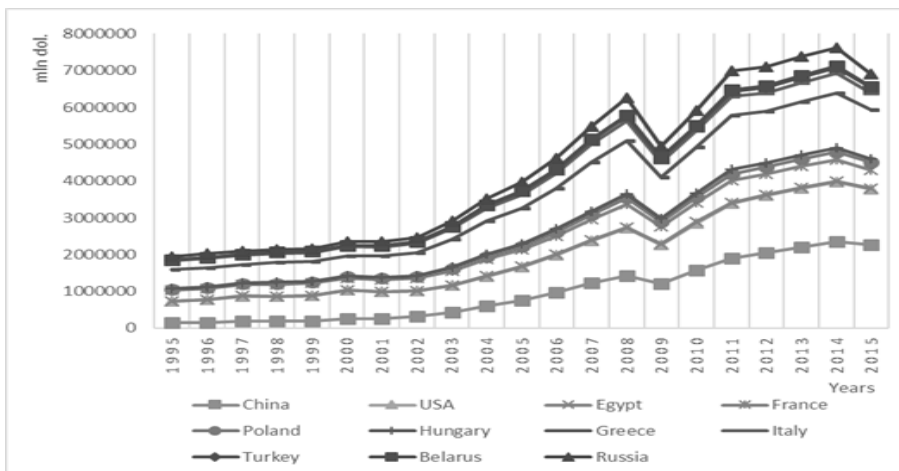


Figure 2.3 – Total export of major trading partners of Ukraine for the period 1995-2015 [4]

In general, the analysis showed a general rising trend of export volumes of these countries, which is inherent in Ukraine for the corresponding period. The exception was 2009,

in which all countries received less export goods and services, partly due to the global economic crisis, which began in 2008. Nevertheless, starting from 2014, the growing trend is shrinking towards the declining trend, which is common for all studied countries over the past two years. In this case, Ukraine did not become an exception. In 2014-2015 the largest decline in export volumes is observed in Russia (\$ 49.764 billion in 2014 to \$ 340.349 million in 2015), which was about 30 % of total export volumes over the last year. In Belarus, there is also a drop in export to 35 % in 2015 (\$ 36080.5 million in 2014 to \$ 26676.1 million in 2015). Thus, it is possible to conclude that the trends regarding the situation with Ukraine's exports coincide with the tendency of changes in its main trading partners. In addition, the socio-political situation related to the conduct of hostilities in the east of the country deepens the deterioration of the export component of the modern economic situation of our country.

The analysis of Ukraine's trading partners for import over the last five years shows that Russia, China, Germany, Belorussia, Poland, the USA are the main countries which export to our country (Fig. 2.4) [10]. Imports have been decreasing over the last three years with all these countries, but significant reductions, especially over the last year, have been observed with Russia (from \$ 23.243994 million in 2014 to \$ 12678.683 million in 2015), which indicates a two-fold decrease in Ukraine's purchases of products in Russia.

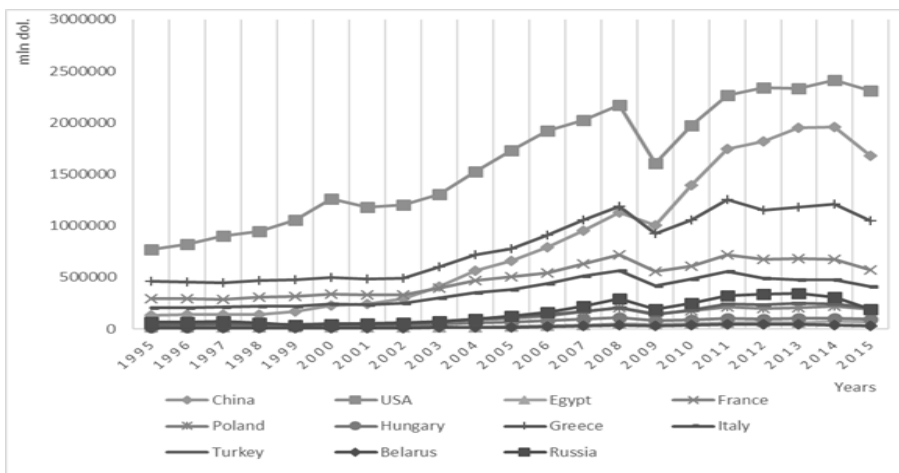


Figure 2.4 – Volume of import of main trading partners of Ukraine for the period 1995-2015

[Authors' research]



Let's compare import volumes of the main trading partners of Ukraine in the international trade system on the basis of statistics over the last five years [11; 4]. The analysis of import volumes of the studied countries during the period 1995-2015 shows that the overall dynamics of their growth excluding the period of the global economic crisis of the end of 2008 – early 2009. The same trend is also observed in Ukraine. However, as with the export, there has been a decrease in import volumes over the last two years, especially in terms of China, the USA, Russia and Egypt, to little bit less – in France and Italy. The revealed trend also coincides with the dynamics of import (as in the case of export) component of the domestic economy, which facilitates the prospects for the integration of Ukraine in the system of international trade.

To analyze the development of integration processes, which take place in Ukraine, we should determine the differences between the integrational associations of the world according to a system of indicators that influence on trade and economic relations in the world economic space. It is advisable to solve such a problem using discriminatory analysis. The main purpose of such analysis is to find a linear combination of discriminant variables that optimally separates the considered groups. However, the preliminary classification should be carried out by cluster analysis using the Ward method.

All integration associations registered with the WTO and Ukraine were considered for the study. Thus, 51 international integration associations (according to the classification of UNCTAD) and Ukraine were studied. UNCTAD is the United Nations Trade and Development Conference, established in 1964 as a permanent intergovernmental body, and is the key body for the General Assembly on trade and development issues [12].

To determine the position of Ukraine in relation to integration associations in the global system of international trade, the following system of indicators was proposed, which is based on the structure of statistics of the official information resource UNCTADstat [13]: export within the association; total export of the association; import within the association; total import of the association; foreign direct investment: internal and external flows and reserves (annual); Gross Domestic Product (GDP); total volume of trade (annual); balance of payments, cash flows of current operations (annual); the growth rate of trade (annual).

In this consideration, each integration association acts as an object, which is characterized by the certain values of the 9 indicators listed. Accordingly, they can be represented as points in a 9-dimensional space. Such a space is usually called the space of properties of investigated objects (integration associations). Comparison of the distance between these points will reflect

the degree of proximity of the considered associations, their similarity to each other. The socio-economic content of this understanding of similarity means that integration associations are considered to be more similar, the smaller the differences between the same indicators with which they are described.

Data for cluster analysis are used from statistical collections and official internet resources [12; 13; 14].

According to these characteristics, the homogeneity of the countries in their aggregate by the Ward method using the Statgraphics Centurion statistical package is established. Fig. 2.5 shows a dendrogram of groups of investigated integration associations and Ukraine, obtained using the Ward cluster analysis procedure [15].

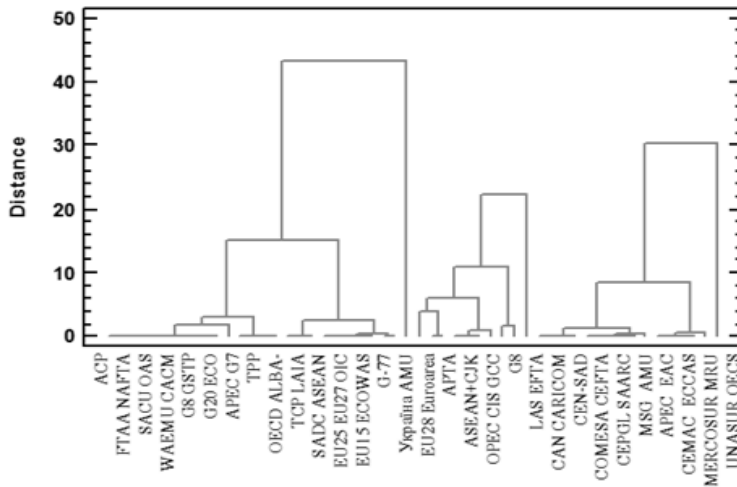


Figure 2.5 – Dendrogram of integration associations and Ukraine in the global system of international trade [Authors’ research]

The visual analysis of the obtained dendrogram demonstrates that the proposed system of traits should consider three clusters of groups of integration associations in the global system of international trade.

Tab. 2.1 contains the structure of each cluster, which includes the investigated international integration associations. The first cluster includes 25 integration associations, so it is the most numerous. The second group contains 10 integration associations. The third cluster has 16. Ukraine joined the first group together with the African, Caribbean and Pacific countries, ALBA, APEC, ASEAN, Central Asian Common Market, West African Economic and Monetary

Union, Arab Cooperation Councils of the Persian Gulf, the NAFTA association, the Organization for Economic Co-operation, etc.

Table 2.1

The composition of clusters of homogeneous integration associations and Ukraine in the global system of international trade [developed by the authors on calculations of cluster analysis]

Rating number	Abbreviated name of the association	Integration association	Cluster	Abbreviated name of the association	Rating number	Integration association	Cluster
1	2	3	4	5	6	7	8
1	ACP	Africa, the Caribbean and the Pacific countries (ACP countries)	1	FTAA	27	Free Trade Zone of North and South America	1
2	ALBA-TCP	AJIBA (Bolivarian alliance for the peoples of our America)	1	G20	28	Group 20	1
3	AMU	the Arab Maghreb Union	2	G7	29	Group 7	1
4	APEC	the Asia-Pacific Economic Cooperation (APEC)	1	G-77	30	Group 77	1
5	APTA	Asia-Pacific Trade Agreement (APTA)	2	G8	31	Group 8	2
6	ASEAN	Association of Southeast Asian Nations (ASEAN)	1	GCC	32	Cooperation Council for the Arab States of the Gulf	1
7	ASEAN+ CJK	ASEAN + China, Japan, Republic of Korea	2	GSTP	33	The Global System of Trade Preferences among Developing Countries	3
8	CACM	The Central American Common Market	1	IGAD	34	Intergovernmental Authority on Development	1
9	CAN	Andean Community of Nations	3	LAIA	35	The Latin American Integration Association	2
10	CARICOM	The Caribbean Community	3	LAS	36	The Arab League	3
11	CEFTA	Central European Free Trade Agreement	3	MERCOSUR	37	MERCOSUR	3

Table 2.1 continuation

1	2	3	4	5	6	7	8
12	CEMAC	Central African Economic and Monetary Community	3	MRU	38	Mano River Union	3
13	CEN-SAD	The Community of Sahel-Saharan States	3	MSG	39	Preliminary group of Melanesian states	1
14	CEPGL	The Economic Community of the Great Lakes Countries	3	NAFTA	40	NAFTA	1
15	CIS	CIS	2	OAS	41	Organization of American States	1
16	COMESA	Common Market for Eastern and Southern Africa	3	OECD	42	Organization for Economic Co-operation and Development	3
17	EAC	The East African Community	3	OECS	43	Organization of Eastern Caribbean States	1
18	ECCAS	Economic Community of Central African States	3	OIC	44	Organization of the Islamic Cooperation	2
19	ECO	Economic Cooperation Organization	1	OPEC	45	OPEC	3
20	ECOWAS	The Economic Community of West African States (ECOWAS)	1	SAARC	46	The South Asian Association for Regional Cooperation	1
21	EFTA	European Free Trade Association	2	SACU	47	Southern African Customs Union	1
22	EU15	European Union of 15 countries	2	SADC	48	Southern African Development Community	1
23	EU25	European Union of 25 countries	1	TPP	49	Trans-Pacific Partnership	3
24	EU27	European Union of 27 countries	1	UNASUR	50	Union of South American Nations	1
25	EU28	European Union	2	WAEMU	51	The West African Economic and Monetary Union	1
26	Euroarea	Euroarea	2		52	Ukraine	1

For a detailed examination of the state of integration processes in each of the three clusters, we define the average values of 9 indicators that are identified by the UNCTADstad, which is a sign of the trade-economic state of the investigated integration associations and Ukraine, namely:  $x_1$  – export within the association (million dollars);  $x_2$  – total export of the association (million dollars);  $x_3$  – import within the association (million dollars);  $x_4$  – total import of the association (million dollars);  $x_5$  – FDI: internal and external flows and reserves, annual (million dollars);  $x_6$  – GDP (million dollars);  $x_7$  – total trade, annual (million dollars);  $x_8$  – balance of payments, current operations accounts, annual (million dollars);  $x_9$  – growth rate of trade, annual (%).

For a detailed examination of the state of integration processes in each of the three prevailing clusters, we will perform a discriminant analysis. The discriminant means the analysis, which allows to learn the differences between two or more groups of objects in several variables (indicators) simultaneously [16]. Let us determine the statistical characteristics of 9 used indicators with the Statgraphics Centurion software static package.

In Tab. 2.2 the average and general average indicators characterizing the position of each integration association in the structure of the global system of international trade in 2015 are given.

Table 2.2

Average values of clusters of integration associations and their total average

[Authors' calculations according to discriminant analysis]

Feature	Cluster 1	Cluster 2	Cluster 3	Total average
$x_1$	1801300.00	846862.00	15188.80	1068180.00
$x_2$	3486070.00	2413940.00	132182.00	2247920.00
$x_3$	1776260.00	829445.00	15459.20	1052400.00
$x_4$	3634450.00	2125670.00	154609.00	2273580.00
$x_5$	216847.00	101808.00	24861.40	135652.00
$x_6$	16903300,00	7660430.00	881094.00	10195900.00
$x_7$	3063550.00	2058180.00	100857.00	1958610.00
$x_8$	-66997.20	142632.00	-20378.40	-12339.70
$x_9$	1440.92	-22.57	-19.77	710.04

It should be mentioned that the average values of the indicators have rather significant differences in the same cluster of homogeneous groups of integration associations, indicating a

significant heterogeneity of the investigated international associations. But the analysis of the average values of indicators for each cluster does not give an unambiguous assessment of the level of trade and economic status of integration associations of each individual cluster, which indicates the necessity for additional research of causal relationships between the indicators that affect the development of trade-economic relations [17].

In Tab. 2.3 the square deviations in each group of integration associations based on the system of determined indicators are displayed. These values allow us to estimate the spread of values of indicators for each cluster and provide an opportunity to determine the differences between the average values of indicators for the analysis of trade and economic development of the corresponding international associations in each group.

Table 2.3

Mean square deviations of the values of indicators by clusters of integration associations

[Compiled by the authors on the results of discriminant analysis]

Feature	Cluster 1	Cluster 2	Cluster 3
1	2	3	4
$x_1$	2190870.00	1306420,00	28872,30
$x_2$	3460580.00	2165130,00	180491,00
$x_3$	2221850.00	1217990,00	29366,90
$x_4$	3563960.00	2165460.00	199292.00
$x_5$	202346.00	102125.00	33193.70
$x_6$	17293300.00	7467120.00	1360810.00
$x_7$	3097530.00	2023750.00	141660.00
$x_8$	206562.00	149814.00	26863.10
$x_9$	7427.91	13.61	12.48

The economic interpretation of the mean square deviations of the studied clusters is explained by the “crowding” of the third group associations and the rather large “spread” of the values of the indicators of the integration clusters of the first cluster.

Analyzing the obtained clusters, it is possible to conclude that the majority of integration associations differ in the main indicators of trade and economic status, which testifies to the uneven development of external integration in different regions of the world. According to established signs of trade and economic development by the end of 2016 – beginning of 2017 Ukraine is a part of the first cluster of homogeneous groups of integration associations of the world. Thus, the conducted analysis enables to obtain an objective structure of international integration and to determine the current situation of Ukraine in the world’s integration space.

Consequently, clusters of homogeneous groups of integration associations based on the criterion of their trade and economic development are set, which are characterized by 9 elemental features, which are indications that are reflected in official statistical documents. The levels of the proposed indicators are the analytical basis for the clustering of international integration associations and foreshadow further economic analysis to strengthen the revitalization of the integration foreign economic policy and determine the strategic prospects for the development of Ukraine's integration processes in the global system of international trade. Further detailed analysis of the indicators provides an opportunity to carry out an in-depth assessment of each indicator of trade and economic development.

To analyze the differences in the development of integration associations, it is necessary to identify discriminatory functions that are useful for identifying the differentiation of development and the impact of the international system on the formation of the corresponding cluster obtained in accordance with the performed cluster analysis, and tactics for obtaining stable interrelations of indicators, which determine the relevant processes. By the calculated values of the classification, functions (informants) we determine which class most likely to refer to this or that object (integration association).

In order to determine the main directions of international integration development, discriminant functions in standardized variables should be analyzed. Thus, according to the made calculations two discriminant functions with standardized variables were included to the model of differences in the level of development of integration processes. With the help of the algorithm for this method's calculating, they are ordered by the values of generalized eigenvalues. This sequence coincides with its own numbers as a percentage of their total. With the rise of correlation relations to the square, it is possible to obtain determination indices, which also confirm the importance of discriminant functions. The statistics of the Wilks criterion show the relative contribution of the obstacle to the overall variability taking into account all functions and with the sequential exclusion of each subsequent [18; 19]. Using the Pearson criterion, the significance of Wilks statistic is estimated.

So, the differential equation for the development of integration processes in 2016 has the form of the first discriminant function in the standardized variables:

$$f(x) = 8,67098 x_1 + 6,36273 x_2 - 9,60139 x_3 - 21,273 x_4 + 1,50212 x_5 + \\ + 5,68611 x_6 + 11,567 x_7 + 0,450606 x_8 - 0,167332 x_9 \quad (2.1)$$

The first discriminatory function explains 95 % of the differences in the distribution of integration associations into clusters according to their criteria of development in the global system of international trade, and therefore it is significant.

The calculated discriminant function allows us to determine the impact rating of economic development indicators on the differentiation of integration associations. Weights for each variable in (2.1) were separated as follows:

$$x_4 > x_7 > x_3 > x_1 > x_2 > x_6 > x_5 > x_8 > x_9 \quad (2.2)$$

The analysis of important coefficients for variables in the estimated function (2.2) allows us to conclude that the differences in the development of integration in the world are in the following ranking of elements of international trade: the total import of the association ( $x_4$ ); total trade (annual) ( $x_7$ ); import within association ( $x_3$ ); export within the association ( $x_1$ ); total export of the association ( $x_2$ ); GDP ( $x_6$ ); Foreign direct investment: internal and external flows and reserves (annual) ( $x_5$ ); balance of payments, current account operations (annual) ( $x_8$ ); Growth rates (annual) ( $x_9$ ).

Consequently, the use of discriminatory analysis methods allowed selecting the most informative coefficients of the received functional dependence on the differentiation of modern development of integration in the global system of international trade. Quantitative analysis, namely the difference in indicators several times, indicates a large uneven impact of certain factors on the development of integrational associations in the international trade system in the regions of the world.

On the basis of the performed quantitative analysis it is possible to conclude that the development of processes of Ukraine's international integration in the system of global trade is primarily attributable to a decrease in the total volume of imports; to a lesser extent (twice less) – an increase in the total volume of trade per year; mostly with the same effect – a decrease in imports and an increase in exports of all-around companies; also the total exports of the association and GDP. To a small extent, the development of international integration processes is influenced by foreign direct investment: annual internal and external flows and reserves; balance of payments (annual accounts of current operations) and trade growth rates.

So, based on the findings, at the level of the state legislation of Ukraine it is possible to give recommendations on strengthening the strategy of support of domestic production in order to increase the competitiveness of Ukrainian goods and services and, consequently, the exit from them into international trade markets. As the analytical analysis shows, this is a significant



reserve for the development of trade and economic relations of Ukraine in the international economic space. Therefore, such a strategy should become a key to the economy of the country, as it will reduce the import of foreign products and increase export of Ukrainian goods and services, increase the total trade, as well as “raise” the level of GDP and other macroeconomic indicators in order to improve the standard of living of the population and economic stability of Ukraine. Achievement of the set tasks involves realization of effective measures of the state policy of foreign economic activity of Ukraine in the aspect of international integration, which is based on the creation of a modern mechanism and tools for stimulating export activity of the country.

One of the directions of the intensification of the integration of Ukraine's foreign economic policy into the global system of international trade is expected on the basis of the domestic agricultural sector and the production of products for the processing of agricultural raw materials. Its further promotion to the world trading markets involves reforming the system of state support of the AIC sphere and attracting investments in this field. In addition, Ukraine's integration into the economic world space on the basis of the formation of a system of state support for its export will promote the development of export-oriented domestic production, increase the level of quality and competitiveness of Ukrainian products, and will enable to improve the competitiveness of national producers on the prospective world markets and increase the foreign trade turnover of goods and services.

Thus, as it is shown by the analysis, Ukraine has the opportunity to integrate into the global system of international trade by addressing a range of issues. The mechanism proposed by the author for Ukraine's integration into the global system of international trade entails the main determinant mortars, which greatly influence the process of integration of Ukraine. In turn, strategic prospects for the development of Ukraine's integration processes include not only a set of methods for regulating foreign economic activity in the country, but also relevant country strategies that can be used to integrate Ukraine into the global system of international trade.

Consequently, in order to integrate into the global system of international trade, Ukraine needs to develop and implement a set of measures to overcome the crisis phenomena in the Ukrainian economy, and, in particular, to resolve the socio-political situation in the east of our country and implement a joint program with its trading collaborates to exit from crises

The following can be recommended as the main methods of regulation of foreign economic activity of Ukraine:

1) The application of economic methods of state incentives for export production, namely, direct state financing of exporters, insurance of exporters, regulating customs tariffs, investment in innovative technologies, development of the agrarian sector, exports of agricultural products and other types of raw materials for the purpose of obtaining additional value of the products.

2) Tariff regulation of foreign trade; the use of protectionist measures to restrict imports, application of non-tariff (administrative) measures of regulation of foreign trade: customs tariffs, technical procedures, measures of currency and fiscal policies.

3) Implementation of administrative and trade-political methods: creation of conditions for access to foreign markets, protection of domestic economic interests, promotion of development of foreign trade activities.

4) Anticorruption methods of doing business, namely, reduction of corruption risks, transparency of business conduct, creation of favorable conditions for investors.

Thus, the globalization of world commodity markets and economies, the growing importance of foreign economic and trade relations, and the development of international co-operation make the integration and interdependence of foreign trade and the domestic economy increasingly tight. The current difficult political situation and, as a consequence of the change in the trading partners, as well as the critical dependence of Ukraine on the external markets, is one of the main deterrent factors that influence the pace of economic development of our state.

The development and activation of the vector of Ukraine's integrational foreign economic policy into the global system of international trade is possible through the formation of a strong economic interest of Ukraine's foreign trade partners. The convergence of political and economic interests in Ukraine should be based on the potential of the domestic agricultural sector and the production of products for the processing of agricultural raw materials that have guaranteed consumers. That is, the strategic synthesis of the foreign trade configuration of Ukraine and other countries should appeal to the fact that Ukraine has an autonomous agricultural and raw material base of AIC.

Promotion of products to the world trade markets for agricultural products involves reforming the system of state support for agricultural production and attracting financing into this field. In addition, the commodity structure of exports needs to be optimized in order to increase the share of production with high added value, in particular, the processing sub-sector of agro-industrial complex and other spheres of the national economy.

Ukraine's external integration processes must focus on its export potential, as well as overcoming the problems associated with low commodity and geographical diversification of Ukrainian export, unprofitable export lending conditions and high risks of residual losses during export operations, low competitiveness of domestic products, insufficient level of investment in modernization and creation of export-oriented productions, lack of effective export support system ditch. Integration of Ukraine into the economic world space on the basis of the formation of a state's support system for its export will facilitate the development of export-oriented domestic production, increase the level of quality and competitiveness of Ukrainian products, and will enable to improve the competitiveness of national producers in promising world markets and increase foreign trade turnover of goods and services.

Based on the theoretical and logical analysis of the works of well-known specialists in the field of international integration, methodological recommendations of the Institute of Economic Forecasting of the National Academy of Sciences of Ukraine and the domestic legislative base, the content and list of trade and economic indicators that are the basis for evaluating the long-term development of integration processes in the global system of international trade are substantiated. criteria of clusterization of international integration processes and form the basis for comparative and further detailed economic analysis to form a foreign policy of Ukraine integration into the global system of international trade.

Based on the revealed trade and economic features, the homogeneity of the studied aggregate of integration associations of the world according to UNCTAD classification was established. Based on the performed cluster analysis, the structure of the set of international integration associations is determined. This gave a possibility to establish alternative groups of international integration associations and to determine the objective position of Ukraine in the global system of international trade.

Using a discriminant analysis, a cause-and-effect relationship was identified as a functional relationship between the indicators characterizing the development of international integration in the global system of international trade and identified the most informative. Quantitative analysis of important factors at the indicators, namely their significant difference between them, shows a large unevenness of the influence of certain factors on the level of trade and economic development of integration associations in the international trade system in the regions of the world. The degree of influence of the identified features may be used to analyze the problems and prospects of integration in the aspect of Ukraine's economic policy.

On the basis of the performed quantitative analysis it is possible to conclude that the development of the processes of Ukraine's international integration in the system of global trade is primarily due to a decrease in the total volume of imports; to a lesser extent – an increase in the total volume of trade per year; practically with the same effect – a decrease of import and an increase of export within the association; also the total export of the association and GDP. To a small extent, the development of international integration processes is influenced by foreign direct investment, annual internal and external flows and reserves; total export trade and balance of payments (annual accounts of current operations). This creates the basis for increasing the efficiency and effectiveness of support and decision making regarding the directions of world integration in the global system of international trade.

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## **2.2 IMPACT OF CUSTOM FORMALITIES FACILITATION ON FOREIGN TRADE**

The problems of trade procedures facilitation has become an agenda of many international organizations. According to the definition of the United Nations Economic Commission for Europe the facilitation of electronic activities and trade procedures is a process of “the simplification, standardization and harmonization of procedures and associated information flows required to move goods from seller to buyer” [1]. This definition assumes that it is important transfer procedure is not only the physical transportation of the goods, but also the flow of related information.

Since import tariffs have significantly decreased over the past two decades, non-tariff measures are beginning to acquire more importance, aimed at further reducing of the costs associated with international transactions.

Execution of documentation and implementation of other import-export operations can cost up to 15 percent of the goods value, even excluding the costs associated with international shipping and other costs [2]. Thus, in order to take advantage of new trade opportunities or to create such ones, companies should have an opportunity to provide more efficient delivery of goods from factory floors to the warehouses of foreign buyers, as well as to introduce single window systems and paperless trading.

According to Asia-Pacific Trade and Investment Report 2011, over the past decade, many countries of the region have made progress in reducing costs [3]. At the same time, this estimation shows that in many cases the reduction of expenditures is almost in half, possibly due to a decrease in tariffs. At the same time, just the non-tariff trade costs work out almost 90 percent of trade costs in general. Therefore, if countries in the region want to make greater progress, they need to address priority attention to issues related to non-tariff barriers, including issues arising from completely unnecessary burdensome trade and transit procedures and unsatisfactory logistics services. For example, in the international supply chain, the movement of goods must be accompanied by the relevant cargo documentation. It includes an average of 40 documents, 200 data items (30 of which are repeated at least 30 times) and requires 60-70 percent of the data to be

reprinted at least once [4]. One of the reasons preventing the movement of the goods is a delay in documents processing or incomplete information on business processes. On average, each additional day of shipment delay reduces the volume of trade at least by 1 percent and approximately by 7 percent if the products include agricultural goods, both perishable and long-term storage [5].

The main two factors of national economies development, such as cross-border movements and the increasing role of international trade enable countries to adopt more effective internal management procedures. Currently, customs authorities are not only responsible for revenues of the state budget; they also play an important role in managing international trade procedures. In this context, the old style of customs authorities' activity can negatively affect the activities of customs and other controlling bodies. These services strive adequately to respond to global challenges and actively expand mutual cooperation and business ties.

In general, it should be noted that the transformation process of trade facilitation is expensive and requires determining which methods of trade procedures facilitation are prioritized in order to ensure maximum utility of its implementation. Nevertheless, numerous studies of the World Bank and OECD show a wide range of opportunities to get benefits. Thus, at the macro level, the positive impact of trade and trade environment is evident. Each additional day necessary for the export and import of goods reduces the volume of trade by 4.5 %. In the Asia-Pacific region, reforms in countries with low income can increase trade in the region by \$ 245 billion. The study of the effectiveness of World Bank's funds allocation shows that each 1 US \$ invested in the facilitation of trade procedures makes it possible to get an income of 70 US dollars from exports [3].

Reducing restrictions that restrain the movement of goods across the borders has become a central theme in the facilitation of trade procedures. Why is it necessary to demand from commercial operators to tender about 40 documents with frequently repeated information in 40 different agencies? The essence of the trade procedures facilitation is the reduction of such procedures, as well as the fastest and easiest information collection necessary for the controlling bodies. The facilitation and reduction of procedures, data and documents, their compliance with international standards, computerization of documents and foreign trade procedures significantly accelerate the movement of goods at the borders. About 40 years ago US experts calculated that the cancellation of unnecessary bureaucratic procedures and

documents flow results in a reduction of trade procedures costs in the US by a one percent, which was always a significant amount that the society simply was losing as a result of insufficiently regulated processes.

An advanced tool of trade processes facilitation is the “Single window” (SW). It is defined as a system that allows all trade and transport participants to provide the information required by the control authorities for the implementation of exports, imports and transit activities in one place, once and in one agency. “Single Window” contributes to solve the main problem of trade procedures facilitation by providing numerous documents with duplicate information in one place, once and in a standard format. The Single window idea has been already introduced in a number of countries, like Japan, Singapore, Sweden, the Netherlands, Mauritius, the United States, Senegal, and Korea.

Under the conditions of a single window, trading operators and control services may physically be in different places, but the information flows between them are interrelated. In fact, a single window is a virtual system of information exchange between departmental systems.

A single window is considered to be one of the most important mechanism providing facilitation and harmonization of trade procedures, costs reducing, time limits of trade transactions, and in case of its effective implementation within the framework of the Eurasian Economic Community, it can significantly shorten the terms of import and export and simplify the requirements for documents flow. Focusing on the facilitation of the above-mentioned international trade indicators the single window mechanism will also contribute to enhancement and increase of mutual trade between EEC member countries. For example, some countries have committed to the positive implementation of the electronic single window system. Reducing the costs of trade transactions as a result of the single window introduction ensured its implementation and economic benefit to the extent of 1 % of GDP in Thailand. According to customs data for 2010, the single window introduction in Korea resulted in economizing of about 18 million US dollars; in that year the share of economic benefit has reached to 3.47 million US dollars as a result of measures facilitating trade.

To ensure the dynamism of the single window mechanism implementation process in EEC member countries, as well as for their further integration, the following document was developed “The main directions of the single window mechanism development in the system of foreign economic activity regulation” [6].



The main directions of the single window mechanism development in the system of foreign economic activity regulation are the following:

1. Bilateral rapprochement of the national single window mechanisms development, for which is necessary:

– To apply the terminology and guidelines for the implementation and development of the Single Window mechanism negotiated in the UNECE Recommendations

– To perform analysis of state procedures and technologies in each member country, as well as legislative acts that determine the procedure of their implementation,

– To identify areas for bilateral rapprochement of national single window mechanisms development, taking into account the results of the above analysis.

2. Development of national single window mechanisms, which implies consolidation of efforts and coherence of actions of state bodies regulating foreign economic activity, business communities and participants of foreign economic activity.

3. Mutual recognition of electronic documents necessary for the implementation of foreign economic activity. For this purpose it is necessary to unify the content of information included in electronic documents, as well as ensure the formation of legal, organizational and technical basis for mutual recognition and use of electronic documents by authorized bodies of member states.

4. Organization of information interaction (with the relevant informational and technical basis) to improve the effectiveness of state control, as well as facilitation of necessary documents and information receipt by participants of foreign economic activities.

The implementation of the main directions will enable to create an effective system of foreign economic activity regulation, to improve of entrepreneurial business conditions in the EEC member countries and to promote higher positions in international rankings.

For the first time, the EEC countries have developed common approaches and national mechanisms for the single window implementation. As a result, was developed a reference model of single window national mechanism in the EEC member countries, which is an innovative cross-border intellectual mechanism which allows to interested parties to obtain comprehensive services for exports, imports and transit transactions implementation during interaction with government agencies and authorized organizations of the member countries.

Taking into account the provisions of the World Customs Organization international standards and the UN recommendations, the reference model integrates the experience of building a modern model of the single window mechanism, applying progressive organizational, legal, technical and technological solutions.

The reference model has a number of characteristic features:

1. One-time submission of documents and information: If in the submitted documents there is no enough information for decision-making by state bodies and authorized organizations then, at the request of such bodies and organizations, the interested parties additionally present only missing data.

2. A wide range of services: At all stages of the goods delivery, interested parties need to provide a wide range of services upwards from the registration of interested parties to the release of goods.

3. An intelligence mechanism that allows interested persons to obtain the necessary information about regulatory measures and the persons who provide services in the field of foreign economic activity, to make calculations and electronic payment of customs and other payments, to prepare reports and to output statistical data.

4. Flexibility and transparency of the provided services: Within the framework of the national single window mechanism, concerned parties should have an opportunity to create a “personal area”, to have a comprehensive view of the export, import and transit operations at all stages of the supply chain. The single window national mechanism should give an opportunity to concerned parties to get services that are provided through the national window mechanisms of other participating countries through a “personal area” and by using technological and information innovations.

5. Providing information exchange opportunity among the different levels of the single window national mechanism’ users: The reference model allows to provide information exchange between concerned parties, stakeholders, government agencies and authorized organizations of the participating countries (B2G/G2B), interagency information interaction (G2G), stakeholders information interaction (B2B) during the implementation of export, import and transit operations, as well as information interaction of national single window mechanisms (interstate S2S).

6. High level of trust: Creation of reliable bases for the implementation of a single window and establishment of trust relations between stakeholders, government bodies and participating countries’ organizations.

Such model of the single window national mechanism is a tool for international trade procedures facilitation, the goal of which is optimization of the state procedures related to foreign economic activity, as well as creation of conditions for electronic transactions and e-commerce.

Privileges of a single window implementation will be the optimization of business processes and the unity of documents and information on the areas of adjustment of foreign economic activity, organization of information interaction and B2G and G2G procedures regulation, development of the EEC data model.

It is obvious that in the process of the single window national mechanism development the EEC member countries will have a difficult path of optimization, integration and harmonization of procedures, document flow and data requirements.

Thus, in order to create favourable conditions for international trade in the EEC countries, comprehensive reforms are needed. The solution of the problem must be found in three main areas: strategic, legislative and information-technical.

1. In the strategic sphere, 4 main directions of single window mechanism development have been identified and a plan of measures for the period up to 2020 has been developed.

The problems of the single window mechanism development within the framework of the EEC, on the solution of which is referred the action plan, are as follows:

- supporting to national single window mechanisms development,
- ensuring bilateral rapprochement of national single window mechanisms development,
- ensuring mutual recognition, unification, standardization and harmonization of electronic documents necessary for foreign economic activity
- organization of information interaction of national single window mechanisms,
- systematization of actions to realize the main directions of the single window mechanism development in the system of foreign economic activity regulation.

2. The principles of a single window are reflected in the draft of the Customs Code of the EEC. The Customs Code is the most important document in the context of discussing legal prerequisites for creating a single window.

3. To ensure the interaction of single windows and the exchange of information flows, an integrated information system for foreign and mutual trade (IISVVT) acted as an information and technological base. The IISVVT agreement on creation, functioning and development of integrated information system, was signed on September 21, 2010.

The IISVVT is designed to promote the concept of a single window by solving the following problems: creation and maintenance of a single legal and regulatory system for foreign and mutual trade of the Union, the formation of an integrated information structure for the interstate exchange of information and electronic documents in the customs area of the Union, the creation of integrated elements and centralized complementary information resources for participant countries.

The results of the above mentioned measures will be the following:

- Transition to full non-paper (electronic) document flow during the implementation of a wide range of processes of foreign economic activity;
- Significant reduction of time, working and financial costs for the implementation of these processes;
- Increasing the level of transparency and predictability of business processes related to foreign economic activity;
- Improving the quality of the public services provision in the case of risk management level increase and a reduction of non-compliance cases with the requirements of the member countries legislation from the participants of foreign economic activity.

Effective implementation of these activities will create the basis for the single window mechanism development and will allow moving from the preparatory to the implementation stage. The priorities of the new stage will be the improvement of business processes and the unification of documents and information on the areas of foreign economic activity regulation, the organization of information interaction and the settlement of the B2G and G2G procedures, as well as the development of the EEC data model.

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### **2.3 THE ROLE OF LEADERSHIP IN INTERNATIONAL HUMAN RESOURCE MANAGEMENT**

The aim of the paper is to identify key challenges in the area of contemporary leadership as one of the major challenges in international human resource management and to analyze the determinants of leadership in contemporary's organizations.

Based on the numerous sources and research results to which the authors refer, they express the conviction that the challenges of contemporary leadership in the international context are very large.

The first part of the paper draws attention to the differentiated understanding of leadership and its importance to the functioning of the organization. The work was further characterized by the characteristics that a modern leader should possess. The importance of inspiring and working with people has also been emphasized. The authors' approach to international human resource management is then presented. The last part of the paper highlights the challenges facing contemporary leaders in international companies.

Contemporary companies are increasingly under the pressure of customers, competitors, owners, as well as their own employees. Such an environment poses far more challenges. It forces organizations to continually seek new ways of working with much smaller resources, especially human ones. Therefore, organizations increasingly appreciate the importance of leadership, which helps to skilfully bring out hidden potential in people and provide the necessary support. Decisions taken by senior managers in international organizations affect both the functioning of the company and the economies as a whole. And the usual managers are no longer

needed - the need for leaders. Effective management of international organizations requires managers with significantly higher interpersonal skills, focused around engaged and loyal people. Therefore, having a strong leadership base is a fundamental condition for the development of a modern enterprise, especially an international one.

### **The importance of leadership**

Leadership in an organization is an important element in the functioning of contemporary's companies. Despite numerous of publications on the subject, this issue still seems insufficiently described by both Polish and foreign authors. B.M. Bass in his research shows that "the number of leadership definitions is equal to the number of people who have tried to explain this concept." [1]. B. R. Kuc points out that "the concept of leadership remains elusive and enigmatic. Despite repeated efforts to develop an intellectually and emotionally satisfactory interpretation of this phenomenon." [2].

However, there is no doubt that leadership occurs when one tries to influence the behavior of others. Leadership is therefore a process of interacting with other people. A. Poczowski points out that "leadership is the process of exerting influence on others in a way that motivates them to voluntarily engage and contribute to achieving the goals of the organization." [3]. A similar approach to defining leadership is contained in the Encyclopedia of Management, which defines it as "the ability to influence employee behavior in order to achieve specific goals. Leadership is based primarily on the authority of the individual and on the power that others voluntarily accept. Leadership is about setting the direction, developing a vision of the future of the organization, as well as giving direction to people. Leadership is also motivation and inspiration, energy release in people. Leadership is necessary to make changes and management to systematically achieve results" [4]. In this view, leadership is identified not only with the process, with the power of interpersonal relationships and influence on the leader line – the other employees, but also by the vision and sharing with others. Handy [5] and Rost [6] also noticed that. R. Rutka considers that "irrespective of the motives of subordinates and forms of government, leadership is primarily about creating among the members of the team such emotional states that will motivate them to engage and cooperate in the creation and realization of common missions and tasks." [7]. So leadership is seen as a kind of action aimed at supporting employees in achieving their goals.

According to D. Stolarska, "the main difference between managers and leaders is the different nature of their activities (tasks they perform) and the skills they need to perform. The task of a leader (especially transformational) is to set a far and ambitious goal and to mobilize subordinates to follow in this direction, while the manager must first manage the running processes."

In conclusion, “the whole of the art of leadership is based on the ability to perceive and realize common goals, to realize the potential of others, and to direct the talents, knowledge and ability of the group towards established results. Leadership as a process involves the use of influence, without resorting to coercive measures. Its purpose may also be to define the culture of the group or organization.” [8]. However, this is not the only definition of leadership. Some point to the important role of leadership personality characteristics.

### **Features and abilities of leader**

According to the many definitions of leadership, it can be observed that a leader is a person with specific characteristics that distinguish him from others. Contemporary leaders are individuals with certain personal qualities, namely self-confidence, having high energy levels and resistance to stress, responsible. In addition, he is also the person followed by others of his own choice, is admired and respectful, goal-oriented [9; 10; 11]. Such a characterization of leaders also agrees with S. Killian, as well as P.G. Northouse. The core qualities of the leaders are enthusiasm, integrity, hardness, honesty, warmth, humility, determination, integration and sociality [12; 13]. Successful leadership also requires attributes such as ambition, assertiveness, optimism, courage, innovation and creativity, as well as honesty and high personal motivation [14; 15; 16].

In turn, Michael Williams points out the main features of effective leadership in an organization [17]:

- giving examples;
- creating engagement through confidence and team cohesion, inspiring people to act and take risks;
- educating successors with ideas, not just followers;
- believe in the potential of coworkers and appreciate it when promote them;
- keep your promises and control the effects of your actions;
- permanent improvement of ourselves and team members.

So leaders, in order to keep up with changes in the economy, must have the above characteristics and skills. The authors of the article also agree with E. Gobillot, who emphasizes that leaders need to build relationships with employees based on trust and mutual understanding, shaping engagement in every area of the organization. It should be based on effective communication, built primarily on the basis of listening to employees and passion for action and undertaking new challenges [18].

## **Determinants of contemporary leadership**

Contemporary organizations operate in a turbulent environment, namely with globalization, increased competition, technological advances, a new approach to managing people, teams and leadership, innovation, or a growing customer base [19].

The environment in which organizations function affects it in three ways [20]:

- time to respond and take action on the part of the company is shorter;
- acting in contradiction – organization simultaneously operates in the short-term perspective and must plan long-term investment; there are often contradictory signals from the surroundings;
- disorganization of priorities – speed of implementation of actions adapted to new changing environment conditions makes the organization can lose sight of the previously defined goals.

One of the factors influencing the adaptation of leaders to new working conditions is the transformations taking place in the organizations themselves. Major changes in the functioning of the organization are included [21; 22]:

- continuity of action – managers change the way they work in the organization to respond to emerging issues and make quick decisions;
- constant and direct contact with the customer;
- autonomy, entrepreneurship and project's structure of units in the organization - creating conditions for exploiting the potential of individual employees in the organization by creating structures based on inter-departmental project teams;
- diversity – with regard to employees understood very broadly – the elimination of discrimination on the grounds of social or cultural groups as well as on grounds of sex;
- the expertise and network of contacts held by employees determine the recognition and leadership of the organization;
- focus on employee productivity and efficiency – talent search and development;
- loyalty to work – employees show more commitment to tasks entrusted to them and task teams than to organizations;
- designation and operation based on value management;
- uniqueness of the organization – this applies to both products and processes in the organization;
- flattening the organizational structure – continuous improvement of the entire organization and its relationship with the environment by introducing numerous changes in all areas of organization management, especially shaping the employees' attitudes [23];



– occurrence of both loose and rigid organizational forms depending on the problem that occurs in the organization.

Organizations increasingly notice the need for change and take action to modify their way of functioning in line with the guidelines described above.

Competitiveness in the present day requires managers of modern visionary organizations and the full dedication of leadership aimed at the efficient use of intangible resources, the multiplication of intellectual resources and the foundation of organizational development [24].

The leaders are also challenged by the philosophy of managing people in which they treat employees as the most important intellectual property and the main force of development, and give them the opportunity to improve their competences, creativity and commitment. This is mainly reflected in the style of managing people [25]. The style of managing people in an organization begins to be “adapted to the specific situation, the characteristics of the group and its members, and the personality of the leader itself” [26]. The authors agree with this statement. There is no single, effective always in every organization and in all situations, style of targeting.

The high insecurity and uncertainty of changes in the organization's environment makes knowledge an important source of competitive advantage. Continuously increasing the knowledge of employees and leaders, allowing for better preparedness for the challenges of the future, elimination of tensions and social conflicts associated with change, cooperation with partners and employees. Leaders and co-workers, by creating organizational knowledge, integrate content, knowledge, and knowledge creation across the organization. Leaders communicate knowledge to employees in such a way that there is an increase in the involvement of subordinates in their actions [27].

It needs to be highlighted that factors influencing the behavior of leaders include the profile and size of the organization, the type and timeliness of the tasks carried out, the organizational culture and the level of competence of the staff team [28]. They shape the behavior of the leader either more on tasks or more on staff. “Task-oriented leaders closely supervise their subordinates so that they are well on their job and care for work. While a leader-oriented subordinate (...) motivates the employee, he encourages the group members to perform their tasks, allowing them to participate in decision-making” [29]. Similar conclusions from the study are provided by E. Scott Geller, pointing out in addition to the 16 guidelines for effective leadership [30]. According to the author, contemporary orientation is essential both for tasks and for people. The superiority of one of these approaches will depend on both internal and external factors that influence the functioning of a particular organization.

Increasingly, leaders in today's organizations face the challenges of international organizations. This contributes to the development of tolerance and the acquisition of cultural differences. It departs from the concept of leadership, which can be used only in the specific environment of a given country or region. There is a problem of multiculturalism. Therefore, solutions should be sought which will be effective in different cultural contexts, mainly in the realization of cultural differences and the development of an agreement enabling far-reaching cultural synergy. In other words, it must be possible to apply them to the broadest possible cultural context [31].

In summary, contemporary organizations show diverse challenges that affect more or less the behavior and action of leaders. Among the most important is globalization, technological progress, change of approach to managing people. The functioning of organizations in different countries, and even on continents, makes leaders increasingly aware of the factor of cultural diversity at the level not only of the entire organization, but also of the individual design teams. This means that they will have to pay particular attention to the aspects of human resource management internationally.

#### **Definition and essence of international human resources management**

Research and publications emerging in recent years on international human resource management reflect the direction of change in contemporary organizations.

International human resources management is considered in the literature usually in two frames [32]:

- analyzing how organizations manage their employees in different countries;
- study the differences in human resources management in each country.

According to T. Listwan international human resources management “includes a set of decisions and actions related to people, aimed at achieving the aims of international organization and meeting the needs of its employees” [33].

According to Torrington, international human resources management is included in the issues referred to as “7k” [34]:

- cosmopolitanism – either employees become citizens of the world or workers delegated to work abroad;
- culture – differentiation of national cultures;
- compensation – related to the posting of workers to work abroad and workers from the country;
- communication;
- consultation – the need to solve local problems by specialists;

- competence – development of competence of employees working mainly across political, cultural and organizational boundaries;
- coordination – activities throughout the organization.

Among the specific features of international human resources management can also be distinguished [3]:

- greater number of tasks performed and greater complexity of individual activities compared to domestic enterprises;
- greater interference in the personal lives of posted workers;
- greater importance of cultural factors in solving personal problems;
- greater number and complexity of factors influencing human resources.

Based on so many different ways of defining international human resources management, it can be said that this area is dynamically developing at both theoretical and empirical levels.

In the international human resource management, the same techniques of recruitment, motivation, training and development of employees are used, as in national companies, but much more determined by cultural factors (national culture and national languages within the organization), geographical spread companies, and characteristics of the home country [35].

The main elements of effective international human resources management include international and intercultural communication. Literature emphasizes that human resource management in international organizations is becoming one of the biggest challenges. This is related to the more complex nature of decision-making and operations than in a national company operating in one local market. International companies need to take into account the many differences in the environment both at the individual and at the global level.

In conclusion, international human resources management continues to provide researchers with a research area. In spite of the different ways of defining this term, we can point to certain factors that significantly shape the actions taken in the international management of human beings, in particular multiculturalism. Therefore, it is important to emphasize the importance of skillfully selected, appropriate management tools and techniques that influence the proper identification, evaluation and development of skills and qualifications of talented employees in the international environment.

The authors wish to emphasize that in the international human resources management a leader plays a vital role. It is through an appropriate communication system that takes into account cultural differences that reinforces the motivation of employees to develop themselves as well as the development of the whole organization.

### **Leadership in an international context**

According to the authors, among the key challenges in the functioning of modern organizations in the international context, the leadership and the motivation of employees, especially in culturally diverse teams.

Leadership primarily has a strong influence on the attitudes and behavior of employees in the international environment, their willingness and commitment to meeting new tasks and challenges. It is very important to communicate effectively the vision and the changes involved, to gain acceptance of employees for the implementation of this vision and new tasks, to support employees in pursuit of goals, especially in difficult situations, and openness to employee ideas. Particularly important in international teams, culturally diverse, it is important for a leader to have the acceptance and respect of the staff, be able to recognize the needs of his team, respond appropriately, care for the development of employees and achieve the company's goals.

Contemporary leader and employees create a common organizational culture that is geared towards continuous improvement of employees, acquiring new knowledge and openness to changes and challenges in the environment [36]. It should be emphasized that the acceptance of the majority of employees by organizational culture influences positively on the way organizations communicate, the rapid processing of information and decision-making, as well as the motivation, loyalty and commitment of employees [37].

An important skill for leaders in international organizations is the ability to act in a multicultural environment. Therefore, they should develop tolerance for cultural differences, have knowledge of the beliefs and values of the country, be flexible and tolerant. The actions of leaders should combine culturally diverse workers [38].

In contemporary leadership, indispensable action is to improve the competence of subordinates and treat them as partners at work. The main task of the leader is also to prepare his successors. Failure to do so can lead to disruptions in the functioning of the group or even the organization as a whole, as well as the loss of the best employees - talents. Continuous development planning and coaching are therefore crucial for the development of employees [39].

Leaders in international organizations are primarily trying to inspire others. They put their employees in the pursuit of ambitious challenges and maintain their enthusiasm. The core element of the leader's actions is to develop human resources, competencies and talents.

Functioning people in cultural diversity makes the leaders pay special attention to open communication with employees, especially in the context of change. Communication of key information is essential to increasing the involvement of organization members and their awareness of organizational change [18].

Modern organizational management requires courageous managers who aim for a better organization that implements changes that quickly respond to their appearance and use them to take new, risky actions. At present, the management of the special importance is willing to take risks and bear the responsibility for them. The manager should make changes; he must plan his future and the future of his organization for a long time. He must be able to anticipate and evaluate future events, states of things and their effects. Management requires creative and inspirational ingenuity and entrepreneurship, energy and imagination, and above all care to ensure that all employees are moving in the desired direction and pursuing their goals and the resulting tasks.

The functioning of organizations in an international environment, according to the authors, has a big impact on the development of new skills. E. Szczepanik claims that the leader should [40]:

- know his own strengths and weaknesses;
- be responsible for employees;
- be open and able to change;
- have the ability to learn from others and adapt new solutions;
- have the ability to communicate, create teams, and customize the style of targeting employees.

International organizations are in an environment in which decisions must be taken very quickly and the firm's performance in the long run to be analyzed. The answer to such changes is the use of leadership called visionary, charismatic, inspirational or transformational. The task of leaders is to inspire employees to make greater efforts. Subordinates play an important role in realizing the vision and creating the desired future. The success of an organization is largely dependent on the well-governed employees knowledge. To motivate and engage employees in action, it is essential to be authentic, genuine, and honest in order to meet new challenges. It is important for a leader to always realize that his belief in what he strives to entice people with his leadership vision and makes him want to go with him the way he chose [41].

The challenge is undoubtedly distributed leadership, which is characterized by “the assumption that every employee who is ready and able to assemble his or her supporters is able to take the lead and take responsibility for the task being performed” [42].

Leadership at global level requires a different way of thinking. Organizations must face cultural diversity, political crises and natural causes. According to research by Roffey Park, the main skills to help create global leadership, namely [43]:

- strategic thinking;
- intercultural competence;
- crisis management;
- political astuteness;
- ethical leadership;
- improvisation;
- global mindset.

Aging population and low birth rates are another challenge facing modern organizations. Investments in mature workers whose knowledge, skills and experience are invaluable should be a normal part of managing a diverse age group. Therefore, leaders should undertake comprehensive actions that will enable rational and effective human capital management in the organization, including older workers. This should include both the planning of employment and the selection of workers, the management of development and career, the organization of the workplace, as well as the preparation for retirement [40].

Leaders in international organizations need to keep in mind that the needs of employees, especially in culturally diverse teams, are often different and motivating employees and engaging them requires knowledge of the needs and adaptation of motivational tools such as training, career development, participation in international projects, trips to other company outlets, payroll or payroll bonuses.

According to the authors, in international organizations, leaders together with employees should create a vision for the company's development, participate in building creativity and innovation, and trust in relationships. One of the main goals of leadership and at the same time a challenge is to build a future organization in which organizational culture is a coherent set of norms and values of all employees and is the basis for inspiring employees to work actively for the company [41].

The changes in the environment of international organizations determine their functioning increasingly. That is why it is so important to hire people with the right skills and qualifications. It is only possible for leaders to extract the potential they have. It is very important to educate and prepare for work in international structures, leaders capable of acting primarily in a multicultural environment. Leaders who are flexible in action easily adopt new solutions, are effective in building new structures, new teams, and relationships between employees who come from different cultures.

According to the authors, it is important to continually study this phenomenon in view of the variety of challenges that arise from leaders. Effective leadership should be visible in building

positive relationships within and outside the organization, in the ability to communicate effectively, and to shape employee engagement in a way that implements the vision of a company together. The importance of leadership in today's organizations, where diversity plays an increasingly important role, including multiculturalism and generational diversity, continues to grow and become more and more important. Leaders are just what they need today, they are essential for the realization of small and large tasks that affect the organization's performance and its competitive position.

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### 3.1 THE IMPACT OF GREEN-INNOVATIONS ON ENVIRONMENTAL QUALITY AND ENERGY RESOURCE CONSUMPTION\*

People's wellbeing and health do much depend on the quality of environment, and quality of the food consumed. During the last decades environmental problems became so complicated and unstable in Ukraine that these issues do attract serious attention of researches. Today the situation is not unlike the recent past. Ukraine annually produces almost 50 times more waste per \$1 of GDP than the U.S. or EU do. Annual amount of industrial waste formation per 1 km<sup>2</sup> in Ukraine is more than 6.5 times bigger than in developed countries.

History of domestic research on Ecological Economics and valuation of anthropogenic impact on the environment started in 1969. At that time group of scientists, from Sumy branch of Harkiv Polytechnic University, started researches on estimation the economic losses from metallurgical pollution. By the end of the 1980s there were established national methodological principles of economic evaluation of natural resources (including water, land, forest) and evaluation of environmental impacts losses in Ukraine. During the 1990s little research was done on economic evaluation of environmental impact; however the interest to ecological and economic researches nowadays increases perpetually.

Environmental quality of natural surroundings and consumer requirements for goods and services represent new challenges for firms in their technology choice. Firms are forced to innovate taking into account these new environmental performance criteria. The problems of stimulation of green industries are analyzed in the papers of many foreign and national scientists among them: L. Brown, 2001; J. Horbach, 2008; M. Frondel, 2007; H. Daly 1994; K. Rennings 2000, etc.

The main objective of the study is to determine the relevant economic mechanisms and instruments to stimulate green industries development and eco-innovations as a response to resource fluctuations. The structure of the paper is as following. First, we analyze greening concepts of national economies. Second, we provide methodological concept for policy and strategy of greening. Third, we compare supply and demand mechanisms to reveal proper eco-innovations economic policy based on EU countries examples.

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\*The publication contains the results of studies conducted within project № 0115U000684 "Development of fundamental principles of reproduction mechanism of the "green" economy in the information society".

The “greening” of the economy implies a targeted process of economic transformation aimed at reduction of ecological impact on the environment. The concept of greening is realized through a system of organized measures, innovations, restructuring, technological transformations, and environmental policy activities at macro- and micro levels. Special attentions in greening the economy is devoted to the environmental innovations, as they both profitable and environmentally friendly.

In a very broad sense, environmental innovations or eco-innovations can be defined as an innovation that includes a new or modified process, practices, systems and products which benefit the environment and contribute to environmental sustainability [1]. According to Eurostat (1999) eco-innovations is an industry engaged in “the production of goods and services to measure, prevent, limit, minimize or correct environmental damage to water, air and soil, as well as problems related to waste, noise and ecosystems (including) cleaner technologies, products and services which reduce environmental risk and minimize pollution and resource use.” [2]. Eco-innovations are the important source of progress, for example according to [3] potential in the solar arena is enormous. Aerial photographs show that even in the notoriously cloudy climate of the British Isles, putting solar cells on the country’s existing roofs could generate 68.000 megawatts of power on a bright day, about half of Britain’s peak power demand. Many firms are engaged to eco-innovation; however most of them do perform a simple improvement or the adoption of technologies developed by others.

The resource fluctuations of environmental policy instruments have a definite positive influence on eco-innovations. Thus considering the previous severe gas crisis in 2006 and 2009, the European Union has taken many measures to respond to gas supply cuts, among them stimulation of eco-innovations and resource saving activities.

As for the resource fluctuations, according to the Ida Auken (Danish Minister for the Environment, 2013), Europe currently shifts to renewables. The main reason is high hidden costs of traditional energy sources, volatile resource prices, resource fluctuations (resources can come from politically unstable regions) and climate risk. It is stated that Denmark works on both a short-term and long-term perspective and aims to be using 100 % renewable energy by 2050.

As for the environmental policy strictness according to [4] found for Germany that environmental policy has an important role to play for the diffusion of firm-level eco-innovations: reliable, predictable and strict framework conditions are equally an important prerequisite for many firms to adopt more incremental and small-scale environmental

innovations. Environmental taxes with slowly but steadily rising tax rates may provide the necessary incentives.

In general greening of industry and commerce might be considered as a function of a system which continuously self-reproduces its elements (Fig. 3.1.):

- (1) the reproduction of green needs;
- (2) the reproduction of green technological basis;
- (3) the reproduction of green labour factors;
- (4) the reproduction of motives for “greening” production and trade.

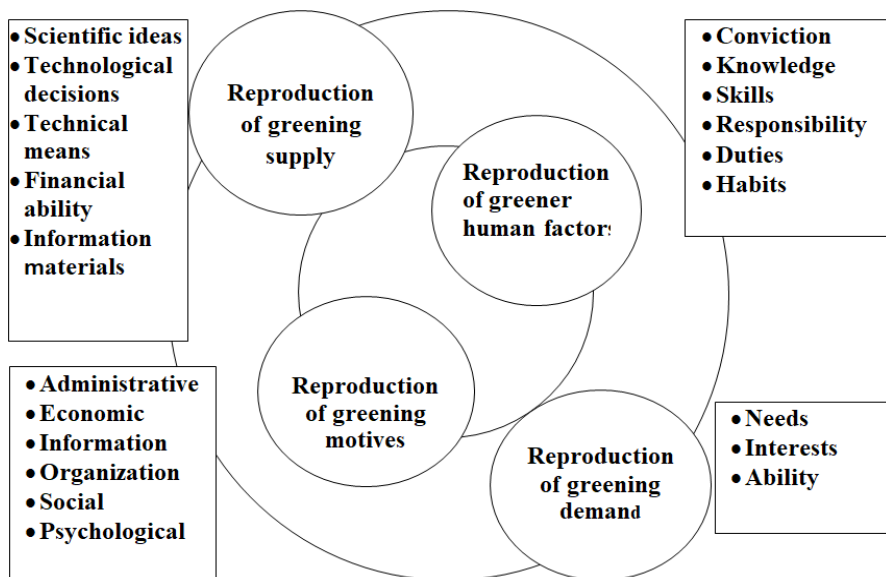


Figure 3.1 – Mechanism of reproduction of greening economy

Reproduction of sustainable (“green”) demand is defined as permanent process of shaping the needs for sustainable goods, as well, as formation of financial possibilities for realization of identified needs. Sustainable goods are considered to be products and services that contribute to mitigation of integral ecological impact per unit of aggregate public product.

Furthermore, when speaking about reproduction of ecological needs we have to formulate the required economic conditions for the national economy greening.

Firstly, the reduction of the material-energy flows of consumed goods must not lead to the lower quality of service from a standpoint of person's vital needs. Secondly, refusal from the use

of ecologically non-friendly products must be compensated by increase in the use of more ecologically friendly goods.

The demand side greening factors are observed mostly in relatively rich societies due to *nonhomothetic preferences* of economic agents with respect to environmental quality. Under the homothetic individual preferences, an increase in income leads to higher consumption, which causes higher pollution. Individuals with nonhomothetic preferences along with rising income may desire less consumption and pollution, depending upon relative risk aversion between consumption and environmental safety. This approach is close to the researches on Environmental Kuznets Curve (EKC), which tries to explain bell-shaped relationships between incomes and pollution. Thus [5] proposed to consider following assumptions to explain the “bell-shaped” relationship between income and pollution: a) with rising income, marginal propensity to consume should decline or at least be constant; b) marginal disutility of polluted environment should increase.

Finally, demand for sustainable goods must result from three interconnected economic elements: needs, elements, and possibilities. *Needs* are motives for consumption of goods that have been realized by people and communities. *Needs* are transformed into *interests*. *Demand* is determined by financial capability, and the ability to pay for goods and services. In general it is possible to identify four stages of sustainable needs development.

1. The first stage is associated with the means to control environmental destruction (“the end of pipe”).
2. The second stage is related to environmental improvement of technology (“wasteless technology”).
3. The third stage is associated with substitution of undesirable goods and service by “greener” ones (“more efficient goods”).
4. The fourth stage is associated with production and consumption of goods for sustainable development (“sustainable life style”).

Economists have traditionally considered nature to be infinite relative to the economy, and consequently not scarce, and therefore properly underpriced it. But nature is scarce and shrinking due to throughput growth. According to [6] the price for renewable and non-renewable energy sources should be paced at the same rate that is to make the green energy competitive with traditional and what is more important to stand on the road of sustainable development.

Motivational greening instruments imply permanent facilitation of organizational, social and economic conditions, which promote the desire to achieve goals of the economy’s greening.

As to demand side determinants, it is generally assumed that market forces alone would provide insufficient innovation incentives and that consumers' willingness to pay for environmental improvements tends to be too low [1]. In fact as emphasized by [7], demand pull policies do shape more the adoption and the diffusion of eco-technologies in comparison to innovative activity itself.

**Supply or demand which strategy is preferable for eco-innovations: the EU experience.** The EU countries due to stricter environmental legislation, high dependence on natural resource fluctuations have already passed the first stages of sustainable needs development and currently working on more efficient goods and sustainable life style.

There are basically three main market strategies of greening and eco-innovations fostering:

1. Influence on demand, called "*push-strategy*". The idea of this strategy is to create a system of motivational influence (ecological standards, economic instruments, information supply) which will push the producer to manufacture "green" products.

2. Influence on supply, "*pull-strategy*" the "production-consumption train". Influencing the supply, one can pull the links of production "greening". The essence of this strategy lies in the necessity to convince a consumer both psychologically and economically to use ecologically friendly products.

3. Influence upon the communication between producers and consumers, called "*interface-strateg*".

The demand side factors of green industries development directly depend on the per capita incomes of population. Thus treatment of environmental protection and ecological quality as "luxury good" means that as the incomes of economies and populations increase, they are prepared to spend more on protecting the environment. As an example, the EU countries are more effective in implementation of environmental regulations because enforcement agencies are often better funded and more transparent.

Several empirical studies stress that cost savings, reduction of resource dependence and productivity growth are key factors of eco-innovations, particularly for clean technologies. As emphasized by [8], innovation in clean technology tends to be driven both by cost savings, in terms of energy and material savings, environmental management systems and by regulation. The demand side determinants are mainly seen on areas with visible effect and customer benefits such as food or baby clothes. Consequently, individuals' willingness to pay a premium for organic food or organic baby clothes is substantial. Finally, also environmental process innovations create customer benefits such as less water, material or energy use.

Government intervention in green industries may be justified as a strategy to increase the supply of public goods. There are several works that tested the efficiency of different policy instruments in green industries. Thus, it is reasonable to analyze the EU countries experience of such activities.

According to [9] the Danish government has intervened intensively in the wind turbine industry and organic farming sector mainly for environmental reasons but with very different impact, also it should be noted that different policy instruments were used. That is to some extent such governmental interventions can be treated as a “pure experiment” within one country green industries. While the market share of wind energy reached 20 per cent in 2007, organic food consumption lags behind with a market share of approximately 8.5 per cent in 2007. The reason is that government intervention in the wind turbine industry has emphasized the use of policy instruments designed to increase demand for wind energy, whereas organic farming policy has put more emphasis on instruments motivating farmers to increase supply. The simple conclusion is that demand mostly represents an engine that drives innovations in green industries.

The amount of resources invested into the eco-innovations depend both on internal characteristics of firm and external characteristics of environment. Thus firms less inclined to innovations in general try to meet minimum market requirements established by consumer demand. Amount of resources invested by such firms is not big because the main purpose of production mainly profit with minimum concern to eco-innovations. Forever the stringency of economic conditions and price resources fluctuations do promotes higher levels of innovations; the main explanation of such behavior is survival of the firm on the market. If the firm does not meet environmental standards it is more inclined to higher punishments and payments. More innovative firms do not necessarily need the regulatory push for eco-innovation. Jens Horbach at al. (2008) used dataset based on the German Community Innovation Survey conducted in 2009 in order to test whether different types of eco-innovations are driven by different factors. It was used such explanatory variables for eco-innovations as supply, firm specific and demand factors, regulation, cost savings and customer benefits. Jens Horbach at al. states that fields such as material and energy savings do not need strict regulatory approaches because of their (potential) economic benefits. That is existing market motives are more than enough to stimulate such area of eco-innovations.

Considering the experience of Germany [4] econometrically proved that eco-innovators put relatively more attention to cost reduction, in particular the reduction of energy and resource costs, compared to other innovators. The last tendencies in energy price growth prevent firms from excessively using the traditionally underpriced input factor energy. Moreover, high energy

costs (and their fluctuations) provide dynamic incentives to generate eco-innovations continuously. Cost factor promotes eco-innovations and contributes to the diffusion of available technologies among firm.

The use of nonrenewable energy resources is correlated with increase of air emissions, which is theoretically expected. The results suggest that production of innovation goods is dependent mostly on expenditures for innovation activities, and per every 1 UAH invested there would be 1.12 UAN of innovative goods. The influence of fixed capital (as an annual stock) and per capita incomes appeared to be insignificant factors for production of innovative commodities in Ukrainian regions. The increase of per capita incomes does not stimulate the growth of innovation goods production on regional level in Ukraine. The more the fixed assets are available with region the more innovation products is produced

Many environmental problems in Ukraine have risen from the use of obsolete equipment and morally worn-out technologies in Ukraine. According to the National Institute for Strategic Studies the usage of worn-out equipment led to huge amounts of industrial waste. Thus mining wastes contain a significant proportion of useful mineral sources. It is 70 % of oil, up to 50 % salt, 30 % coal, and 25 % metal are left in depths after mining is completed. Our results are in accordance with [10] who performed the environmental analysis for Ukrainian regions (Tab. 3.1).

Table 3.1

The intensity of environmental load: the administrative representation in Ukraine [10]

Environmental load in Ukrainian regions	Regional boundaries	Total area
Relatively clean areas	North part of Ukrainina Carpathian mountain, south part of Volyn region, Poltava and Cherkassy region, central Podil	Up 50 th. square km, about 8 % of whole Ukraine
Relatively polluted areas	Western part of Ukraine, and almost all south east part of Ukraine (except big and middle cities in this areas)	Up to 150th square km, about 24 % of whole Ukraine
Very polluted	Donbas and south of Odessa region Bookovyna, south east Podil, south part if Kiev and Cherkassy region, central part of Poltava region	Up 178 th. square km, about 29 % of whole Ukraine
Environmentally disrupted areas (ecological catastrophe)	Thirty kilometers area near Chernobyl nuclear station and Black sea areas of intensive irrigation	Up to 7 th square km, more than 1 % of whole Ukraine)

According to [11], having analyzed technological responses of industrial firms to environmental problems it was found that green changes such as input substitution, process redesign, and product reformulations were rare events among other technological responses. One



of the possible explanations for slow green changes is that environmental requirements were not stringent enough on their face and/or because there was inadequate enforcement to force technological change. On the example of US Federal Government's [11] shows that waste minimization program was *voluntary*. As for the governmental regulation of pollution related activities the same conditions would promote different technological response depending on responder. Thus, pollution control industry in response to environmental regulation would introduce pollution control devices, the regulated firm would change have stimulus to change inputs, perform a process change and product reformulation. Also regulated firm, like other responder, may introduce new products if it would have enough time to develop comprehensive strategies and solve tradeoff between achieving quick results and radical change. Depending on the size of the company and its maturity there would be different responses. In general high volume, mature sectors would be resistant to change, although they are very amenable to environmental monitoring and process controls that improved efficiency. The last according to [12] fits with the Abernathy-Utterback product life cycle model that during the product life time producing industry becomes rigid and inelastic to changes. On the contrary potential new entrants would demonstrate more innovative responses to environmental regulations.

The presence of environmental policy regulations in Germany is significant for environmental product innovations in several directions like air, water, soil and noise emissions but not for the energy consumption and recycling. That is different areas of environmental impact need different policy approaches and [13] underlines that industries related to material and energy savings do not need strict regulatory approaches because of their (potential) economic benefits. Also energy saving benefits are not automatically equally achieved by the firms due to organizational, control and coordination problems.

It is necessary to consider the effectiveness of any regulation policy, since according to [12] there are few examples of environmental policies that stimulated green innovation. Most often the common compliance industry response is the use of expensive end-of-pipe solutions and incremental process changes offering limited environmental gains.

The environmental impact of environmental innovation is affected by the rate and direction of technological change. New technologies may create or facilitate increased use of nonrenewable energy resources and thus pollution, or may mitigate or replace existing polluting inputs or processes [14]. The Tab. 3.2 supports one of the [14] idea and innovation expenditures are related with nonrenewable energy resources consumption growth.

Table 3.2

## The influence of innovations on non-renewable energy resources consumption

Random-effects GLS regression				Number of obs	=	225
Group variable (i): id				Number of groups	=	25
R-sq: within = 0.3300				Obs per group: min	=	9
between = 0.8601				avg	=	9.0
overall = 0.4191				max	=	9
Random effects u_i ~ Gaussian				Wald chi2(10)	=	59.85
corr(u_i, X) = 0 (assumed)				Prob > chi2	=	0.0000
-----						
Nonrenewable						
E.resources		Coef.	Std. Err.	z	P> z	[95% Conf. Interval]
-----						
Innovation						
products		.0002095	.0000688	3.04	0.002	.0000746 .0003445
Innovation						
expenditures		.0008785	.0002502	3.51	0.000	.000388 .0013689
assets(fixed)		-.015909	.0605129	-0.26	0.793	-.1345121 .1026941
y2006		574.4968	189.6388	3.03	0.002	202.8116 946.182
y2007		414.8366	202.2501	2.05	0.040	18.43371 811.2394
y2008		242.1146	203.3663	1.19	0.234	-156.476 640.7052
y2009		116.9674	192.4463	0.61	0.543	-260.2204 494.1552
y2010		-127.8754	192.2482	-0.67	0.506	-504.6748 248.9241
y2011		-14.17369	190.1517	-0.07	0.941	-386.8643 358.5169
y2012		-97.1803	194.1575	-0.50	0.617	-477.7219 283.3613
_cons		5121.225	725.1998	7.06	0.000	3699.859 6542.591
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It is found that implementation of innovation products and performing different innovation expenditures is related with the increase of non-renewable energy resources use. An increase in every ten mln. UAH invested in innovation expenditures per year increase annually the use of nonrenewable energy resources by 8.7 mln ton (in terms of oil equivalent) per region. The last suggest about the necessity to change classification of innovation expenditures at last they should not increase the use of nonrenewable energy resources, on the contrary it should decrease and the use of renewable resources should be stimulated. It is seen from the Tab. 3.2 that starting 2008 year the time dummies become insignificant for the consumption of non-renewable resources, which could mean that unobservable energy factors price increases were not significant for domestic energy consumption.

Cost savings are considered to be one of the key factors of energy efficiency increase and reduction of material use. During the rather long time Ukraine was exporting Russian gas at 50 USD per thousand of cubic meters. The first Ukraine-Russia gas conflict ended with two times gas prices increase in 2006 with following prices increases up to 130 USD in 2007. First gas price fluctuations were not critical for domestic chemical and metallurgical producers and the rates of GDP growth were positive in those years due to increased demand for steel and chemical on

world markets. However, a number of Ukrainian corporations started to prepare for possible gas problems several years before the first gas conflict was launched. Thus, Azovsteel started a program of substitution of gas for coal in steel melting in 2005. Similar modernizations were performed by many other chemical and metallurgical plants.

The experience of Central and Eastern European countries has many positive examples in reducing energy dependency due to increased energy efficiency. For example, Poland, Check Republic and Hungary have reduced energy resource consumption from 0.8 kilogram of oil equivalent in 1991 to 0.39 kilogram per one USD of GDP in 2012. The improvement in energetic sphere in above mentioned countries was achieved due to development of small in medium scale enterprises. In case if Ukraine would achieve the average European energy efficiency indicators it would save 31.9 mln. tons of oil equivalent. The last is compared with gas volumes imports from Russia, which was about 38 mln. tons of oil equivalent in 2008-2012 [15; 16].

One of the reasons for slow implementation of sustainable development concept in Ukraine is the inherited industrial sector from former USSR and related problems of economy restructuring. Also to the relevant causes of environmental problems in Ukraine are attributed rather long-lasting governance loyalties to polluting industries, absence of appropriate conditions for other economic model building, low level of ecological culture among population.

Success in sustainable economic development greatly depends on human ability to effectively transform economic systems towards their permanent perfection and a decrease of nature intensity use. Specification of “greening” allows us to formulate local objectives for transformation of the economies as follows: restructuring of the economy, restructuring of enterprises, removal of needs with respect to not environmentally friendly products or services, change of ecologically non-friendly technological processes and lowering of the resource capacity of the products. Among most valuable factors that promote eco-innovations are cost savings motives, productivity improvements, supply chain pressure, networking activities, environmental management systems, extended producer responsibility, R&D activities, and industrial relationships. The demand (*push-strategy*) in eco-innovation fostering is appeared to be more effective than the supply (*pull-strategy*) as it can be seen from EU countries experience.

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### 3.2 NEOINDUSTRIAL DEVELOPMENT OF THE EUROPEAN CHEMICAL INDUSTRY: PROMISING TRENDS AND OPPORTUNITIES FOR UKRAINE

Chemical industry is an important sector of the European economy. It provides annual sales for over €600 billion (including 85 % – in the countries of European Union 28) [1].

Nearly two-thirds of EU chemicals are supplied to the industrial sector (rubber & plastics, construction, pulp & paper, automotive, basic metals, textiles, fabricated metal products, machinery & equipment, food & beverages). The main non-industrial customer sectors are health & social work and agriculture.

In the structure EU chemicals sales specialty chemicals (auxiliaries for industry, paints & inks, crop protection, dyes & pigments) include 28.0 %, petrochemicals – 26.3 %, polymers (plastics, synthetic rubber, man-made fibres) – 20.1 %, basic inorganics (fertilizers, industrial gases) – 13.1 %, consumer chemicals – 12.5 %.

During the last 20 years (1995-2015) EU chemicals sales were 1.6 times increased, but their share in the world chemicals sales was reduced from 32.3 to 14.7 % (Fig. 3.2).

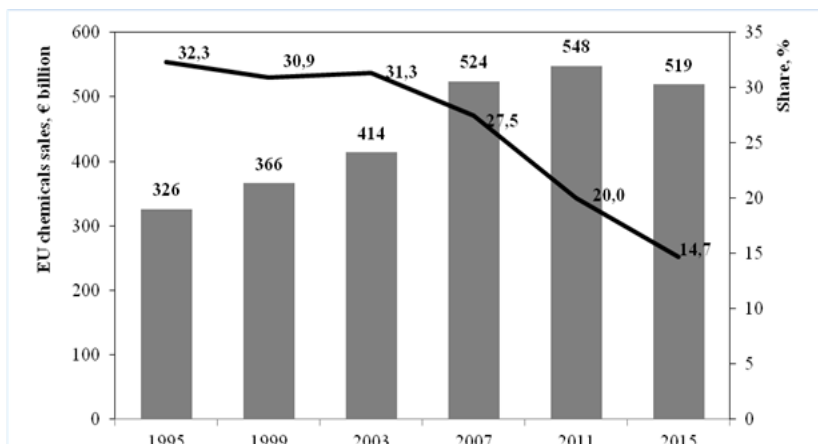


Figure 3.2 – EU chemicals sales and world share [1]

After post-crisis renewing in 2010 the European chemical industry reached stagnation stage. Its annual increasing rates do not exceed 1 % with average rates of the world production growth 3.5 % (Fig. 3.3).

High concentration is peculiar for the European chemical industry: 84 % EU 28 chemical production is located in seven countries: Germany, France, Italy, Great Britain, Netherland, Spain and Belgium. They have large-tonnage basic productions and obtain benefits from their

intermediate chemicals use in the industry of other countries. However a number of small countries (for example, Ireland) produce special chemicals and actively join the global value chains at their final stages.

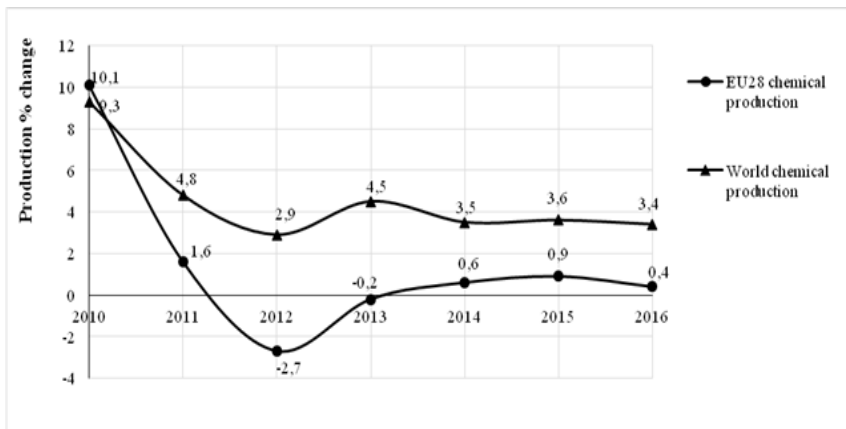


Figure 3.3 – EU and world chemical production change [2]

18 European companies, particularly 6 German companies, 3 Holland companies, 3 Switzerland, 2 French and 1 company from Great Britain, Belgium, Austria and Norway were included to the rating Global Top 50 Chemical Companies of 2016 [3]. Top 10 European Chemical Companies are demonstrated in the Tab. 3.3.

During the long time European chemical companies realized traditional strategies, based on added value from fixed assets use. In 1970-1980s main attention was paid to the improving of basic functions and technological processes. The key trend of 1990s included consolidation and restructuring, which were to get great production and to reduce cost.

Such strategies use in the pre-crisis period provided chemical business with high effectiveness, which exceeded proper indexes of such industries as metallurgy and woodworking industry. However crisis in 2008-2009 demonstrated that their potential was greatly exhausted.

One can observe graded loss of competitiveness by developed and European countries at the large-tonnage goods markets owing to high price on the raw materials. At the modern stage neoindustrial approach is a basis of European chemical corporations, grounded in diversification of investment portfolio and concentration of production around key competence and those business fields, where companies have the most unique advantages. The last are provided by active development of deep processing high technologies and other innovations.

Table 3.3

## Top 10 European Chemical Companies [3]

Rating position of Global Top 50 Chemical Companies of 2016	Company, headquarters, sector	Chemical sales, mln. \$	Operating profits, mln. \$	Chemical assets, mln. \$
1	BASF, Germany, Diversified	60654	6396	70491
7	LyondellBasell Industries Netherlands, Petrochemicals	24624	5638	n/a (no data available)
8	Ineos Group Holdings, Switzerland, Petrochemicals	23530	4780	n/a
11	Air Liquide, France, Industrial gases	19554	1915	44721
14	Linde, Germany, Industrial gases	16489	2454	n/a
15	Akzo Nobel, Netherlands, Diversified	15719	1663	17932
17	Evonik Industries, Germany, Diversified	14097	1727	21751
21	Covestro, Germany, Diversified	13180	1396	11331
22	Solvay, Belgium, Specialty Chemicals	12626	1462	26733
23	Yara, Norway, Agrochemicals	11577	1045	14357

Within the framework of this approach, many companies participate in various added value chains. For example, company BASF does not sell its paints to automakers, but dyes cars, produced by the leading auto groups. Using its advantages concerning dyeing processes and chemical technologies, BASF greatly increases quality of works and reduces consumption of paints and varnishes.

Changes in commodity and geographical structure of production caused new tasks of the corporative development and appearance of new mechanisms to increase competitiveness. Assets restructuring became popular as one of tools in corporate and intersectoral resources redistribution depending on the market situation.

The first steps in that field were connected with disposition of surplus and non-core assets in basic chemicals production, consolidation of resources on the level, next vertical integration of production at the international level and formation of global value chains. Therefore, such corporative tasks were solved as to reduce competitors' number, to extend market share, to focus production of basic chemicals by large companies.

Principally another approach was used at the markets of small-tonnage narrow-specialized goods, production of which was based on expensive R&D results. “Soft” (non-property) forms of the intercompany cooperation became popular at the initial stages of the innovative process, when companies coordinate investigation of the complementary technologies and exchange non-material assets.

It is reasonable to mention that chemical industry belongs to one of the most innovatively active sectors and drivers for other economic spheres development. Generating its own productive and technological innovations, this sector creates a platform, stimulates activation of innovative processes and realizes sustainable development strategies at all stages of global value chains.

It is clear that production of high technological goods requires great investment into the fundamental and applied scientific research. That is why, level of R&D intensity is a key factor for European countries, which defines chemical industry competitiveness. Fig. 3.4 proves that, in the EU chemical industry annual cost for R&D exceeds €9 billion, and their share in sales is 1.8 %.

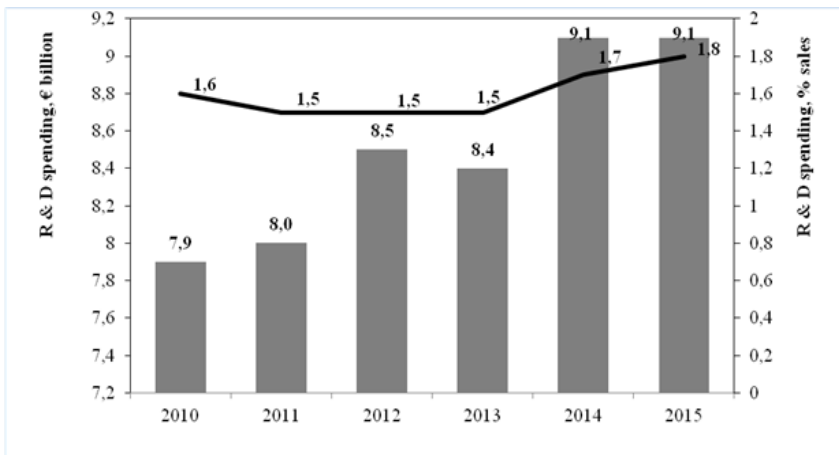


Figure 3.4 – R & D spending in the EU chemical industry [1]

Last year company BASF spent on R&D €1.863 billion, directing them within three global technological platforms: Process Research & Chemical Engineering (Germany), Advanced Materials & Systems Research (China), Bioscience Research (USA). Almost 10 thousand people are engaged in the sphere of company R&D.



Its focus areas in research are derived from the three major areas in which chemistry-based innovations will play a key role in the future: resources, environment and climate; food and nutrition; and quality of life. For instance, in 2016 BASF established the Amsterdam-based Synvina S.V. joint venture with Avantium to produce and market furandicarboxylic acid (FDCA) from renewable resources on an industrial scale. The most significant use of FDCA is the production of polyethylenefuranoate (PEF), a new polymer used for applications such as food and beverage packaging [4].

Generally, analysis of international practice to form and to realize strategic fields of the chemical production development show that choice of these directions within national industry depends on the character of existed and (or) potential competitive advantages and possibilities to involve and to fulfill them in the global added value chains. It is possible to distinguish two directions today: (1) development of the large-tonnage basic chemical production (early stages of chains), based on access to the cheap resources, high effective technologies of their use and favorable logistics; (2) development of the science-intensive ecologically safe low-tonnage productions in the segments of special and fine chemistry (final stages of chains), based on the innovative technologies.

Current European variant of the neoindustrial model in the chemical industry pays attention on the following top-priority directions:

- Climate action, environment, resource efficiency and raw materials;
- A sustainable and inclusive bioeconomy;
- Secure, clean and efficient energy;
- Health, demographic change and wellbeing;
- Smart, green and integrated transport;
- ICT and the chemical industry: smart process and smart materials [5].

New modern filling of the European industry development neoindustrial model is linked to the concept Industry 4.0, which shows perspectives and problems of cyber-physical systems mass adoption into production and various spheres in human activity.

This concept appeared in 2011 in Germany to indicate the process of global value chains radical transformation. Then the conception Industrie 4.0 (in German variant) was being developed as a coordinated initiative of the scientific community, business and state structures on national resources mobilization to fasten technological changes and to provide strong international positions of Germany in the global industrial production [6].

Recently this conception attracted attention by an active discussion at the World Economic Forum in Davos and when its Head – Klaus Schwab published a work with the same title [7].

Sectoral aspects of the Fourth industrial revolution bases implementation in the chemical industry is realized by way of Chemicals 4.0 conception formation. It is a leading conceptual approach to take chemical technologies, productions and markets to a new level owing to the systematic use of smart innovations and information and communicative technologies. Leaders of the global chemical business see great potential of Chemicals 4.0 and its value to save (increase) competitive advantages in the nearest future and make efforts to provide their leading positions in the smart neoindustrialization processes.

The problem of conception Chemicals 4.0 content and peculiarities, its realization forms and possible consequences, approaches to use separate (initially, digital) technologies and organizations and to develop chemical production using smart innovations, is a subject for active scientific and analytical studies, applied investigations and sectoral discussions [5, 9 – 15].

Transformations, based on Chemicals 4.0, are related to the chemical production intellectualization, its automatization, digitalization and smart technologies introduction. Modern approach provides using of ICT-systems and digital innovations along the whole value chain, including modeling, design, operation, logistics, management and control of the chemical production. Innovations, created under support and based on ICT, provide reducing of time to produce goods and technologies (by 20-40%) and to save the proper cost.

New opportunities in chemical business are given by the conception Internet of Things. It observes objects' nets, which have built-in devices to transmit and exchange data between physical world and computer systems. These abilities are linked to new production output, to production efficiency and quality increase, technical provision improvement, new partnering, cost reduce, minimization of problems in supply chains and security strengthening.

The popular problem in the chemical industry includes emergency shut-down and off-schedule technical service. Smart technologies suggest solving this problem on the basis of predictive service through transducers, analytics and data in the real time regime, that lets to prevent from failures and to react the crucial situations quickly.

Significant features of Chemicals 4.0 are goods and service individualization processes and production customization. It allows to use long tail strategies, to avoid price competition and to generate added value. So far as interrelations between consumers and digital space are being increased, and individual likes analyses possibilities are being raised, the same situation is with proposals setting individual possibilities.

BASF completely automated production of liquid soaps at its smart pilot plant in Kaiserslautern. Once a user places an order for a customized soap, the radio-frequency identification tags attached to the soap containers inform the equipment on the production line via wireless network connections about the desired composition of the soap and packing – thus enabling mass customization without human involvement [12, p. 1].

Industry 4.0 helps chemical enterprises to plan their supply chains owing to visibility improvement of processes inside chains (considering final consumers' needs). Besides, prediction of the demand models, based on Big Data, gives an ability to prevent great difficultness, peculiar for chemical markets, to reduce risks and operatively to rebuild productive systems and supply chains. For example, the forecasting model of the company BASF includes both internal relevant information, particularly, strategic information, and data about external factors motion (seasonal effects, shifts in allied sectors, normative changes) [12, p. 7].

In the Chemicals 4.0 environment some enterprises' borders are shifted, productive and economic systems become more open and clear. New technologies assist development of different integration forms and out-sourcing processes activation.

In spite of traditional approaches, which provide complex control of vertical and horizontal synergy, in Chemicals 4.0 more self-organized coordination is added via Internet of things, which builds speed and assists flexibility and new synergy type. Strategic focuses are shifted to productive and sales chains and virtual partnership relations.

An important constituent of the modern transformations is industrial digitization. Deep digital transformations occur also in the chemical sector: companies carry out digitization of main functions both in internal systems and with partners along the whole value chain. Besides, they extend their products portfolios with digital functions and introduce innovative service, based on data.

Digitization of chemical enterprises provides consecutive realization of three approaches: digital transformation of the current processes (by experience of other sectors, an expected profitability increase is 5-10 %), data based operating model (10-20 %), digital business model (20-30 %) [13, p. 7].

Today most foreign companies, captured by abilities of business digitalization, do not grow out of the first approach, where popular tools as sourcing platforms, omni-channels etc are added to the main processes. Such an approach is reasonable in the short-term period.

Over the medium term, it is reasonable to focus on the second approach using information and channels to improve service for clients. Only an integral approach, which comprises

processes, resources, strategies, management systems and IT-infrastructure, will let to realize great potential Chemicals 4.0 and is a long-term guide of business digitization.

Thus, chemical companies can use technologies of Industry 4.0 to improve business operations via digitization, optimization of the productive processes and material-energetic flows, control of security, to strengthen market positions via investigation and smart production, to use collective competences and great deal of information owing to the cooperation in value chains, and to look for ways to develop own business with the help of modern materials, intellectual chemical substances and new service proposals.

The given peculiarities of Chemicals 4.0 prove a significant change of principles to organize and to control chemical production. Study and involvement of the European experience is necessary to form the concept smart neoindustrialization of Ukrainian chemical industry.

Nowadays chemical industry in Ukraine, mostly its basic sectors, is in crisis, caused both by long-term systematic misbalances and situational factors. Analysis of the main industry indexes dynamics proves that in 2015 it decayed, and the chemical production growth did not provide for 1.1 % stable trend development in 2016. Negative results of the first month in 2017 confirm weak feasibility of the current model in chemical industry.

Traditional actions use, oriented to support feasibility and resource-effectiveness of the technical and technological base, is able to continue the life cycle of the current chemistry production, but it puts off their fall and liquidation only for several times. It is necessary to use this time in favor development and introduction of chemical industry new model development, which would agree modern global neoindustrial changes and challenges within Industry 4.0.

To authors' minds, policy to realize neoindustrial model in the chemical industry of Ukraine has to pay attention to two strategic directions: (1) reindustrialisation, i.e. to return to basic large-tonnage chemical production profitability and to prolongate the product chains on their base; (2) diversification and search of national productive and technological niches in the global added value chains, particularly at their final stages, by way of knowledge-intensive low-tonnage production creation in the special and fine chemistry, based on the innovative technologies, energy- and ecological efficiency.

Among the perspective directions of innovative chemical goods production with high added value, which have great market potential, taking into account import substitution, one can

distinguish complex mineral fertilizers and other agrochemicals, paint materials, reagents to clean natural and sewage waters, retardants, household chemistry goods, detergents and cleaners, materials for modern diagnostics methods, additional chemical material for food production, pharmaceuticals etc.

We suppose that the main role in these processes have to play productive and innovative structures of medium and small-sized business. These agents (not large enterprises, which mostly operate resource-intensive productions of low technological conversion and do not have experience to realize active innovative competitive strategies) have to be the base for new smart industrialization of chemical industry in Ukraine. It will allow to reach the world chemical production, to form forward-looking development strategy, orienting on high technological stages of the global production chains.

Based on the carried out research, it is reasonable to make the following conclusions.

Low dynamics of the European chemical industry development preconditions the necessity to find innovative conceptions, focused on great change of business models and principles to organize chemical production in the direction of the smart innovations and information-communicative technologies systematic use.

Chemicals 4.0 become the conceptual base of the European chemical business strategic development. It regards smart technologies as one of the main directions to increase the efficiency, competitiveness and chemical production safety, to provide innovative other economic sectors with innovative materials, and to harmonize relations with environment.

Potential of the Ukrainian chemical industry competitiveness traditional model, based on large-tonnage production operation, is being constantly exhausted. New strategic possibilities of its development have to connect with organization of low-tonnage innovative productions within prolongation of domestic production chains and local competitive advantages realization in the global value chains.

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### **3.3 INNOVATIVE PROJECTS OF INTERNATIONAL ORGANIZATIONS IN UKRAINE**

The formation of ecological consciousness is one of the most important prerequisites for sustainable development. Universities play a special role, since it is here that the foundations for the worldview of highly qualified personnel who will continue to make responsible decisions, introducing approaches socially responsible attitude towards nature and to join the UN Global compact. Greening the manufacturing sector companies is a fundamental policy direction of European integration and ecologization of knowledge of the Bologna process, joined by Ukraine.

The first phase of the concept provides for the development of effective cooperation of interested groups, local government and industrial institutions in the sphere of solid household waste (SHW). The essence of the conceptual approach lies in the effective cooperation of community business and government bodies to provide a comprehensive approach to solve. The aim of the project is the development of environmental awareness and systematic management of the learning process. The project involves the revitalization of the scientific community, collaboration with local governments and business organizations, which will reduce the burden on the environment, saving costs on energy and resources. The transition to the European system of separate waste collection allows a 35 % reduction in load on the landfills, which are powerful stationary sources of pollution of landscapes of Ukraine [1].

Universities in the USA, Canada, Western Europe and China are already actively implementing projects like “Green campus” or “Green Office”, which allows them to contribute to the formation of ecological thinking, development of environmental consciousness. Among the national institutions implementing similar projects of Kyiv-Mohyla Academy, national aviation University, NTU KPI, Vinnytsia national technical University, national University “Ostrog Academy” and others [2].

It should be noted that the environmental problems of European integration of Ukraine has not received adequate and systematic awareness and understanding in the fields of government, political and corporate elite of the society. Unconsciously and extent of anthropogenic threats to the environment. It requires considerable activity of universities and scientific community, the formation of the national system of environmental management, the strengthening of the cultural and aesthetic perception of the landscape. The role of universities as focal points cannot be overemphasized. It is the universities that have the proper vote of confidence, because they stand outside of the party and political conflicts that are stable from the point of view of the organizational structure and carriers of advanced ideas of the XXI century.

There is a consistency of interests of local authorities, businesses and the scientific community, through the conclusion of voluntary environmental agreements. The methodology is based on the principles of sustainable development proclaimed by the UN Summit “planet Earth”, the Rio-92, as a means of overcoming traditional management approaches and stimulate ecological innovations in the sphere of SHW management.

A major problem is the imperfection of administrative decisions. In Ukraine has not yet formed a national system of environmental management in its European system of integrity in government, public and corporate (business) environmental management. At the current time is

dominated by the state control system in the field of environmental protection, the powers and functions which are defined by the Law of Ukraine “On environmental protection”. The state actually “monopolized” environmental responsibility, which led to the weakening of the responsibility of users of natural resources – business entities. The EBRD as part of its Sustainable Resource Initiative (SRI), is actively promoting investments and policies focused on waste minimization, waste management and recycling practices across all countries of operations. The EBRD launched the Project: *Supporting Investments in Sustainable Municipal Solid Waste Management and Recycling in Ukraine* and International Consultants, Ramboll, have been engaged to assist the Bank in identifying suitable projects in this regard.

The Bank, together with its Consultant, is seeking to identify 5 municipal solid waste (MSW) management and/or recycling investment projects in Ukraine and to develop Pre-Feasibility Studies for the projects identified. To this end the Bank organized a Stakeholder Workshop/Marketing Event in Kiev in October 2015 and one of the key conclusions from this event was that there is a significant level of interest among private companies in investing in the MSW sector in Ukraine.

As a follow up to the Stakeholder Workshop/Marketing Event the Bank is seeking Expressions of Interest from investors/companies who are interested in developing an investment project in the sector in question. Those interested are requested to complete the Expression of Interest Form in order to provide sufficient information to the Bank to enable the identification of 5 suitable projects.

The Bank’s Consultant (Ramboll) will assist the Bank in the identification and short-listing of suitable projects and will prepare Pre-Feasibility Studies in respect of the short-listed projects.

Following receipt of the Expressions of Interest the EBRD, together with its Consultant, will seek to identify a short-list of not more than 5 projects. The Bank’s Consultant (Ramboll) will then prepare Pre-Feasibility Studies on the short-listed projects. Based on the outcomes of the Pre-feasibility Studies, the Consultant will rank the projects according to their market potential and technical advancement, and will support EBRD in discussions with the potential investors on implementation aspects of the project, where deemed necessary by the Bank.

In order to identify a short-list of suitable projects the Bank reserves the right to discuss the projects indicated in the Forms with the interested parties.

We took part in this project. Nikita Gromyko – the founder, the general director and the owner of the company WASTE MANAGEMENT SYSTEMS INC received an invitation to participate and passed into the top five projects (Tab. 3.4).



Table 3.4

## Completion of expression of interest form [3; 4; 5]

Topic	Response
	Details of Investor/Company
1	2
Name of Company	WASTE MANAGEMENT SYSTEMS
Type of Company	Limited Liability Companies (LLC)
Structure of Company	<p>The structure in which the members participate directly in LLC management is known as a “member management” structure. The Company is a hybrid business structure that combines the shareholder protection of a corporation with the pass-through benefits of a partnership.</p>
Activities of the Company	<p>We produce concrete wells for MOLOK DOMINO semi-underground garbage containers in Kiev, by using specially designed moulds produced in order to get the best possible quality in this regard and we sell these concrete wells back to our partner in Finland for future installation. We use these concrete forms for installations at our local customer’s locations in Kiev and Kiev regions. More than 250 containers have been installed up to this point and all contracts have been signed for 25 years of service.</p> <p>Our company collects MSW from its own containers on a daily bases by using our own waste collection trucks. We have specially designed equipment produced in Germany in order to be able to regularly wash (i.e. once a month) each of the MOLOK DOMINO containers. All MSW comes to our own materials recovery facility (MRF) which is located 12 km away from the Kiev city border, for further treatment. We extract 14 types of recyclables out of the incoming waste stream and we sell these recyclables into the Ukrainian open market. Our MRF facility works with two shifts and sorts about 200 tons of MSW per day, 6(six) days a week.</p> <p>We have 6 contracts with Remondis, Altfater, SpetzCommunTechnika, BrovaryCommunService and two local villages to receive enough MSW from them, which secures an incoming waste stream to our existing MRF. All these companies can supply us with additional volume on a daily bases.</p> <p>We currently charge 85 hrivnas per ton to all our MSW suppliers. On a daily basis we capture 30 tons of MSW from our own semi-underground containers, 70 tons from Remondis, 50 tons from Altfater, 50 tons from SpetzCommunTechnika and 10-20 tons periodically from other haulers. Our Company uses ZERO WASTE technology in all its operations. The “tale” (i.e. residual waste material) goes directly to Kiev local incinerator plant “ENERGIA”.</p>

Table 3.4 continuation

1	2
Brief History of the Company	<p>The Company “Waste Management Systems” was founded in 2010, and is a pioneer in the application of innovative European technology for collection, removal and recycling of waste in Ukraine by using semi-underground containers at its operations.</p> <p>The collection of waste in large-capacity, semi-underground containers have changed the perception of the residents of urban and rural settlements of MSW management.</p> <p>The basic concept is to use the vertical type of container, with two-thirds of the container placed under the ground. This design when compared to the traditional MSW collection systems, gives customers significant advantages: large capacity, longer intervals between emptying containers, improved hygienic conditions, better user convenience and better use of space in the territory.</p> <p>The containers also prevents incursions by the informal sector who regularly steal recyclables from traditional containers and this means that our Company via our MRF is able to extract much more recyclables from the incoming waste stream, compare to the waste stream coming from regular 1.1 m<sup>3</sup> wheel containers. We typically extract less than 8 % (by weight) of recyclables from our contractor’s MSW and up to 30 % from our semi-underground containers.</p>
Current Resources of Company, including Manpower	<p>Manpower Resources LLC is a small staffing company that provides qualified and competent skilled workers to various contractors across the UKRAINE. Within its current resources, WMS provides innovative services in MSW collection by its use of deep collection containers. The Company does not have any debt and has grown organically on the basis of its financial resources.</p>
Contact Details	Name of Contact Person: NIKITA GROMYKO
	Position Within Company: CEO
	Telephone Number:
	Email Addresses: info@wasteua.com
	Company’s web site: http://wasteua.com
<b>Description of Proposed Investment Project</b>	
Name of Project	Comprehensive system of treatment of solid domestic and other waste including production of electricity from biogas and extraction of recyclables.
Description of Proposed Investment Project (e.g. processes, technologies, treatment methods to be applied, as applicable)	<p>The comprehensive system of treatment of MSW management, including:</p> <ol style="list-style-type: none"> <li>1. Increasing the production and installation of deep collection containers (semi underground waste containers type);</li> <li>2. Modernization of the fleet in terms of purchasing refuse collection trucks that are designed to completely eliminate cross-contamination. Each collection truck has two separately operated compartments which makes mixing of the two fractions impossible. The reliability is guaranteed by the simple design. It is built on chassis with a capacity between 18 to 26 tonnes;</li> <li>3. Construction of a modern materials recovery facility – MRF (1,500</li> </ol>

Table 3.4 continuation

1	2
	<p>tons of MSW per day or 400,000 tons per year) with extraction of organic waste, in addition to extraction of recyclable materials.</p> <p>4. Construction of biogas (i.e. methane) treatment facility in order to generate electricity at the final stage of this step.</p> <p>5. Purchase of large-capacity trucks (20 tons) with a moving floor in order to be able to move “the tale” of the MSW stream (i.e. the residual waste) to the local incinerator plant “ENERGIA” in accordance with our ZERO WASTE approach and in order to reduce transportation costs.</p> <p>6. Implementing new equipment to produce refuse-derived-fuel - RDF from “tale” (i.e. residual waste) and thus reduce the amount of residual waste to be sent to the local incinerator plant “ENERGIA”.</p> <p>7. Purchase of turner, shredder and trommel for production of better quality compost.</p>
Key Items of Equipment Required	Mobile waste-sorting complex. A complex utilising various items of mechanical equipment including: trommel screen(s), waste sorting line(s), washing equipment, crusher(s), magnet(s), storage bin(s), hydraulic press and baler, composting equipment and gas installations, etc.
Location of Project	Proleski village, Kiev region, re-cultivated landfill 12km away from Kiev city border towards Borispol International Airport. The site is 19 hectares in size.
Coverage of Project (e.g. Territory/Population Served)	West side of Kiev city and Kiev region.
Details of Ownership and Current Use of the Site	<p>WASTE MANAGEMENT SYSTEMS LLC Ukraine, 08322, 8 Pavlik Morozov Street, Proliski, Borispol region, Kiev Region. www.wasteua.com E-mail: <a href="mailto:info@wasteua.com">info@wasteua.com</a></p>
Key Stakeholders in the area (e.g. municipalities) and Their Role in Relation to the Investment Project	<ol style="list-style-type: none"> <li>1. “Volodar rose”, a company in private ownership, which services the Western side of Kiev city and has its own landfill, which is 38 km from the city border. This company is a Very strong competitor in terms of its ability to lobby its interests through local authorities.</li> <li>2. “Remoundis”, a German/Ukrainian partnership, services the West side of Kiev city.</li> <li>3. Number of different local municipalities (Kiev city, Kiev region and villages) with very corrupt structures.</li> <li>4. KievKommunService – a municipal company which plays a key role in Kiev city waste collection.</li> <li>5. All of these competitors use 1.1 m<sup>3</sup> wheeled containers in their areas of operations.</li> </ol> <p>Our company has its own MRF (manual picking line) and we only use semi-underground containers to collect MSW from our customers. “Volodar rose” also has a small picking line. Also KievEnergio has an incineration plant “ENERGIA” which burns 250.000-300.000 tons of MSW per year.</p>

Table 3.4 continuation

1	2
<b>Inputs:</b> Waste Stream Targeted – Inputs to Investment Project	Single stream collection and separate collection of recyclables in some areas. Our target is 1.500 tons a day.
Existing System for Managing the Waste Stream Targeted	Our company owns 7 waste collection trucks with cranes. The MRF has a capacity of 200-250 tons of MSW per day. 400 concrete wells, ready to be installed, are stored at our facility in Proleski. We produce 12 new concrete wells per week. We purchase 54 lid sets for MOLOK DOMINO containers from our partner MOLOK OY in Finland every 3 months. We carry spare parts to fix our vehicles (e.g. trucks, excavators, bulldozers, and front loaders) and MRF in a timely manner on site.
Size/Scale of Project (i.e. m <sup>2</sup> , capacity in m <sup>3</sup> /year, m <sup>3</sup> /day, etc.)	Our new MRF would be able to sort up to 400.000 tons of MSW per year or 1,500 tons of MSW per day.
Waste Generation Figures - Current and Future Demand for Project	<p>We have 6 contracts with Remondis, Altfater, SpetzCommunTechnika, BrovaryCommunService and two local villages to receive enough MSW from them, which secures incoming stream of waste to our existing MRF. And all these MSW collectors can supply us with a lot more volume on a daily bases.</p> <p>We charge 85 hrivnas per ton to all our MSW suppliers as of now. On a daily basis we receive 30 tons of MSW from our own semi-underground containers, 70 tons from Remondis, 50 tons from Altfater, 50 tons from SpetzCommunTechnika and 10-20 tons periodically from other haulers.</p> <p>We will have to increase the input waste stream up to 8 times in order to supply the new MRF with enough MSW.</p>
Measures to Ensure Security of Supply of Input Material	<p>The project expects to fully provide itself with its own MSW materials, through the extension of the semi-underground waste collection containers to Kiev region and the Western side of Kiev city.</p> <p>All of our contractors will bring enough of MSW to our new MRF if we lower the price to 50 hrivnas per ton for incoming waste.</p>
<b>Outputs:</b> e.g. Secondary Raw Materials, Compost-like-Output (CLO), Refuse-derived Fuel, Energy Generated, as Appropriate to the Specific Project	<p>Recoverable fraction will be up to 15 % from a single stream input, plus 35% of organic waste will be used to produce electricity, and 10-15 % RDF.</p> <p>PET 1.4 %  HDPE 0.3 %  Glass 8.9 %  Black Metal 0.8 %  Paper + cardboard 7.2 %  Aluminium 0.037 %  Plastic film 2.82 %  Wood 0.13 %</p>
Markets for the Outputs (i.e. what facilities in Ukraine will use the outputs)	All recyclables will be sold to local (i.e. Ukrainian) manufactures, to give a second life to these materials. Compost will be used for local road construction purpose and to improve the soil enrichment of local parks.

Table 3.4 continuation

1	2
Total Number of Persons Directly Employed When Project is Operational	250
Summary of Environmental and Social Benefits from Project	<p>The purpose of the project –the creation of an integrated system of management of solid domestic wastes and other wastes in targeted cities and towns. This will reflect European best practice in MSSW management, and will result in an improvement in environmental and public health conditions in the region. Valuable components will be captured from the waste stream, including alternative fuel (RDF), secondary raw materials, biogas, compost and inert fractions. The problem of wild dump sites formed on adjoining urban areas, can be addressed by the introduction of a collection system for bulky and construction waste.</p> <p>In order to improve our service offering to supermarkets, markets, business centres, office centers, warehouses and logistics facilities, which daily produce large quantities of waste, including packaging waste, we propose the installation on their territory of special technological equipment – mobile and stationary compactors of different capacity. Our mobile MSW processing complex will contribute to reducing the amount of waste that must be disposed at the landfill to 30% of the total weight, as well as increase the volume of secondary raw materials and alternative fuels obtained by sorting and recycling waste.</p>
<b>Financial and Economic Analysis</b>	
Estimated Investment Costs (CAPEX)	27-30.000.000 EURO
Estimated Annual Operating Costs (OPEX)	6.000.000 EURO
Other Costs (e.g. rehabilitation and aftercare costs at the end of the life-cycle of the Project)	450-500.000 EURO
Sources of Financing for the Project and Amount of EBRD Loan Sought	90 % EBRD loan and 10 % own funds.
Sources of Revenue and Cost Recovery Aspects	Sales of recyclables and biogas, payments from our contractors for accepting MSW for further processing.
<b>Project Implementation Aspects</b>	
Current State of Development of Project (e.g. Business Plan prepared, design developed, permits applied for/obtained, etc.)	<p>The Company «Waste Management Systems» has considerable scientific technical, financial and economic, experience and expertise in the field of waste management.</p> <p>The Company has many years of experience in the development and implementation of innovative systems for the collection, transportation, sorting, recycling and safe disposal of MSW, in cooperation with leading foreign companies in this field, including</p>

Table 3.4 continuation

1	2
	<p>producers of processing equipment. The Company has exclusive rights for the installation of innovative containers, and for equipment for energy production, all of which confirms the status of the company «Waste Management Systems» as the market leader in MSW management in Ukraine.</p>
<p>How will Project be Procured/Implemented (i.e. overall project or phases/components of Project)?</p>	<ol style="list-style-type: none"> <li>1. Implementation of extraction of organic material from existing MSW stream.</li> <li>2. Construction of mechanical biological treatment (MBT) plant to process organic waste and to produce refuse-derived-fuel (RDF).</li> <li>3. Purchasing new waste collection trucks, shredder(s) and trammel(s).</li> <li>4. Construction of new materials recovery facility (MRF).</li> <li>5. Construction of processing plant to produce second hand granules from recovered plastic and other high margin goods from captured recyclables.</li> </ol>
<p>Timeframe for Implementation</p>	<p>Over the period 2016-2020</p>
<p>Key Risks Associated with the Project (e.g. changes in legislation, changes in taxation, instability within public authorities, currency risk, legal and contractual risks, insurance risks, technological risks, demand risks [i.e. in respect of input and output aspects], lack of availability of suitable personnel, force majeure risk, etc.)</p>	<p>Possible risks of the implementation of the business project are:</p> <ul style="list-style-type: none"> <li>– Political risks (instability of the political authorities, changes in legislation, etc.);</li> <li>– Economic risks, in particular: <ol style="list-style-type: none"> <li>1. Investment risk – associated with the possibility of devaluation of the financial investment portfolio;</li> <li>2. Currency risk – associated with possible fluctuations in market rates (i.e. exchange rates hryvnia and other currencies);</li> <li>3. Legal risk – associated with improper or illegal paperwork, contracts;</li> <li>4. Insurance risk – the risk of the insurance company related to the adequacy of the formation of insurance rates;</li> <li>5. Innovation risk – the risk of deviation from the target in the case of investments in the production of innovative product research and development work;</li> <li>6. Insufficient supply of highly qualified personnel. <ul style="list-style-type: none"> <li>– Instability of tax policy;</li> <li>– Technological factors;</li> </ul> </li> </ol> </li> <li>– Insufficient development of logistics infrastructure.</li> <li>– Force majeure (war, risk of natural disasters, loss of property in case of fire, etc.).</li> </ul> <p>One of the economic risks is marketing risk, which relates to market conditions.</p> <p>No less dangerous is the risk of price changes.</p>
<p><b>Statutory Process Requirements</b></p>	
<p>Details of Statutory/Regulatory Compliance Requirements for Project</p>	<p>The basis for the development of the investment project “Creation of an integrated system of solid domestic and other waste in cities and towns” are the EU Directives” On the packaging and packaging waste “(94/62/EC, the EU 2004/12),” On the landfill waste (1999/31/EC), “waste Incineration” (2000/76/EC), “Waste Framework Directive”</p>

Table 3.4 continuation

1	2
	(2006/12/EC), “reporting” (91/692/EC) and the regulations in force in Ukraine.
Permits Already Obtained	Permits are available but some of the development of the investment project requires further negotiation during the development stage.
Further Permits Required for Project	Necessary permits for construction work.

The European Bank for Reconstruction and Development is an investment mechanism created in 1991 by 61 countries and two international organizations to support a market economy and democracy in 34 countries – from Central Europe to Central Asia.

The EBRD provides a comprehensive support package for Ukraine to assist its stabilization and the anchoring of its reforms.

The WMS INC project entered the top five projects in its field, but, unfortunately, due to the raider seizure of the enterprise, in today’s conditions the company temporarily suspended its activities.

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### 4.1 METHODOLOGY OF THE REGIONAL ENVIRONMENTAL AND ECONOMIC SECURITY IN THE CONTEXT OF SUSTAINABLE DEVELOPMENT REGULARITIES

Taking into account a significant factor for introduction of the sustainable development regularities, the economic, environmental and financial security plays an important role for regions in the country. It provides a possibility of active control on the part of regional authorities concerning an effective use of resources, economic growth, environmental stabilization and citizens' welfare ensuring. The investigation of technique to evaluate and to generalize current approaches to the existing methods, which consider sustainable development regularities, is urgent to study security thoroughly and to estimate it.

The regional economic and social development strategy defines aims and priorities and determines directions of the economic security monitoring, where evaluation has to be an important link.

Theoretical and methodological aspects of the economic security evaluation technique for Ukraine were studied by the following native scientists: V.I. Hrushko, V.S. Sidak, V.H. Alkema, V.V. Kuzmenko and others. Specialists focus their attention on the national level of the state security, leaving aside regional peculiarities and three constituent of the sustainable development. There are interesting investigations of V.K. Antoshkin, who suggested principles of the regional economic security, based on regional economy development degrees. At the same time, scientists proposed criteria to evaluate economic security, which include: parameters of the economic growth (dynamics and structure of the national production and income, indexes of industrial production amounts and rates, capital investment etc; indexes of the natural and resource, productive, scientific and technical potential of the country; indexes of dynamism and economic mechanism adaptiveness and its dependence on external factors and indexes of people's quality of life [1] Observing these criteria it is reasonable to mention that they are all based on indexes, which define national, but not regional level. That is why, we suppose that it is irrelevantly to use them without proper correcting.

Kovalska L. and Savosh L. [2] suggested determining level of regional security on technique of real data comparison with indicators of the destabilizers level. Therefore indicators are observed as "guiding points of development, which define a negative processes limit, setting a signal to market participants about possible unfavorable spheres, decrease of the national security global level, and allow to evaluate quantitatively and to signalize about future danger, to carry out a number of program-focused measures concerning situation stabilization" [2, p. 91].



A generalized analysis of special literature lets to conform that regional development is defined, on the one hand, by resources potential, and on the other hand, on the activity efficiency. Level of the regional development is characterized by two blocks of indexes:

- 1) economic indexes, which define conditions and level of economy management;
- 2) environmental indexes, which outline results of the economic and vital activity.

The first block includes indexes which are relevantly to be divided into such factorial groups: natural, historical, demographic, social and economic, material and technical, political and legislative-regulatory. The second block includes indexes, which show the condition of environment, people's health, standards and norms. According to the above it concerns the determination of the environmental & economic security, which is observed as a state's protection from existing or potential possible economic and environmental threats [3, p.79].

Modern environmental crisis threatens the possibility of social sustainable development. Further degradation of the natural resources leads to the loss of its ability to support a necessary level of the environment. It is clear that introduction of the "mechanic" levers is impossible under modern conditions, that is why in order to prevent from the existing situation it is possible only to form the interconnections between people and nature, oriented to stabilize ecological situation, using environmental security regulations. Nowadays there is a stable tendency of consequences number and severity, caused by natural and technogenic situations, which comprise Ukrainian regions. It can lead to irreversible changes of the environment and has a negative impact on the economy and security of regions and country in general. That is why without necessary measures to activate and to improve regional environmental policy in the near future, the country's economy will not be able to cover all cost.

During the long time "environmental security" was understood as preservation and revival of environment. However, today's peculiarities have made essential corrections to conditions and directions in the given definition development, where economic factor is given a prior place. Today there are conceptual approaches to the profound interpretation of the concept "environmental security". They are reasonable to be united into the following ones:

1. Balanced approach. It is based on the objectives of the ecological balance support, which provides parity development of the environment and a human. M.F. Reimers and T.A. Khoruzhaya support this approach.

2. Protective approach is based on society's awareness of catastrophic situation with the formed type of economy development. It will cause increase of the load on environmental systems and assists necessity to introduce urgent measures concerning environmental protection. P.R. Kondratyev, L.O. Dobryanska, P.V. Shelest. D. Hutson are supporters of this approach.

3. Predictable and modelling approach, oriented to investigate special optimal criteria, which provide environmental efficiency to use the territory. Founders of this approach are L.H. Melnyk and L.M. Cherchyk. Z.V. Herasymchyuk suggests to observe organizational providing of the environmental security in the region as “interconnected essence of aims, principles, functions, methods and tools, which allow to organize, regulate and coordinate the process to achieve and to support optimally necessary level of the environmental security in balance with its economic and social development” [4, p. 98].

The research and analysis of the current approaches to render the observed definition allowed to give personal understanding of the existing ones. To our minds, the environmental security consists in the complete functioning and further development of any social and economic system with balanced use of its internal and external factors and setting of the favorable conditions for its living elements.

The most significant problem of the environmental security is recreation areas activity, which mostly responds to those activities, which are able to worsen its recreation peculiarities preservation and renewal conditions. According to the Russian scientists’ calculations, the recreational territories investing is characterized by the economic effect growth 3.71-4.26 units [5, p. 89].

Recreational territories are characterized by wide exploration, which includes richness with elements of natural objects. Using this criterion it is reasonable to carry out functional structuring of the recreational territories distinguishing a rank by each type. Later an average value of the weight rating was defined, and it allowed distinguishing separate regions in the country, which have maximum, provide the recreational territories development (Tab. 4.1).

Table 4.1

Functional structure of the health and recreational lands in Ukraine

Region	Health and recreational lands, ha/rating				
	Nature preserve	Health	Recreational	Historical and cultural	Average rating
Donetsk	142.70/5	0.50/8	9.41/4	2.30/6	5.75
Prydniprovsky	93.3/7	1.57/5	6.62/5	1.01/8	6.25
Eastern	430.86/5	1.60/4	6.09/7	3.47/5	5.25
Polissya	477.51/3	0.94/7	6.31/6	14.11/1	4.25
Central	57.63/8	1.53/6	5.56/8	8.06/2	6.0
Podillya	444.58/4	1.88/3	18.17/3	3.51/4	3.5
Black Sea region	570.82/1	10.99/1	29.08/1	6.04/3	1.5
Carpathian	526.90/2	4.89/2	25.66/2	1.80/7	3.25
Total	2744.30	23.90	106.9	40.3	

Note: rating evaluation has reverse calculation.

The given data show reasonability to distinguish three regions, which have maximal rating: Black Sea region, Carpathian and Podillya. They have great health and recreational resources.

Odessa region, which is included to the Black Sea region, was chosen for research. It is divided according to the regional principle into the following constituents: Northern region (Ananiyevka region, Baltsky region, Kodymsky region, Kotovsky region, Savransky region), North-eastern region (Mykolayivsky region, Lyubashivsky region), North-western (Krasnoyoknyansky region), Eastern region (Berezivsky region), Western region (Velykomykhaylivsky region, Tarutynsky region, Frunzivsky region, Bolgradsky region), Central region (Bilyayivsky region, Kominternivsky region, Ivanivsky region, Ovidiopolsky region, Rozdilnyansky region, Shyryayivsky region), South region (Izmayilsky region. Tatarbunarsky region), South-western region (Bilgorod-Dnistrovsky, Artsyzsky region, Reniysky region, Saratsky region), South-eastern region (Kiliysky region) (Tab. 4.2).

Table 4.2

Functional structure of the recreational resources of Odessa region

Region	Health and recreational lands, thousand ha/rating		
	Resort and recreational	Tourist	Average rating
North	0.95/6	0.07/6	6.0
North-Eastern	0.03/8	0.01/8	8.0
North-Western	0.05/7	0.01/7	7.0
Eastern	0.32/7	0.78/4	5.5
Western	1.93/3	0.06/7	5.0
Central	4.43/1	1.98/1	1.0
Southern	1.33/5	0.21/5	5.0
South-Western	2.03/2	0.24/2	2.0
South-Eastern	1.65/4	0.87/3	3.5
Total	12.7	5.23	

Note: rating evaluation has reverse calculation.

There was a rating of health and recreational lands for the distinguished regions. It proves the existence of valuable recreational resources and possibility to use and to reactivate them. The largest rating was given to Central (1.0), South-western (2.0) and South-eastern (3.5) regions. In order to calculate it, the weight index was chosen for every region, particularly an area of health and recreational lands and was divided into a medium rating, the least and the largest ratings 8.0, 1.0 accordingly.

The recreational territories development gives an opportunity to influence the process of capital accumulation in the resort and recreation sphere that is possible while using such

economic instrument as budgeting. It is reasonable to reduce tax burden and to increase state budget cost to support service sphere, particularly – resort and recreational sector and tourism [6, p. 12].

Development of the recreational territories depends on demand for service, which is proposed to potential tourists. Stable growing of demand leads to the constant economic growth. However therefore there is degradation of ecological situation, connected with anthropogenic pressure on the territory. According to technique, proposed by the native scientist P.V.Hudzem, evaluation of pressure while using tourists’ distinguishing density index was carried out. The results of this evaluation are shown in the Tab. 4.3.

Table 4.3

Density of tourists’ distinguishing in Odessa region, persons/km<sup>2</sup>

Year	Regions								
	North	North-Eastern	North-Western	Eastern	Western	Central	Southern	South-Western	South-Eastern
2001	57.22	0.10	0.11	55.35	13.95	697.12	20.53	203.25	170.15
2005	61.22	0.13	0.15	57.60	15.05	712.35	24.02	208.65	176.85
2010	68.17	0.18	0.19	61.8	17.75	747.82	25.47	212.73	185.71
2012	68.91	0.18	0.20	63.57	18.23	756.11	26.31	213.92	186.85
2013	69.02	0.18	0.21	64.62	20.25	827.16	28.35	246.18	192.31
2016	69.8	0.18	0.22	70.85	58.91	1802.12	95.23	586.52	318.66

The given data prove the fact that main burden is put on the central and southern regions and tourists are concentrated in the small territory. It negatively influences the ecological situation. Besides, recreational territories are located under the influence of the non-stationary polluting sources, number of which is increased 3-4 times during the holiday season. We calculated economic loss, yielded by the recreational territories of Odessa region, that is 30.73 mln UAH and consists of: vehicle emissions (68.9 %), wastes, left by tourists (16.64 %), dust emission (14.46 %).

Thus, the recreational territories development depends on stabilization of economic and environmental constituents. The current organizational and economic mechanism does not provide solving of environmental problems. That is why, there is a necessity to investigate, to justify and to use market-oriented economic tools, which correspond to the today’s economic situation.

Nowadays there are various approaches to form technique to evaluate environmental security. One of them was chosen for further research, investigated by Crimean scientist, and is based on comparison of the environmental capacity and anthropogenic pressure on the environment [7, p. 193]. Tourists' impact on the components of the recreational territories environment during the holiday season, which leads to changes of their qualitative state, was chosen as an anthropogenic pressure. Therefore environmental capacity is observed from position of the distinguished environmental component state and changeability of the environmentally significant parameters.

According to the chosen technique environmental security of the recreational territories is evaluated in two stages. During the first stage individual indexes in six components of the environment (air, surface water, sea water, burden of tourists and recreational territories, flora and fauna) are defined. The ratio of environmental capacity and anthropogenic burden allow to determine coefficient of danger for every component and to distinguish that one, which will receive maximum negative impact and demands realization of situation normalization measures. During the second stage environmental security complex index is defined, involving qualimetry, which preconditions possibility to observe different indexes, which characterize components state, and to put together proper indexes.

Thus, in order to calculate initial indicator, the following formula was used:

$$ES = \sqrt{ES_a \cdot ES_{sw} \cdot ES_{sw} \cdot ES_{tb} \cdot ES_{flora} \cdot ES_{fauna}}, \quad (4.1)$$

where  $ES_a$ ,  $ES_{sw}$ ,  $ES_{sw}$ ,  $ES_{tb}$ ,  $ES_{flora}$ ,  $ES_{fauna}$  – environmental security according to the six components of the environment.

Owing to the total calculations it is possible to define level of the recreational territories environmental security and to have objective ideas about real ecological situation and to investigate ways to improve the existing situation.

Recreational territories accept the tourists' anthropogenic burden owing to irregular distribution during the year of natural and climatic conditions distinguishing [8, p. 28]. Maximum negative impact is made during the holiday season – April – September (Tab. 4.4).

Table 4.4

## Anthropogenic burden on the recreational territories

Region	Anthropogenic burden, persons/km <sup>2</sup>					
	IV	V	VI	VII	VIII	IX
North	956	1835	2570	3672	2081	1224
North-Eastern	27.7	15.2	21.1	121.1	68.4	40.7
North-Western	25.3	14.2	19.8	120.5	66.8	39.9
Eastern	1351	2897	4065	5080	2081	1224
Western	1961	4202	5883	8404	4762	2801
Central	9535	8692	27759	39656	22471	13219
Southern	2096	4492	6289	8985	5092	2999
South-Western	6296	13493	18891	26988	15292	8995
South-Eastern	7185	15399	21559	30800	17452	10266

The given data show that anthropogenic burden is distinguished with further deployment and achievement of peak values practically in all recreational territories of Odessa region.

The carried out calculations showed that component “sea water” is a dominant component for recreational territories. It provides reproducing of maximum oxygen amount that helps to reproduce environment and at the same time to stimulate tourists’ arrivals.

Thus, as a result of methodic provision approbation to evaluate environmental security of the recreational territories, character of ecological situation changes by the selected components of the environment is defined. A research of environmental security index dynamics proves its irregular distinguishing and underlines lack of positive factors to stop the process of ecological situation worsening in recreational territories.

The recreational territories sustainable development approach justification as innovation to provide environmental protection and further social and economic functioning is connected with environmentally dangerous and economically oriented activity achievements and is oriented to keep the current regions structure. Recreational territories are related to those, which are intensively developed, and it makes positive impact on social, economic and environmental problems solving of the Crimean region. Improvement and development of the market economy forms makes demands for economic stimulating of the recreational territories nature management, where special attention is reasonable to pay to new economic instruments investigation. Marketing of resorts is suggested, the aim of which is to create, support and measure tourists’ relations and behavior on the proper territory. It is based on price differentiation of the tourist’s service to redistribute tourists’ flow and to decrease anthropogenic pressure on the recreational territories.

In order to define actual equivalent evaluation of the concrete results in economic activity in the region, unfortunately there is no adequate statistic measurer. In general, one can suppose that methodological and methodic instrument, which is mostly adapted to determination of the resource potential final effectiveness, is extending system of the UNO national account considering population welfare evaluation. It is necessary to observe this problem, because at the regional level of regional development indicators evaluation, which are based on national account elements.

Stability of the social and economic system provides sustainable development of the country's economy, and in this way it influences the territorial formations development constituents. The leading factor of stability is public and political situation, which affects open access to information, decisions making, interregional and international economic relations establishment. The next significant factor of the regional sustainable development is an environmental security, which is based on support at the optimal level of the resource potential both within region and outside it; providing of balance between resources use and their consumption; environmental protection and as a result people's health. Socially oriented factor plays an important role. It is main element of any economic system development and includes educational part of the labor resources, knowledge, intellectual and managerial labor tools, which runs the social interconnection mechanism. Economic factors include capital, general economic knowledge and competition, which provide creation of effective mechanisms and tools owing to the flexible taxing system, financial and credit policy, using of state control methods and support, will lead to active investment and innovative activity. Complex action of all macroeconomic factors will provide environmental security, the living standards increase, the internal market development and successful cooperation with neighbor regions at the level of country or global space.

In order to build the regional economic & environmental evaluation model considering macroeconomic factors, Kalman-Bucy method was used, which takes into account either evaluation results (useful signal plus random barrier) or features of the investigated system via introduction of the system dynamics equation to the filter equation. Besides, Kalman-Bucy method gives possibility to: 1) receive minimum dispersion linear evaluations, based on known statistic characteristics of the income variables and barriers; 2) elaborate evaluations to the extent of their incomings, that allows to use method in real time; 3) receive practically realized structure of the optimal filter, solve tasks of multidimensional dynamic systems synthesis; 4) keep structure of algorithm with joint solving of tasks concerning optimal filtration and optimal management [9, p. 29]. Choice of the given method is caused by its specific nature, particularly:

with absence or small information about internal state of the system (in our case region) determination is performed on the basis of calculations of external constituent evaluations.

The proposed models are realized on the example of statistic data elaboration in Odessa region during 2012-2016. As a result of the carried out economic activity analysis macroeconomic factors are defined, which greatly influence general state of the regional development and its potential. They include (according to the significance degree): public and political situation, black (shadow) economy, intrasectoral competition, scientific and technical progress, consumers' economic interests, social state, irregularity in the economic complex structure, ecology, economic crisis.

The given model implementation provides environmental and economic evaluation of the region and revealing of environmental & economic evaluation dependency degree on macroeconomic factors in the region. As a result it was defined that Odessa region development as a border region, based on sustainability grounds, is possible while considering macroeconomic factors, which greatly influence some sectors (transport, industrial, processing and others).

In order to provide regional environmental & economic security, several measures have to be realized, which will help to solve existing social and economic problems, initiations of the economic entities' entrepreneurial activity, to increase amounts of the competitive service, which are able to satisfy people's demands, to extend dynamic development of separate regions with territorial environmental security providing and their development owing to own resource potential. In order to stimulate an effective use of the existing resources in the region, it is relevant to increase the intersectoral production level, to provide competitiveness and innovativeness in different types of natural and economic territorial systems, to outline their further development perspectives, based on the average- and long-term prognostications. As a result one can receive an economic effect from prudent use of the resource potential, social and environmental result from living standards and people's lives improvement.

Thus, the question of economic & environmental evaluation of regions' security has an important value to find real situational picture and to outline further spheres for their development and competitiveness degree growth. The macroeconomic factors significance to analyze and evaluate region, is based on the conceptual approaches of the economic theory, therefore, investigation of these factors is not always shown while building the regional formations development model.

Under modern conditions of the economy decentralization the key moment to provide regions' development is to investigate ways for their functioning, taking into account external environment, that is possible, based on stability and through evaluation of the existing resource



potential and provision of environmental & economic security, based on the sustainable development principles and regulations.

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## **4.2 COMPREHENSIVE APPROACH TO THE GLOBAL ECONOMIC SYSTEMS ENVIRONMENTAL SECURITY MANAGEMENT\***

Irrational use of natural resources during many years, structural changes, occurred in the economical complex of the state, and also low level of the ecological society consciousness lead to great environment degradation. The main reason of the mentioned negative changes became

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absence of the environmental management effectively active legal, administrative and economic mechanisms in the environmental management, which did not consider rational and effective use of the natural resources. Owing to it problems of environment saving, renewing and improving are of special attention [1], solving of which depends on sustainable development provision, based on the interconnection between economic systems and nature, when global economic system ecological security is achieved.

One of the main problems on the way to fasten achievement of the sustainable development in the global environment includes difficulties to use instruments to provide ecological security in economic systems at any level (global, regional, state) in practice. It is determined by absence of the universal methodic approach to choose strategies, and within them – tools to provide ecological security of the economic system and necessity to adapt the existing tools to specific development of each separate economic system at lower level.

### **Essence of the global economic system**

The modern world economy may be determined as global economic system, including components of the motivational, providing and regulating subsystem, which interconnect as one unit. It conditions focus and level of the society social and economic development, and provides stable ecological and economic balance and stability of internal evolutionary transformations during continuous changes. The motivational subsystem plays an important role in the economic system. It determines other subsystems directions and orientation of all reproducing processes on a global basis. Increasing role of the ecological constituent in the structure of various components in economic system (motivational subsystem) is explained by necessity to satisfy existing and potential needs, which is formed considering economic system and impact level of eco-destructive factors, without threat to exhaust the integral resource potential and opportunity to provide future generations' interests and needs in long perspective. These human's needs as biological and social creature, which are formed in close interconnection with natural environment factors, dictate necessity of innovative activity ecologization in all economy spheres [2].

Structurally global economic system will be observed as totality of economic, ecological and social subsystem.

*Economic subsystem* is characterized by the following factors ( $x_i^{(1)}$ ):  $x_1^{(1)}$  – index of the GDP total world amount, calculated per 1 person (in relation to the previous period);  $x_2^{(1)}$  – part of the industrial production in GDP;  $x_3^{(1)}$  – part of agricultural production in GDP total world amount;  $x_4^{(1)}$  – index-deflator of the GDP total world amount (in relation to the previous period);

$x_5^{(1)}$  – index of the industry (in relation to the previous period);  $x_6^{(1)}$  – index-deflator of industry (in relation to the previous period);  $x_7^{(1)}$  – index of the agriculture (in relation to the previous period);  $x_8^{(1)}$  – index-deflator of the agriculture (in relation to the previous period);  $x_9^{(1)}$  – retail turnover (in relation to the GDP world amount);  $x_{10}^{(1)}$  – index-deflator of the retail turnover (in relation to the previous period);  $x_{11}^{(1)}$  – amount of the paid service, given by enterprises (establishments) in region (in compared prices in relation to the GDP total world);  $x_{12}^{(1)}$  – index-deflator of paid services ((in relation to the previous period);  $x_{13}^{(1)}$  – investments into the main capital (in relation to the GDP total world amount);  $x_{14}^{(1)}$  – index of the investments physical quantity (in relation to the previous period);  $x_{15}^{(1)}$  – index-deflator of investments (in relation to the previous period);  $x_{16}^{(1)}$  – index of the consumers’ prices at the end of the period (in relation to the previous period);  $x_{17}^{(1)}$  – index of the budget provision owing to the personal incomes sources per capita (in relation to the previous period);  $x_{18}^{(1)}$  – innovative goods production and implementation profit part in the general structure revenue;  $x_{19}^{(1)}$  – incomes of the consolidated budget (in relation to the total world GDP);  $x_{20}^{(1)}$  – expenditure part of the consolidated budget (in relation to the total world GDP);  $x_{21}^{(1)}$  – consolidated budget proficit (+) or deficit (–) (in relation to the total world GDP);  $x_{22}^{(1)}$  – part of taxes in total world GDP;  $x_{23}^{(1)}$  – added value of the ecological taxes and payments in the total world GDP;  $x_{24}^{(1)}$  – part if the added value in general amount of the produced goods;  $x_{25}^{(1)}$  – ratio between transfers number to gross value added;  $x_{26}^{(1)}$  – index of the credits provision (it is calculated as ratio between received credits amount to the total world GDP);  $x_{27}^{(1)}$  – part of the unprofitable enterprises by all branches of the world economy;  $x_{28}^{(1)}$  – index of financial provision in global economic system owing to personal resources (it is calculated as ratio between incomes amount from all sources (profits of the economic system) and general sum of expenses during period  $T$ );  $x_{29}^{(1)}$  – main funds drift coefficient;  $x_{30}^{(1)}$  – coefficient of the main funds renewing;  $x_{31}^{(1)}$  – coefficient of the world economy openness (part of the international trade turnover in gross value added);  $x_{32}^{(1)}$  – import relation to export in the countries;  $x_{33}^{(1)}$  – export part in gross value added in the country;  $x_{34}^{(1)}$  – import part in gross value added in the region;  $x_{35}^{(1)}$  – expenses for scientific and research exploratory constructive investigations (in relation to the gross world GDP).

*Ecological subsystem* is described by factors ( $x_i^{(2)}$ ), which also determine level of ecological security (LES) in economic system, relat. unit:

1) level of the goods and service ecological compatibility in the world (*Leg*), which is determined by the following factors:  $x_1^{(2)}$  – part of the ecological goods in general production output;  $x_2^{(2)}$  – part of the ecological goods in general amount in retail trade;  $x_3^{(2)}$  – part of the ecological goods in general import size;

2) level of the ecological compatibility of all economic activity types in the world (*Lep*), which is determined by the following factors:  $x_4^{(2)}$  – part of the extra emissions into environment (in relation to the total amount);  $x_5^{(2)}$  – part of the extra emissions into natural environment (in relation to the general amount);  $x_6^{(2)}$  – part of wastes (those which were created during research period), which were not ecologically safely utilized during this period;  $x_7^{(2)}$  – part of the stored wastes (those which were created during previous periods), which were not ecologically safely utilized during studied period;  $x_8^{(2)}$  – part of the fresh raw materials, used for goods production;  $x_9^{(2)}$  – consumption of the fresh fuel and energetic resources (in relation to the previous period);  $x_{10}^{(2)}$  – use of the fresh fuel and energetic resources for productive and exploitation needs (in relation to the general amount of the utilised energetic resources in the current period);  $x_{11}^{(2)}$  – use of alternative power sources (in relation to the general amount of the used energetic resources during the current period);  $x_{12}^{(2)}$  – index of the alternative energetic development in region (in relation to the previous period);  $x_{13}^{(2)}$  – index of the power resources saving in the process of productive activity;  $x_{14}^{(2)}$  – part of the damaged lands in general area of the land fund;  $x_{15}^{(2)}$  – part of the recultivated lands among broken ones;  $x_{16}^{(2)}$  – number of wild animals in hunting lands (in relation to the previous period);  $x_{17}^{(2)}$  – index of forests renewing (ratio of the planting, seeding area to the natural forests renewing to the whole area of the forest felling);  $x_{18}^{(2)}$  – index of the workers' illness frequency;  $x_{19}^{(2)}$  – workers' part, which have professional illnesses;

3) level of the ecological compatibility in the consumption sphere in the world (*Lesi*), defined by the following factors:  $x_{20}^{(2)}$  – wastes part (those which were created during researching period), which were not ecologically safely utilized during this period;  $x_{21}^{(2)}$  – part of the stored wastes (those, created during previous periods), which were not ecologically safely utilized

during researching period;  $x_{22}^{(2)}$  – part of the used power resources by the regional population;  $x_{23}^{(2)}$  – use of the secondary power resources by the regional population;  $x_{24}^{(2)}$  – saving index of the power resources in the consumption sphere (in relation to the previous year);

4) risk of the ecologically caused emergencies ( $R$ ), determined by the following factors:  $x_{25}^{(2)}$  – index of manmade emergencies growth by immensity of consequences (it is calculated as ratio between manmade emergencies number to general losses amount in comparing prices) (in relation to the previous year);  $x_{26}^{(2)}$  – index of natural emergencies number growth by immensity of consequences (it is calculated as ratio of manmade emergencies number to whole of the total amount of losses in comparing prices) (in relation to the previous year);  $x_{27}^{(2)}$  – index of the local emergencies growth (in relation to the previous year);  $x_{28}^{(2)}$  – index of the objective emergencies growth (in relation to the previous year);  $x_{29}^{(2)}$  – part of forests lands, hit by fires, in total forests area;  $x_{30}^{(2)}$  – losses, caused by fires (in relation to the previous period);  $x_{31}^{(2)}$  – number of injured people as a result of fires (in relation to the previous period);  $x_{32}^{(2)}$  – number of dead people as a result of fires (in relation to the previous period).

*Social subsystem* is characterized by the following factors ( $x_i^{(3)}$ ), relative units:  $x_1^{(3)}$  – demand and supply of labor power;  $x_2^{(3)}$  – level of the unemployment by methodology of International Labor Organization;  $x_3^{(3)}$  – level of hidden unemployment;  $x_4^{(3)}$  – part of senior citizens, engaged in labor activity (by all types of economic activity);  $x_5^{(3)}$  – part of the working citizens in total population number;  $x_6^{(3)}$  – ratio of the citizens' financial incomes and expenses;  $x_7^{(3)}$  – part of the payment for labor in the structure of citizens' incomes;  $x_8^{(3)}$  – part of salary in gross value added in the region;  $x_9^{(3)}$  – ratio of the workers' average salary, except administrative and management personnel and public servants, to minimum wage;  $x_{10}^{(3)}$  – ratio of labor productivity rates and increase of workers' salary, except administrative and management personnel and public servants;  $x_{11}^{(3)}$  – ratio of the average salary to the minimum wage;  $x_{12}^{(3)}$  – part of the citizens with average financial expenses per month, lower than minimum wage;  $x_{13}^{(3)}$  – break between 10% of rich and 10% of poor citizens;  $x_{14}^{(3)}$  – social helps (in relation to the previous period);  $x_{15}^{(3)}$  – social transfers (in relation to the previous period);  $x_{16}^{(3)}$  – ratio of the financial incomes and citizens' expenses;  $x_{17}^{(3)}$  – coefficient of the

citizens' depopulation;  $x_{18}^{(3)}$  – population migration;  $x_{19}^{(3)}$  – coefficient of the birth rate;  $x_{20}^{(3)}$  – coefficient of death rate;  $x_{21}^{(3)}$  – coefficient of the children's death;  $x_{22}^{(3)}$  – expected life duration (at birth);  $x_{23}^{(3)}$  – coefficient of the population graying in the region;  $x_{24}^{(3)}$  – expenses on education (in relation to the GDP total world amount);  $x_{25}^{(3)}$  – expenses for culture (in relation to the GDP total world amount);  $x_{26}^{(3)}$  – expenses on health protection (in relation to the GDP total world amount);  $x_{27}^{(3)}$  – number of the injured persons after traumatism on production.

### **Methodic approach to marketing strategies choice and tools of ecological security provision**

Marketing strategies to provide ecological security are suggested to be observed, proceed from ecodestructive decrease and ecoconstructive increase impact on the environment through ecologization production sphere, trade and consumption, based on innovations use, and tools of positive and negative motivation.

To choose marketing strategies to provide ecological security of the global economic system is suggested on the bases of its ecological security level estimation, considering real conception of the innovative activity ecologization. Innovative activity ecologization concepts, distinguished depending on development stages of the ecological motivation development stages, is shown in the work [3].

LES is suggested to observe as complex factor, which is calculated by formula

$$LES = f(Leg, Lep, Lesi, R), \quad (4.2)$$

$$Leg, Lep, Lesi, Re = \begin{cases} 1, & \text{if } Leg \geq 0,5, Lep, Lesi, R < 0,75, \\ 0, & \text{if } Leg < 0,5, Lep, Lesi, R \geq 0,75, \end{cases} \quad (4.3)$$

where *Leg* – level of the goods ecological compatibility; *Lep* – level of the production ecological compatibility; *Lesi* – level of the ecological security of the providing infrastructure; *R* – risk of the emergencies.

In general the following levels of ecological security are distinguished [3]:

I Natural is not changed directly by human's economic activity (local nature feels only weak mediate impacts from global manmade changes).

II Balanced – speed of the reviving processes is higher or equal rates of the manmade breaks.

III Critical – speed of the manmade breaks exceeds rates of nature self-reviving, but great change does not take place in the natural system.

IV Crucial – reviving substitution of the previous ecological systems by manmade pressure for less ones.

V Catastrophic – hardly reviving substitution of the ecological systems under manmade pressure for less productive, strengthening of the less productive systems.

VI Collapse – not reviving loss of the biological productivity.

I-II levels of the ecological security provide ideal conditions for human functioning, reviving and development, III-IV levels put at hazard for generations functioning, reviving and development, V level – for today’s and future generations, VI – leads to human and other biological types death [3].

Choice of the marketing strategy to provide ecological security is suggested to conduct due to the received values of the ecological security level, considering innovative activity ecologization real conception (Tab. 4.5).

Choice of the tools to provide ecological security in the economic system is suggested to conduct on the basis of their potential estimation.

Table 4.5

Choice of the marketing strategies to provide ecological security in the economic system

[Author’s research]

LES		Real conception of the ecologization			
		I	II	III	IV
<b>Level I</b>	(1;1;1;1)	A, B, D	A, B, D	B, F, G	C, G, H, J
<b>Level II</b>	(1;1;1;0)	A, D	A, B, D	B, C, D, F, G	B, F, G, H, J
	(1;1;0;1)	A, B, D, E	A, D, E	B, C, F, G	F, G, H, J
	(1;0;1;1)	A, B, D	A, B, D, E	C, F, G	F, H, J
	(0;1;1;1)	A, B, D, E	B, D, E	B, E, F, G	G, H, J
<b>Level III</b>	(1;0;1;0)	A, B, D, E	A, B, D, E	B, C, F, G	F, G, H, J
	(1;0;0;1)	A, B, D,	A, B, D, E	B, E, F, G	B, F, G, H, J
	(1;1;0;0)	A, B, D,	B, D, E	B, C, F, G	F, G, H, J
	(0;0;1;1)	A, B, D, E	A, B, D, E	B, E, F, G	G, H, J
	(0;1;1;0)	A, B, D, E	A, B, D, E	C, F, G	F, G, H, J
	(0;1;0;1)	B, D, E	A, B, C, D, E	B, E, F, G	F, G, H, J
<b>Level IV</b>	(1;0;0;0)	A, B, D, E	A, B, D, E	C, F, G, H	G, H, J
	(0;1;0;0)	B, D, E	A, B, C, D, E	B, E, F, G	F, G, H, J
	(0;0;1;0)	A, B, D, E	A, B, D, E	C, E, B, F	F, G, J
	(0;0;0;1)	B, D, E	A, C, D, E	B, E, F, G	B, F, G, H, J
<b>Level V</b>	(0;0;0;0)	A, B	A, B, D, E	B, D, E, F	B, F, G, H, J

A – Strategy of changes; B – Strategy of adaptation; C – Strategy of support; D – Strategy of the “clean” production; E – Strategy of initiative; F – Strategy of the producers’ motivation; G – Strategy of the consumers’ motivation; H – Strategy of diversification; J – Strategy of integration.

Authors determine that *marketing instruments potential* is an ability to impact the market structure, formed by principle of ecological factors dominating, through formation and fastening of the ecologically oriented needs in various markets segments. Estimation of the instruments potential is suggested to carry out by factors which allow qualitatively and quantitatively to estimate the process to form conscious ecological need among consumers, – index of consumers’ reaction and market structure dynamics.

*Index of consumers’ reaction* is suggested to be factor which show consumers’ values and needs change as a result of society awareness and ecological consciousness formation. Observing it through the prism of consumers behavior ecologization and ecological security provision, one sets that it is indicator of the dominating ecologization conception and sustainable development. Index of the consumers’ reaction has to be determined in the following sequence:

1) segmentation of consumers, based on their questionnaire, quantitative and structural factors of every segment (“green”, “caring”, “economic”, “ripened”, “grey”, “indifferent”). To segment consumers, one suggests methodic, described in the work [4];

2) prognostication of the ecological needs formation dynamics under information impact, which is necessary for their consumers’ behavior change.

One suggests to observe two groups of consumers in order to estimate ecological needs formation: group 1 is with real or formed ecological need, and group 2 is with potential or not formed ecological need. Group 1 is represented by consumers’ segments “green”, “caring”, “economic”, “ripened”, for which ecological compatibility is consumers’ value, i.e. they realize consumer’s need to provide ecological security (personal or the whole family). Group 2 includes representatives of segments “grey” and indifferent”, in which need in ecological security provision has not been formed yet. We have to mention that such consumers’ groups exist in the natural objects’ mutual synchronization (self-synchronization) problem area. Speed of consumers’ number growth in each group is proportional to the consumers’ number in each of them. Analytically it can be presented by the following equation system, which is also suggested to use for prognostication of the ecological needs formation dynamics under information impact:

$$\begin{cases} G_1(t) = \frac{\xi[G_1(t_0) + G_2(t_0)]}{1 + (-\omega^{(z)}t)^p \cdot \left( \frac{\xi[G_1(t_0) + G_2(t_0)]}{G_1(t_0)} - 1 \right)}, \\ G_1(t) + G_2(t) - \xi[G_1(t) + G_2(t)] = 0, \quad G_2(t) \rightarrow 0, \end{cases} \quad (4.4)$$



where  $G_1(t)$ ,  $G_2(t)$ ,  $G_1(t_0)$ ,  $G_2(t_0)$  – number of consumers of group 1 and group 2 in time  $t$  and  $t_0$ ;  $\omega^{(2)}$  – independent speed of the process to provide ecological security ( $\omega^{(2)} > 0$ ) (more details see p. 3);  $\xi$  – coefficient of the rationality in consumers' number change in group (it shows rationality of consumers' transfer from one group into another);  $G_1(t)$ ,  $G_2(t)$  – speed of the consumers' number change in groups 1 and 2 due to the time  $t$ ;

3) determination of the consumers' reaction index to marketing tools.

Index of the consumers' reaction to the proper tools is suggested to define on the basis of real and potential ecological necessity estimation by formula

$$I(t) = 1 - \frac{G_2(t)}{G_1(t)}, \quad (4.5)$$

where  $G_1(t)$  – number of group 1 consumers in the time  $t$ , defined as integral capacity of “green”, “caring”, “economic”, “ripened” segments;  $G_2(t)$  – number of the group 2 consumers in the time  $t$ , defined as integral capacity of segments “grey” and “indifferent”.

The scale of factor values  $I(t)$  is shown in the Tab. 4.6.

Table 4.6

Value of the consumers' reaction index [Author's research]

Reaction level	Critical	Very high	High	Middle	Low	Crucial
Value $I(t)$	$I(t)=1$	$0,8 \leq I(t) < 1$	$0,6 \leq I(t) < 0,8$	$0,4 \leq I(t) < 0,6$	$0,2 \leq I(t) < 0,4$	$0 \leq I(t) < 0,2$

*Market structure dynamics* has to be determined by such factors which are calculated at the time  $t$ : part of the consumers from group 2  $g_2(t)$ , change of the consumers' part in the group 2  $\Delta g_2(t)$ , part of the consumers from group 1 without segment “ripened” considering  $g_1^*(t)$  and change of the consumers part from group 1 without considering “ripened” segment  $\Delta g_1^*(t)$ .

The scale to determine level of the tools potential for economic system ecological security is presented in the Tab.4.7.

Within every strategy chooses marketing instruments, introduction of which may be complex or prior, owing to the resource supply of the economic system and its development expected factors.

Table 4.7

Levels of the marketing tools potential [Author's research]

Factors value				
$I(t)$	Value $g_i^*$ , $g_2$ , $\Delta g_i^*$ , $\Delta g_2$			
$I(t)=1$	$g_i^*(t) \cong 1$ , $\Delta g_2(t)=0$	$\Delta g_1^*(t) > 0,05 \Leftrightarrow g_i^*(t) > 0,9$ $\Delta g_2(t) \cong -0,2$	$0,03 \leq \Delta g_1^*(t) \leq 0,05 \Leftrightarrow g_i^*(t) \geq 0,9$ , $-0,2 \leq \Delta g_2(t) < -0,1$	$0 \leq \Delta g_1^*(t) < 0,03$ , $-0,1 \leq \Delta g_2(t) \leq 0$
$0,8 \leq I(t) < 1$	x	$\Delta g_1^*(t) > 0,2 \Leftrightarrow g_i^*(t) \geq 0,75$ , $\Delta g_2(t) \cong -0,2$	$0,1 \leq \Delta g_1^*(t) \leq 0,2 \Leftrightarrow g_i^*(t) \geq 0,75$ , $-0,2 \leq \Delta g_2(t) < -0,1$	$0 \leq \Delta g_1^*(t) < 0,1$ , $-0,1 \leq \Delta g_2(t) \leq 0$
$0,6 \leq I(t) < 0,8$	x	$\Delta g_1^*(t) > 0,25 \Leftrightarrow g_i^*(t) \geq 0,55$ , $\Delta g_2(t) \cong -0,2$	$0,13 \leq \Delta g_1^*(t) \leq 0,25 \Leftrightarrow g_i^*(t) \geq 0,55$ , $-0,2 \leq \Delta g_2(t) < -0,1$	$0 \leq \Delta g_1^*(t) < 0,13$ , $-0,1 \leq \Delta g_2(t) \leq 0$
$0,4 \leq I(t) < 0,6$	x	$\Delta g_1^*(t) \geq 0,2 \Leftrightarrow g_i^*(t) \geq 0,35$ , $\Delta g_2(t) \cong -0,2$	$0,1 \leq \Delta g_1^*(t) < 0,2 \Leftrightarrow g_i^*(t) \geq 0,35$ , $-0,2 \leq \Delta g_2(t) < -0,1$	$0 \leq \Delta g_1^*(t) < 0,1$ , $-0,1 \leq \Delta g_2(t) \leq 0$
$0,2 \leq I(t) < 0,4$	x	$\Delta g_1^*(t) \geq 0,15$ , $\Delta g_2(t) \cong -0,2$	$0,08 \leq \Delta g_1^*(t) < 0,15$ , $-0,2 \leq \Delta g_2(t) < -0,1$	$0 \leq \Delta g_1^*(t) < 0,08$ , $-0,1 \leq \Delta g_2(t) \leq 0$
$0 \leq I(t) < 0,2$	x	$\Delta g_1^*(t) > 0,05$ , $\Delta g_2(t) \cong -0,2$	$0,03 \leq \Delta g_1^*(t) \leq 0,05$ , $-0,2 \leq \Delta g_2(t) < -0,1$	$0,03 \leq \Delta g_1^*(t) \leq 0,05$ , $-0,1 \leq \Delta g_2(t) \leq 0$
Level of the instruments potential	Critical	High	Sufficient	Low

Formation of the marketing tools complex is suggested on the basis of global economic system development scenario formation, which is analytically written as multisets of the total scenario group concerning final choice formation (formula (4.6)).

$$V = \{V_j\} = (f, X^{(s)}, Z, F_j) \rightarrow opt, f : \{X^{(s)}, Z\} \rightarrow \{F\}, \quad (4.6)$$

where  $V$  – set of the economic system development scenario;  $V_j$  – act to choose  $j$ -scenario;  $X^{(s)}$  – set of  $s$ - subsystem functions;  $Z$  – set of the marketing tools,  $Z = \{z_1, z_2, \dots, z_k\}$ ;  $F$  – set of functions  $f$  values, which correspond full group of scenarios,  $F = \{F_j\}$ ,  $F_j = \{\omega_j, I_j, LES_j, g_1, g_2, \Delta g_1^*, \Delta g_2^*\}$ ;  $\omega_j$  – speed of the system synchronous development;  $I_j$  – index of the consumers' reaction to the marketing tools, which correspond  $j$ -scenario;  $LES_j$  – expected LES of the economic system while realization of  $j$ -scenario;  $g_2, \Delta g_2$  – part and change of the consumers' part in group 2 accordingly;  $g_1^*, \Delta g_1^*$  – part and change of the consumers' part in group 1 without considering the segment “ripened”.

One has to mention that methodic approach allows not only to determine real state of the ecological security, but also to face various crisis phenomena owing to complex approach to choose estimation factors.

### Estimation of the economic system ecological security synchrony provision

The efficiency of the instruments which provide ecological security depends on economic system balanced development and proper processes rate, conditioned by introduction of the  $z$ -instrument. Estimation of the processes synchrony which provide ecological security in the economic system is suggested to carry out on the basis of factors correlation, which characterize system development and every process, – speed of the system synchronous development  $\omega$  and autonomous speed of the process to provide ecological security  $\omega^{(z)}$ , formulas for calculation of which are suggested by authors.

Speed of the synchronous development in the economic system  $\omega$  ( $\omega > 0$ ) is suggested to determine from set of equations, describing its development [5]:

$$\left\{ \begin{array}{l} x^{(s)} = X^{(s)}(x^{(s)}(t)), \\ y = \varepsilon^{(z)^y} Y(x^{(1)}, x^{(2)}, x^{(3)}, y(t)), \\ x^{(s)}(t) = \alpha^{(s)} \left[ \theta^{(s)\beta} \omega t + f^{(s)}(x_1^{(s)}, \dots, x_i^{(s)}, \dots, x_{n_s}^{(s)}, \delta^{(s)}, \omega, t) \right] \\ y(t) = A(y^{(1)}(t), \dots, y^{(z)}(t), \dots, y^{(k)}(t)), \\ y^{(z)}(t) = \alpha^{(z)} \left[ \mu^{(z)^z} \omega t + {}^{(z)m} \cdot u^{(z)}(g^{(z)} y_1^{(z)}, y_2^{(z)}, \tau^{(z)}, \omega, t) \right], \\ s \in [1; 3], \quad i \in [1; n_s], \quad z \in [1; k], \quad t \in [1; T], \end{array} \right. \quad (4.7)$$

where  $x^{(s)}(t)$  – function of  $s$ -subsystem state, represented by  $n_s$ -vector, in the moment time  $t$ ;  $x^{(1)}, x^{(2)}, x^{(3)}$  – functions of the economic, ecological and social subsystem state;  $y(t)$  – function, describing system of connections in the time moment  $t$ ;  $x_i^{(s)}$  –  $i$ -factor, describing subsystem  $x^{(s)}$ ;  $x^{(s)}, y$  – derived functions  $X^{(s)}, Y$  accordingly;  $Y$  –  $k$ -vector-function;  $y^{(z)}(t)$  –  $k$ -vector, describing character of interconnections in the system, which appear as a result of  $z$ -process (tool) introduction;  $\alpha^{(s)}$  – stability index of the  $s$ -subsystem;  $\alpha^{(z)}$  – stability index of connections in the system considering  $z$ -process impact;  $\theta^{(s)\beta}$  – coefficient of aggregation of  $s$ -subsystem with environment (with reinforcing character of actions  $\beta=1$ , with decreasing –  $-1$ );  $\mu^{(z)^z}$  – aggregation coefficients of the  $z$ -process with environment (with reinforcing character of actions  $\tau=1$ , with decreasing –  $-1$ );  $\varphi^{(z)^z}$  – space coefficient of the efficiency in  $z$ -process (with strengthening

character of action  $m=1$ , with decreasing  $-1$ );  $\varepsilon^{(z)}$  – coefficient, which considers social, economic and ecological effects synergism after introduction of the  $z$ -marketing instrument and synergism as a result of effects addition in every  $t$ -period to previous ones (with strengthening character of action  $\gamma=1$ , with decreasing  $-1$ );  $f^{(s)}$ ,  $u^{(z)}$ ,  $\Lambda$  – mathematic functions;  $\delta^{(s)}$  – coefficient of the mutual correlation of the constituents in  $s$ -subsystem;  $g^{(z)}$  – the potential speed coefficient of expenses return for introduction of  $z$ -process;  $\tau^{(z)}$  – coefficients of the mutual correlation connections in  $z$ -rocess with others;  $y_1^{(z)}$ ,  $y_2^{(z)}$  – components of vector  $y^{(z)}$ ;  $T$  – duration of the investigated period;  $k$  – number of processes to provide ecological security within investigated system in period  $t$ ;  $t$  – time features of the system development;  $s, z$  – ordinal number according to the subsystem and process to provide ecological security, conditioned by the proper instrument introduction;  $i$  – ordinal number of the factor, which describes subsystem  $x^{(s)}$ ;  $n_s$  – number of factors, which describe subsystem  $x^{(s)}$ .

Considering the fact that costs, designed to ensure a certain result and the expected effect are not always coincided in time. Moreover, they can be stretched in time. While forecasting and estimation of the expected financial flows one has to consider rate of return in the investigated process through time factor. Existence of the time state between the start of the process in ecological security and result receiving preconditions to introduce corrective coefficient  $g^{(z)}$ . Its value is established on the basis of the process category definition (“fast”, results of which are observed in the short term perspective, or “slow”, the results of which are observed only in the medium and long term perspective, “dot”, resulting in a static variable, or “prolonged” results are observed in the dynamics as relatively constant, evenly distributed over time) as well as current and potential concept of economic system ecologization. Value of the coefficient  $g^{(z)}$  is determined according to the values table, developed by authors and based on the retrospective factors analysis, which correspond various processes and acts concerning ecological security provision of the global economic system (in more details see [6].

In order to simplify the suggested factor use, factor values  $\alpha^{(s)}$ ,  $\theta^{(s)}$ ,  $\delta^{(s)}$ ,  $\mu^{(z)}$ ,  $\tau^{(z)}$  are determined owing to correlative and regressive analysis of the output data. Values  $\varphi^{(s)}$ ,  $\varepsilon^{(z)}$ ,  $m$ ,  $\beta$ ,  $\lambda$ ,  $\gamma$  are established on the basis of existing experience or by expert’s method – if there are no retrospective data.

Thus, system synchrony speed (frequency) index  $\omega$ , determined from formula (4.2) should be compared with autonomous frequency (speed) index of the process development (actions or many actions) to provide ecological security  $\omega^{(z)}$ , calculated by formula:

$$\omega^{(z)} = \frac{4T^{1/2} \cdot y^{(z)}(t)}{1 + y^{(z)}(t)}. \quad (4.8)$$

The biggest ecological and economic efficiency is achieved by the system if  $\omega^{(z)} = \omega$ , i.e. there is **full synchrony** of the processes to provide ecological security and economic system development. If  $\omega^{(z)} < \omega$ , we can affirm that there is **interval synchrony** of processes to provide ecological security. If  $\omega^{(z)} > \omega$ , we can confirm that there is **impulse synchrony** among processes to provide ecological security.

We have to mention that suggested theoretical and methodic approach to estimate processes synchrony to provide economic system ecological security, which considers changes of the ecological security level in economic system, expenses level to introduce marketing instruments, synergy of interconnection between these tools, subsystems and systems at various levels, provides flexibility to form the most optimal instrument complex to support ecological security for every level in the economic systems. Its use in the activity of international establishments and organizations, state borders or regional administration allows to optimize processes to provide ecological security at different levels and also to avoid inefficient expenses.

Integral results of the conducted research is to improve conceptual positions of theory and methodology to control ecological security in economic systems. The use of methodic approach to control global economic system ecological security, suggested by authors, allows to increase reasonability of conclusions about ecological and economic optimality concerning the marketing instruments, to optimize processes to provide ecological security at various levels, and also to avoid inefficient expenses and to increase level of the ecological security in the world. Besides, the investigated scientific and methodic approach to determine marketing tools potential, based on market segments dynamic factors, distinguished by the ecological compatibility in behavior, interests and consumers' needs, and consumers' reaction index on the marketing tools, allows reasonably to choose marketing instruments for various market segments and to increase efficiency to control economic system ecological security. Practical value of the received results consists in the fact that owing to the suggested scientific and methodic approach to estimate synchrony of the mentioned processes, one may increase efficiency to control economic systems development in the system of sustainable development.

Thus, positions, formed by authors, allow developing theoretical and methodic approach to through management of the global economic system ecological system in further studies.

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### **4.3 ECONOMIC RATIONALE FOR INVESTMENT PROJECT IN THE CONTEXT OF GREEN ECONOMY**

Recent international summits, including the UN General Assembly in September 2015, stated that civilization needs a new economic development course based on the principles of green economy. Transition to green economy means growth of energy efficiency and the use of renewable energy sources, growth of labor productivity in agriculture, efficient use of water and forest resources, biodiversity protection, environmental management, as well as waste recycling and disposal.

The problem of waste, formation of which reached enormous figures in some places, is one of the most relevant environmental problems in the world. To solve this problem the governments of several European countries found it necessary to transfer organizational and/or financial responsibility for waste management directly to the manufacturer or supplier of products, which generate waste after losing its consumer properties. Thus a concept of “Extended

Producer Responsibility” (EPR) arose, which is a state requirement towards economic entities to improve environmental performance of their products at every stage of their life cycle. Implementing the EPR, a producer shall be responsible for the damage caused by its product throughout its life cycle, as well as for the collection, recycling and disposal of used products.

In 1994, the implementation of the EPR obtained a legal status with the adoption of Directive 94/62/EC on package and packaging waste, which set the basic requirements for the collection and recycling of packaging waste in the member states of the European Union. Later on, the EU applied, by further directives, this waste management principle to other types of products such as cars, tires, chemicals, batteries, household appliances, and pharmaceuticals.

There are certain specifications in the EPR implementation for each type of product, but some principles are common for them:

- to define reasonable standards of collection, reuse, and recycling of used products;
- to monitor and control on governmental level the compliance with the approved standards, and impose sanctions in case of non-compliance;
- to prohibit or limit the use of some hazardous hazardous substances in the manufacturing process;
- to introduce recycling fee for products sold to completely or partially cover the administrative costs of waste management, or creation of a deposit-refund system;
- to determine the rate of the recycling fee in accordance with the extent of manufacturers’ environmental effect in order to stimulate the development of eco-design products;
- to ensure transparency in the interaction of the EPR parties.

The analysis of international experience in the EPR functioning reveals the following aspects:

- *Economic responsibility* means that a manufacturer completely or partially covers the costs related to the collection, recycling, and disposal of used products. It is a significant incentive to reduce waste volume, since the total production costs include these expenses;

- *Physical responsibility* means that a manufacturer physically participates in the organization of collection and disposal of its products. This responsibility can be individual (related to one company) and collective, in case of which the producers cooperate on a commercial basis to organize the system of waste collection and recycling by creation of specially authorized organizations called operators;

- *Compensatory responsibility* means that a manufacturer is responsible for the direct and indirect environmental damage caused by its products throughout their life cycle;

- *Information responsibility* means that a manufacturer is to inform consumers about the environmental effects of its products [1].

Different countries have their own particular institutional mechanisms of the EPR. Numerous parties are involved in a product's life cycle: manufacturers, distributors, importers, consumers, recycling facilities, etc. All of them, with varying degrees, impact on the environment; therefore, environmental responsibility can be shared among multiple parties. However, in most countries producers bear the major part of this responsibility as, firstly, they have the largest impact on the environment, and, secondly, they are able to prevent a product's negative influence at the stage of its design and development.

The EPR mechanism can be voluntary or mandatory. It is also possible to combine these approaches. A voluntary approach is implemented through agreements concluded or obligations assumed by different industries. A mandatory approach involves a legal status of the EPR principles, the approval of collection and processing standards, and the reuse of waste products. The effectiveness of the voluntary approach is questionable. As a rule, it is more effective when supported by the legal regulatory framework.

The EPR principle is most common in the sphere of packaging waste management. In the Republic of Belarus, this principle is established by law and implemented in accordance with the Decree of the President of the Republic of Belarus No. 313 of 11 July 2012 "On several aspects of consumer waste management". However, despite the introduction of the EPR principle in the activities of business entities, in Belarus the collection of packaging waste does not exceed 10%. The main reason for that is that there are no efficient economic mechanisms that would stimulate economic entities to improve the current system for collecting, sorting, and recycling of packaging waste.

Fig.4.1 schematically illustrates the organizational and economic mechanism of the EPR functioning, which reflects the required interaction of all its parties. According to the above-mentioned Decree, the organizer of the EPR implementation is a specifically authorized organization named "Operator of secondary material resources" (hereinafter - "the Operator"), which is obliged to provide funding for the collection, sorting, and recycling of waste, as well as to ensure that the EPR requirements are met by manufacturers.



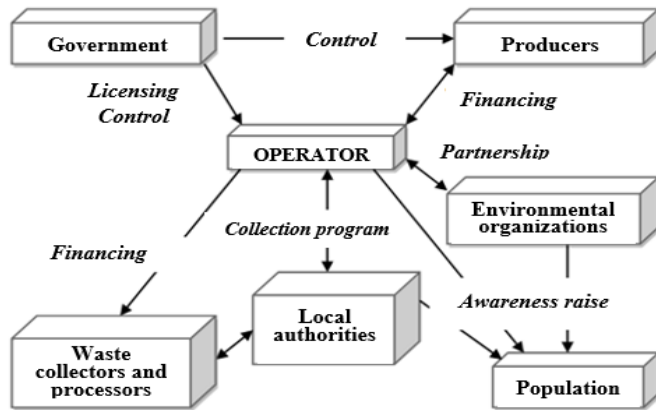


Figure 4.1 – The organizational and economic mechanism of the EPR

The operator company is approved by the government. The operator reports, on a regular basis, the results of its activity to the government and in cooperation with local authorities develop a program of separate waste collection. Environmental organizations cooperate with the Operator in informing the public, and every citizen collecting waste separately determines the success of the whole EPR system.

The crucial elements of this system are the producers and suppliers (importers and distributors) of the products subject to the EPR that provide the collection, neutralization and/or reuse of waste.

There are two ways for the producers and suppliers to implement the EPR: to pay a recycling fee to the Operator or to create their own system of collection and recycling of the waste left from the packaging they produce. The recycling fee is not a tax payment and does not flow into the state budget. It is paid on a contract basis to the Operator in exchange for acceptance of the EPR and depends on the type of materials used in production of the packaging, its sales volume and ways of use.

In both cases, the organization of the collection, neutralizing, and/or use of waste affects production and selling costs, and, as a result, affects products' competitiveness. Thus, the economic function of the EPR principle is to internalize environmental costs throughout a product's life cycle by means of including the above-mentioned costs in the cost price. That should stimulate the producers to consider the environmental aspects of their products at the stage of design in order to prevent negative impact on the environment and thereby reduce their costs.

In the Republic of Belarus, according to the assessment of the EPR system's current functioning in the field of plastic packaging, there are no incentive mechanisms for the producers and suppliers of the packaging to create their own system of waste collection. Almost all legal entities and individual entrepreneurs (99.5 %) implement the EPR by paying the recycling fee to the Operator.

Plastic packaging currently enjoys great popularity in the world: the annual increase of its use is about 6 %. In 2014, 47 % of package producers preferred plastic packaging to its other types, with 10 % of them giving preference to polyethylene terephthalate packaging [2].

Polyethylene terephthalate (PET) is one of the most common materials used as packaging for food and beverages due to its unique properties: it is better in chemical resistance, inertness and barrier properties than almost any other packaging material, including polymeric materials. In addition, PET packaging is more environmentally friendly and safer than glass and aluminum, as the process of its production is of lower energy consumption, generates less waste and greenhouse gas emissions.

In most cases, the first stage in the production of PET packaging is making bottle preforms, which are further on transformed into the bottles ready for filling by the method of extrusion blowing. As the majority of packaging materials, after packaged goods are used, PET packaging loses its consumer properties and becomes waste. Although households may store packaging for some time, in the Republic of Belarus the annual volume of PET packaging waste generated is supposed to be equal to its annual volume of domestic consumption.

According to the marketing research conducted within the project assessment, in the Republic of Belarus only 19.3 % of PET packaging waste is covered by organized collection and reuse. The remaining waste (more than 80 %) comes to municipal solid waste (MSW) landfills. These figures demonstrate the necessity to develop and implement the measures aimed at improving efficiency of the functioning EPR system in order to increase the volume of PET waste collection and to reduce its impact on the environment.

According to the legislation for the implementation of the EPR requirements, if a PET packaging producer creates its own waste collection system, PET waste is simply to be transferred to other organizations in order to be neutralized and/or reused. However, the legislation also allows the producers of PET packaging to use (recycle) collected waste by themselves.

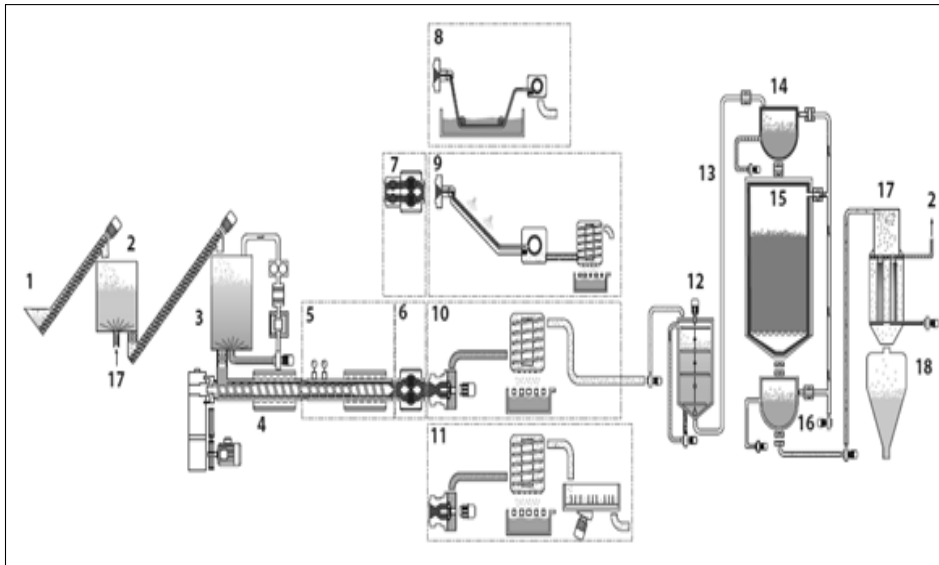
Currently the entire volume of the PET waste collected in the republic comes to a foreign company “RePlas-M” to be converted into PET flakes. The PET flakes produced in Belarus are of low value added. Then they are fully exported to Russia and the EU, where they are used for the production of PET pellets, which in their turn serve as raw materials for the production of PET packaging, including food packaging. Belarus imports such pellets to produce PET packaging, which proves the ineffectiveness of the existing PET waste collection and reuse system.

At this point in time, in Belarus there are no production facilities providing full recycling of waste to use it for production of goods with greater value added. As a result, the life cycle of about 20 % of the PET packaging produced ends up at the stage of flakes manufacture. The remaining secondary material resources in the form of PET waste come to municipal solid waste landfills, thereby increasing the burden on the environment. In addition, it should be pointed out that recycling enterprises import PET bottle waste, which in our country is to be disposed in landfills.

One of the objectives of the green economy for the improvement of the ecological situation and rational use of the country’s resource potential is the recycling of production and consumption waste in its territory. This was an incentive to initiate the investment project, the purpose of which is to increase the economic efficiency of PET waste recycling by means of creating in Belarus the first innovative, technologically advanced industrial facility for deep processing (hereinafter “recycling”) of PET waste into the material, similar to the primary food grade PET, known as PET granulate.

The resulting PET granulate would be subjected to further processing in Belarus in the production of PET preforms, including food grade PET using the technology, known as “bottle-to-bottle”, which is actively used in the USA and the EU countries. The investment project “The Organization of the first in Belarus deep processing of PET waste” is planned by “Effective Packaging Systems” LLC, which is the leader in the market of PET packaging in Belarus, accounting for more than 53 % of the PET packaging produced in the country.

The main stages of the recycling process in this project are extrusion (flakes are sequentially dried, melted, homogenized, cleared of impurities, and filtered in an extruder with vacuum degassing), granulation, polycondensation in the solid phase (increasing the polymerization degree of the material with simultaneous efficient clearance of impurities) (Fig. 4.2).



- |                                   |   |
|-----------------------------------|---|
| 1. Feed auger                     | 11. Underwater pelletizer with integrated crystallization |
| 2. Hot air drying apparatus       | 12. Crystallizer  |
| 3. Primary drying apparatus       | 13. Vacuum conveyor                                       |
| 4. Extruder                       | 14. Pre-heating unit                                      |
| 5. Extruder with vacuum degassing | 15. SSP reactor   |
| 6. Non-backwash melt filter       | 16. Cooling unit/vacuum lock                              |
| 7. Backwash melt filter           | 17. Energy recovery unit                                  |
| 8. Strand pelletizer              | 18. Material storage silos                                |
| 9. Automatic strand pelletizer    |   |
| 10. Underwater pelletizer         |   |

Figure 4.2 – Secondary raw materials processing complex  
 “recoSTAR PET 165 FG iV + Starlinger & Co. GmbH”

The economic assessment of the project is based on the effectiveness assessment methodology, adopted in the economic practice, by calculating the following indicators:

- net present value (NPV);
- payback period (PP);
- profitability index (PI);
- internal rate of return (IRR).

The effectiveness of the project was calculated over the estimated period of its implementation of 8 years (starting from the 2017 1st quarter). The calculations done using Microsoft Excel resulted in the following financial and economic indicators of the investment project implementation (Tab. 4.8):

Table 4.8

## The effectiveness indicators of PET waste recycling project implementation

Indicator	Value in case of grant funding provision for 50 % of the project cost	Value in case of using bank loans to raise funds
Estimated duration of the project, years	8	8
PP, years	5.3	Does not pay off for over the period of implementation
Discounted PP, years	7.0	Does not pay off over the period of implementation
Return on invested capital, %	136	–
NPV at the end of the estimated period (NPV), US dollars	1.015.088	–
IRR, %	19	–
Tax payments over the estimated period (VAT, income tax, contributions to the Social Security Fund), US dollars	4.138.065	0

As shown in Tab. 4.8, if the government provides grant funding for 50 % of the investment project it will be highly effective. Moreover, the projects allow the state to receive additional income of 4.138.065 US dollars in the form of tax payments.

According to the assessment made, the implementation of the project will cause the following significant changes of key indicators in the field of PET waste management (Tab. 4.9).

Table 4.9

## The key indicators in the field of PET waste management in Belarus

Indicator	Before the project	After the project	Effect over 8 years
The selling price of PET bottles waste recycling product, US dollars	PET flakes – 695	PET granulate – 1085	+ 31 824 000 value added
The selling price of PET bottles waste, US dollars	360	430	8 400 000
The level of collection and reuse of PET waste, %	19	31	> 62
The outflow of currency from the country for the purchase of imported raw materials for the production of PET packaging, US dollars per year	21.600.000	9.360.000	97.920.000
The creation of additional jobs in the framework of the project production facility, units	–	+ 20	N/A

The production of PET granulate (product with higher value added) is expected to raise the selling price of PET bottle waste by 70 US dollars per 1 ton, which over 8 years will bring minimum additional income of 8.400.000 US dollars to procurement organizations. The increase in the price of PET bottle waste will improve the profitability of procurement and raise the interest of the procurement organizations in intensifying their activity. According to the calculations, the level of PET waste collection and reuse will gradually increase from 19.3 % in 2015 to 31 % in 2018.

Another vital economic effect of the project is that the replacement of the raw materials currently used in the production of PET packaging by PET granulate will result in the substitution of imported PET materials, and as a result will decrease the foreign exchange outflow from the country. In addition, the implementation of the project will create new jobs at the considered industrial facility, as well as additional jobs in the system of transporting, sorting, pressing, and primary processing of the collected waste. Finally, the use of the PET preforms, produced by the facility, will decrease the cost of PET packaging and, consequently, the cost of the products sold to the population in this type of packaging.

It is also planned within the project to launch an information campaign in order to inform the population about the danger of waste, the necessity of its sorting, the location of containers, and the methods of waste collection.

Thus, the assessment of the project effectiveness demonstrates the economic feasibility of the project implementation, high effectiveness and short payback period of the investments made.

In addition, the project in question will bring significant environmental and social benefits, as it will improve the existing system of collecting, sorting, and recycling of secondary material resources and decrease the negative impact on the environment by reducing the volume of waste dumped in landfills.

1. Shimova O.S., Radyuk A.R. (2014), Extended producer responsibility as a mechanism for greening products life cycle / Proceedings of the Belarus State Economic University // Minsk: Belarus State Economic University, 7, p. 470–475.

2. PET Bottle Market: Consumer and Recycling Market 2012/2013: Report of PCI PET Packaging, Resin & Recycling Ltd [Electronic resource]. – Access mode: <http://pcipetpackaging.co.uk>.

**5.1 ENERGY EFFICIENT DEVELOPMENT OF UKRAINE AS RESPOND TO  
MODERN CHALLENGES\***

Recent social and economic crisis in Ukraine combined with military-political crisis significantly exacerbates issues of the rational use of energy resources. Today the efficiency of energy use in the national economy is extremely low. In this regard, the economic system of the country is suffering from external negative influences and it has serious unresolved deepening problems in domestic social, ecological and economic development.

Despite the fact that the current situation creates significant threats it also provides new opportunities for further energy efficient development of Ukraine. Effective use of these opportunities requires detailed scientific research by studying causes and consequences of such threats. They are closely linked and therefore, their investigation requires an integrated approach.

Thus, the purpose of the research is a systematic analysis of the current situation in energy efficiency sphere of Ukraine and finding on this basis, innovative approaches to transformation of the national economy towards improving energy efficiency and providing sustainable development.

The main objectives of the study are as follows:

- identifying prerequisites of energy efficient development of the national economy;
- systematizing main barriers to energy efficiency and current results of energy saving policy implementation in Ukraine;
- determining directions for further development of energy efficiency in Ukraine at the state level.

The application of statistical methods and factor analysis in this research is put forward to investigate threats and opportunities for energy efficient development of Ukraine in the context of sustainable development and give recommendations on the use of administrative, economic and other mechanisms to ensure that development. We used data compiled by World Energy Council, World Data Center, official information from State Statistics Service of Ukraine, National Energy

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## **1. Prerequisites of energy efficient development of Ukraine**

Based on the analysis of the main macroeconomic indicators' dynamics in Ukraine in recent years, it is expedient to highlight the following prerequisites of the country's transition to energy efficient development.

### ***1.1. The deficit of energy resources and a high level of country's dependence on natural gas imports***

Ukraine is an energy-scarce country that covers its energy needs by 53 %, importing 75 % of the required amount of natural gas and 85 % of the crude oil and oil products. In recent years expenditures of Ukraine on import of energy resources (60-65% of their needs) were accounted for about 25 % of gross domestic product (GDP), that is rather large figure compared with the available reserves of energy saving in the country [1; 2].

During last years the structure of fuel and energy balance of Ukraine was characterized by the largest share of natural gas – 34 % in the total consumption compared to the European average of about 22 %; consumption of oil and oil products was about 8.5%, coal – 36%, uranium – about 19 %, hydro and other renewable sources – about 2.5 % [3].

Ukraine's energy dependence level corresponds to the European average (the share of imports in energy resources supply in the country is about 50 %), but until recently it was characterized by high monopoly dependence on imported oil and gas (70 %) and nuclear fuel (100 %) from Russia [1].

Difficulties in increasing own coal, oil and gas extraction and unfavorable energy balance (a significant share of gas) exacerbate the problem of political and energy dependence and actualize the issue of energy-efficient development.

### ***1.2. High levels of energy intensity of GDP due to the irrational structure of economic system, which leads to economic problems related to sustainable economic growth provision and energy-efficient economic restructuring***

Significant energy intensity of GDP of Ukraine, the former Soviet Union legacy due to the specific structure of the national economy, was reduced to some extent during the 2000s, but it is still rather high compared with the world leading countries and post-Soviet states (Fig. 5.1).

Thus, in 2014 energy intensity of Ukrainian GDP was 321 koe/USD (PPP, 2005) or 2.1 times higher than in the world in average and 3.06 times higher than in European Union (EU). Based on data of Energy World Council and the average EU indicators, in 2014 [4] the possibility of reducing energy consumption for Ukraine through energy efficiency improvements was amounted up to 239 % of the current level in the domestic industry, 107 % – in the service sector and 14 % – in the transport sphere.



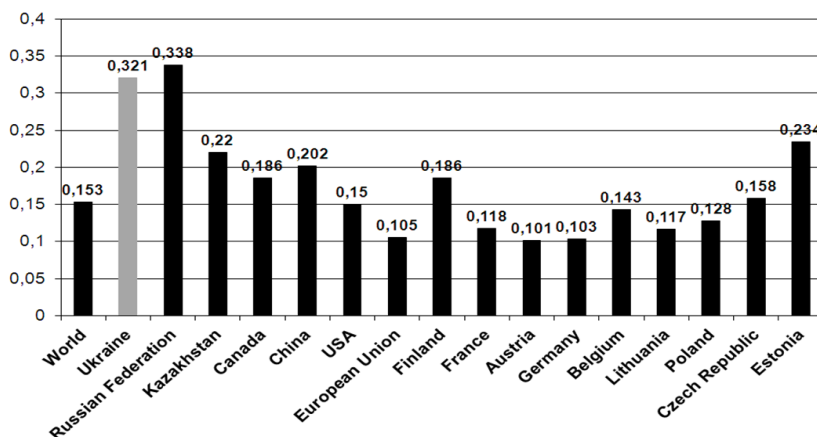


Figure 5.1 – Primary energy intensity of GDP in some countries in 2014, koe/USD (PPP, 2005) [4]

During 2015-2016, the situation did not significantly change for the better, but it was characterized by some slow positive trends. Therefore, today energy efficiency in Ukraine is extremely relevant concerning the scarcity of domestic energy resources and the need to import them at world prices from other countries.

### ***1.3. Growth of energy prices, increasing share of energy costs in the prime cost of goods and services***

After the collapse of the USSR, Ukraine was forced to import energy resources at world prices, which were several times higher than domestic prices prevailing in the Soviet space. This fact is clearly demonstrated by the dynamics of prices for Russian natural gas in 2002-2016 (Fig. 5.2). It should be noted that during 2002–2004 Ukraine also carried out the supply of natural gas from Turkmenistan, which price was lower than Russian (38-44 instead of 50 USD/1.000 m<sup>3</sup> respectively). During 2010-2014 the price of Russian gas was growing rapidly and exceeded the European prices. That led to the reorientation of Ukraine to European supplies in 2014-2015. In 2015, Ukraine bought natural gas in Russia and Europe. At the end of Y2015 Ukraine refused from supplies of Russian natural gas and in 2016-2017 the country carries out supplies from Europe only (Slovenia, Hungary, Poland) [5; 6]. Due to high prices of natural gas which is the main energy resource for many sectors of the national economy, today the energy costs constitute 60-70 % (in some cases more) of the prime cost of Ukrainian goods and services, exacerbating the problems of rational and efficient use of production resources.

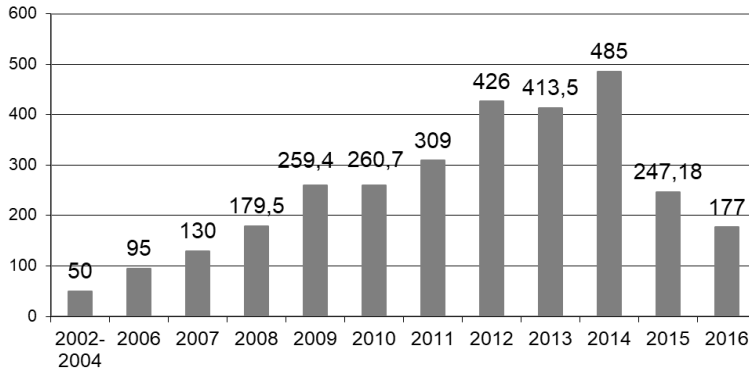


Figure 5.2 – Dynamics of natural gas prices for Ukraine in 2000-2016 (import from Russia), USD/1,000 m<sup>3</sup> [5; 6]

Because of rising prices of Russian natural gas and in order to align energy prices for the population and industry of the country, Ukrainian government implemented a phased increase in energy prices for the population to bring them to economically justified level: by 40 % to 1/05/2015, by 20 % to 1/05/2016 and by 20 % to 1/05/2017 [7]. Thus, the total increase in gas prices for population reached 948.3 % in 2014-2016.

During 2015–2017 electricity prices rose in 5 steps:

by 18.7 % (from 30.84 to 36.6 UAH/100kWh) to 1/04/2015;

by 24.6 % (from 36.6 to 45.6 UAH/100kWh) to 1/09/2015;

by 25.0 % (from 45.6 to 57.0 UAH/100kWh) to 1/03/2016;

by 25.3 % (from 57.0 to 71.4 UAH/100kWh) to 1/09/2016;

by 26.1 % (from 71.4 to 90.0 UAH/100kWh) to 1/03/2017 [8].

Today the consequences of such transformations are social problems of poverty and reduction of the competitiveness of Ukrainian enterprises at domestic and global markets.

In order to prevent social tensions and solve the problem of high prices of public utilities for poor population, since 2014 Ukrainian government has introduced an ambitious program of subsidies to households. Due to targeted subsidies, the government managed to protect most of socially disadvantaged groups from excessively high prices for public utilities. Today, however, energy prices continue growing, and therefore the amount of state subsidies continue increasing too: at the end of 2016 it exceeded 2 % of GDP. Despite the fact that high energy prices stimulate energy saving measures, increase in energy efficiency is unsatisfactory in all sectors of the

national economy and, especially in housing. The reason is inefficient system of subsidies which does not encourage poor people for energy saving.

**1.4. Irrational use of scarce energy resources, which leads to high levels of environmental pollution**

In 1990s the economic downturn weakened acuteness of environmental problems for Ukraine because of reducing the total volume of pollution. However, economic growth in early 2000's actualized issues of environmental protection and prevention of natural resources exhaustion which are still relevant today, even in crisis.

In 2014, the level of CO<sub>2</sub> intensity of Ukrainian economy exceeded the European average in 3.27 times and the world average in 2.06 times, showing, however, a downward trend (Fig. 5.3).

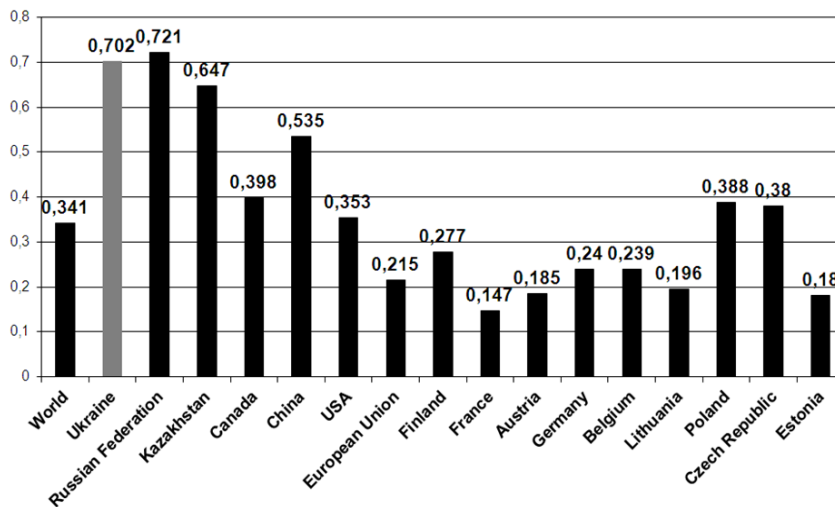


Figure 5.3 – CO<sub>2</sub> intensity of GDP in some countries in 2014, kCO<sub>2</sub>/USD (PPP, 2005) [4]

High values of the index indicate substantial reserves of energy efficiency growth and greening of the national economy. However, due to the economic crisis, over the past five years the dynamics of environmental pollution is characterized by the general trend of decreasing absolute amounts of pollution [9].

**1.5. The annexation of the Crimea and the military conflict in Donbas, which aggravate the problem of insufficient power supply of the country**

The involvement of Ukraine in the military and political conflicts in Crimea and Donbas led to significant losses in the energy sector of the country. Annexation of the Crimea peninsula caused the loss of 36.5 % of domestic renewable energy capacity. That fact questioned the full fulfillment of the obligations to achieve 11 % of energy from renewables in total energy consumption by 2020, which was approved within the framework of Ukraine's membership in the European Energy Community [10].

At the same time, the loss of the part of Donbas significantly reduced the possibility of providing population and enterprises by domestic coal. The government of Ukraine is trying to replenish coal stocks by supplies from South Africa, Poland and Kazakhstan. However, these contracts use much higher prices for coal and its quality characteristics require reconfiguring the thermal power plants and additional costs respectively.

## **2. Barriers to energy efficiency in the country**

Based on the analyzed prerequisites, the experience of developed countries concerning energy efficiency barriers and the results of surveys of Ukrainian enterprises, it is expedient to allocate the following main barriers to energy efficiency increase of production and consumption processes.

### ***2.1. The low level of innovative activity***

Most domestic companies are unable to meet current challenges applying outdated technologies. Today the physical depreciation level of fixed assets in Ukrainian industry is about 60% (critical limit) and moral depreciation level is 90 % [9]. Lack of finances prevents companies from installing innovative, energy saving and energy efficient technologies. This primarily indicates the trend in new technological processes installing index in Ukraine's industries for the period of 1991 to 2015 (Fig. 5.4), which could not reach the level of 1991 for more than 20 years of independence. The share of low-waste, resource saving and waste-free processes in the total volume of new technological processes did not exceed 20-40 % during that period, indicating low energy and resource savings of industrial enterprises [9].

Recently, absence of state financial support, contradictory legislation, lack of innovative infrastructure and innovative products' market, problems in intellectual property rights protection, etc. impede innovative activities of local firms. Consequently, the share of firms engaged in innovations in Ukraine did not exceed 18% of their total number for the period of 2000–2014, and the share of innovative products ranged from 9.4 % (in 2000Y) to 1.4 % (in 2015Y), that is extremely low (Fig. 5.5) [9].

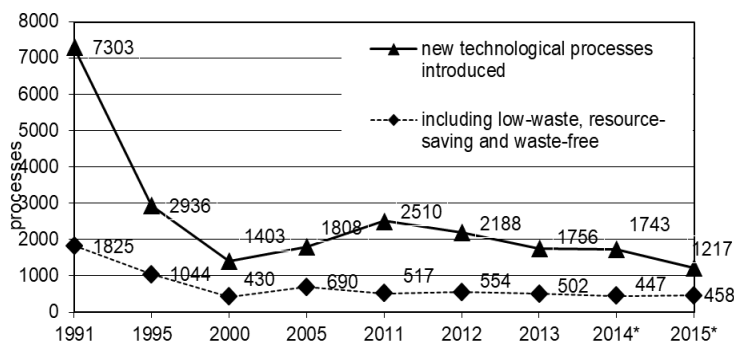


Figure 5.4 – Installing new technological processes in Ukrainian industry in 1991–2015 (without temporarily occupied territory of the Autonomous Republic of Crimea, Sevastopol and the zone of the antiterrorist operation) [9]

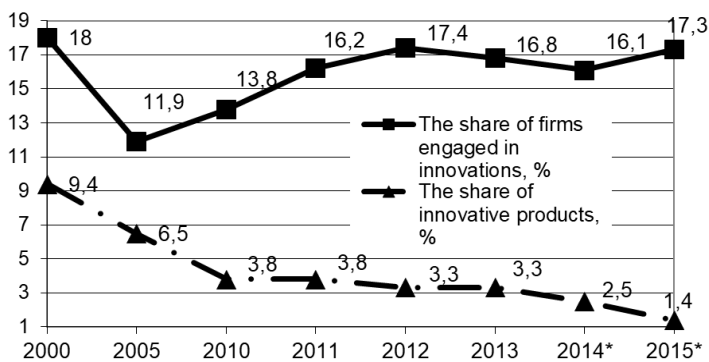


Figure 5.5 – The share of firms engaged in innovations in Ukraine and the share of innovative products (without temporarily occupied territory of the Autonomous Republic of Crimea, Sevastopol and the zone of the antiterrorist operation) [9]

## 2.2. Lack of sufficient investment to ensure energy-saving projects implementation, including budgetary funds

During 2000-2012 total expenditures on innovative activities including energy efficient projects, increased annually (except the 2009 crisis), and began to decrease in 2013-2014 due to the economic crisis with increasing in 2015 (Tab. 5.1). Today, like 10–15 years ago, the lion's share of the cost is firms' funds (53-97 % depending on the year) [9]. The companies are not always able to finance the implementation of innovative projects in production, introduce capital-intensive energy efficient and resource saving technologies.

Table 5.1

Sources of financing innovations in Ukraine (without temporarily occupied territory of the Autonomous Republic of Crimea, Sevastopol and the zone of the antiterrorist operation) [9]

Year	Total expenditures on innovative activities, mln UAH	Including the funds, %			
		own funds	state budget	foreign investors	other sources
2000	1757.1	79.6	0.44	7.6	12.3
2005	5751.6	87.7	0.49	2.7	9.0
2010	8045.5	59.4	1.08	30	9.6
2011	14333.9	52.9	1.04	0.4	45.6
2012	11480.6	63.9	1.95	8.7	25.5
2013	9562.6	72.9	0.26	13	13.7
2014*	7695.3	85.0	4.47	1.8	8.7
2015*	13813.7	97.2	0.4	0.4	2.0

As known from business practices, every time the Government wants to spend budget money for reconstruction and modernization of Ukrainian economy it is opposed by a powerful industrial lobby in the Parliament. Corruption schemes and kickbacks reduce to zero the efforts to update national production and consumption patterns. For the period 2000–2015 the budget's share in financing innovative activities did not exceed 4.5 %, what can be hardly named as an active state support.

### ***2.3. The lack of economic interest of potential performers in energy saving measures implementation***

Today incentives for implementing energy saving activities in the country are rather underdeveloped and use inefficiently. As a result, the formation of interest for all members of society in energy efficiency is complicated. Among the existing management methods, administrative levers are mostly used; moral and emotional as well as coercive economic methods (particularly of fiscal orientation) are less popular. Encouraging economic methods are less common and do not promote the active implementation of energy saving measures, especially in "painful" industries such as housing and utilities, public and energy sector and heavy industry.

### ***2.4. The imperfect state regulation in the field of energy efficiency.***

Government of Ukraine adopted the updated Energy Strategy of Ukraine till 2030 [1], State Target Economic Program on Energy Efficiency and the Development of Energy Production from Renewable Energy Sources and Alternative Fuels for 2010-2017 [11], National Renewable Energy Action Plan by 2020 [12], National Energy Efficiency Action Plan until 2020

[13] and other laws, aimed at implementing existing energy saving potential. However, the processes of energy efficient improvements in the national economy are extremely slow. Imperfect legislative base, low energy prices until recently, lack of information for energy consumers concerning energy saving opportunities, lack of reliable funding and professional performers of energy efficient projects are the main reasons for this deceleration.

Results of imperfect management are reflected in disrupting the state programs of economic development and energy saving, changes of government agencies responsible for conducting energy saving activities, the negative dynamics of innovations and energy saving investment, inefficient structural economic policies and other aspects.

### ***2.5. High level of corruption.***

The high level of corruption in Ukraine is one of the important factors that impede energy saving processes. The presence of illegal extortions significantly complicates doing business, including the energy efficiency sphere. The budget funds allocated for energy saving are often used uncontrollably, creating opportunities for corruption. Thus, a result of energy saving measures is not like the expected one. Eradicating corruption and establishing strict control over financial flows at all levels of management are necessary for further implementation of energy saving measures.

### **3. Results of the energy saving policy in Ukraine**

Despite the above-mentioned obstacles, there are some positive results in increasing energy efficiency of the national economy. In particular, in 2000-2014 the energy intensity of Ukrainian GDP fell by 91.3% (or to -4.5% annually) (fig. 5.6) and CO<sub>2</sub> intensity of the economy reduced by 93.7 % [4].

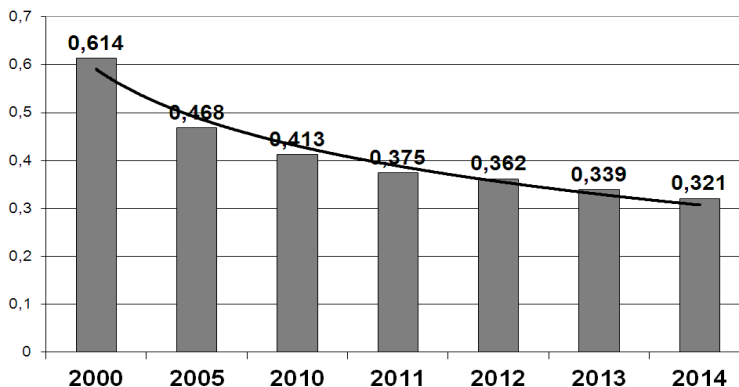


Figure 5.6 – Primary energy intensity of GDP in Ukraine in 2000-2014, koe/USD (PPP, 2005) [4]

Due to the use of “feed-in” tariff, recently the renewable energy sector is actively developing. Although today the contribution of renewable energy is small to affect the overall energy balance structure of the state (about 1 %), experts say that in recent years domestic renewable energy is developing more intensive than traditional energy sector.

According to the National Energy and Utilities Regulatory Commission, the installed capacity of Ukrainian renewable energy objects covered by the “feed-in” tariff amounted to 997.1 in 2015 and 1117.8 MW in 2016. In the previous years, the capacity of such renewable energy facilities amounted to 413.6 MW in 2011, 649.0 MW – in 2012, 1244.2 MW – in 2013 and 1490.3 MW – in 2014. Reduction in the installed capacity of renewable energy facilities in 2015-2016 compared to previous years is explained by the loss of Ukrainian authorities’ control over solar energy objects on the Crimean peninsula because of Russian expansion. Overall, in 2015 the amount of energy produced by renewables was 1760.9 mln kWh or 1.2 % of total power generation in Ukraine and 1775 mln kWh in 2016. Compared to the previous years, the volumes of electricity generated by renewable energy objects, working on "feed-in" tariff were as follows: 323.7 mln kWh in 2011, 784.7 mln kWh in 2012, 1522.4 mln kWh in 2013 and 2007.4 kWh in 2014 [14; 15; 16]. Private households are also involved in processes of "green" energy generation. In 2015 they produced 296.588 kWh (as of 01.12.2015) from solar energy with increasing numbers of households from 21 to 128 during that year [17]. In 2016 the number of households with installed solar panels increased almost 4 times (from 244 to 1.109 households) compared to 2015. The installed capacity of solar panels has increased 7 times, from 2.2 MW at the end of 2015 to 16.7 MW at the end of 2016 [15].

At the same time the growth rate of energy efficiency is rather low compare to other countries. For example, in 1990–2014 Slovakia had reduced energy intensity of its economy in 2.52 times, Poland – 2.59 times, Ukraine – only 1.56 times. The high energy intensity determines a huge potential of energy efficiency growth for production and consumption processes in Ukraine, only a small part of which is now implemented.

#### **4. Directions for further energy-efficient development of Ukraine**

Given the results of energy efficient policy in Ukraine and barriers to implementing energy saving measures it is expedient to define the following directions of state policy implementation to improve energy efficiency of production and consumption.

##### ***4.1. Development of renewable energy sector, empowerment of emissions trading***

From the standpoint of reducing energy dependence of Ukraine, which largely causes the difficult economic situation in the state, it is more expedient to use active management mechanisms for the development of new energy sources. State concept of renewable energy



development management needs improvement with regard to the necessity of ensuring evenly placement of renewable energy capacities throughout the country and diversification of their structure, using a balanced approach to pricing, improving the economic and financial incentives for the development of renewables.

Another issue is creation of the national emissions trading market involving representatives of local communities and individual economic entities as market participants and giving them access to the international market of emissions trading. The creation of internal market for trading greenhouse gas emissions will provide additional incentives for energy conservation projects at regional and local levels.

#### ***4.2. Intensification of economic incentives for implementing energy efficiency projects at all levels of management and balanced regulation of energy prices***

Formation of the economic interest for all participants of energy saving processes in their implementation is a key factor of the success of energy efficiency policy. This requires significant expanding of the list of energy saving incentive economic instruments used by the government, such as introduction of preferential taxation of energy saving activity, partial public financing, preferential loans for energy efficient measures, public procurement of energy services and so on.

Excluding the practice of unbalanced energy prices, equalization of such prices for industrial and household consumers, prevention of cross-subsidization at the expense of energy price disparity will facilitate the formation of the full demand for energy-saving technologies and the development of national energy saving market.

It is advisable to improve the mechanisms of formation and government regulation of energy and final products prices. It can be implemented by setting higher prices for non-renewable and exhaustible energy resources used in production and for energy-intensive products, as well as by installing lower prices for energy from renewable sources and energy efficient products and by implementing "eco-labour reform".

#### ***4.3. Reliable financial support of energy efficiency and creation of favorable investment climate for the implementation of energy efficiency projects***

In order to create reliable funding and favorable investment climate for energy efficiency measures introduction it is advisable to ensure adoption and strict implementation of relevant national and regional programs with a mandatory allocation and control of the target budget spending, as well as to provide state and local government guarantees for investors of energy efficiency projects.

It is also important to form a multi-level system of energy saving funds. They should accumulate means for the goals of energy efficiency growth and should grant money to

performers of energy saving measures on a competitive basis by using, for example, public procurement of energy services.

Along with the use of own and borrowed funds of enterprises and organizations, money from energy saving funds and budgets of different levels, foreign loans and investments, it will be expedient to involve consumers' means for energy efficiency measures implementation wider by applying flexible mechanisms of funds accumulation and use. Other forms of getting investment funds are the emission of energy saving bonds and greenhouse gas emissions trading.

Special attention should be paid to further deployment of energy service companies' activity in Ukraine as an effective means of economic and financial performance of energy-saving projects.

#### ***4.4. Development of innovation activities, updating the material and technical base of production, restructuring the economy towards the growth of its energy efficiency***

It is necessary to change current national and regional priorities in the implementation of energy saving policy. The goal is to support the introduction of new highly efficient energy saving technologies accompanied by significant economic effects, instead of taking measures with relatively small economic effect and rapid payback period. New highly efficient energy saving technologies may require large capital expenditures in the medium and long-term period but they will provide a rapid restructuring of the national economy.

This shift becomes significant in addressing issues of rebuilding destroyed infrastructure of Donbass, where priority should be given not to restoration and modernization of old production facilities, but to the application of innovative technologies contributing to the transition of territories to self-energy and resource provision. In turn, this requires the formation of a strong financial base for energy saving projects' implementation involving internal and external sources.

To enhance innovative activity on the rest of Ukrainian territory and update the material and technical base of production it is expedient to strengthen state support of innovation processes through the state's participation in the financing of such projects and giving the actual tax and credit privileges to companies-innovators instead of declaring such incentives in the legislation.

#### ***4.5. Improving the legal framework and structure of public administration of energy efficiency, strengthening the legal and economic responsibility for the inefficient use of energy resources***

Revision and adjustment of Ukrainian legislative and normative acts on energy saving will eliminate the contradictions existing in legal framework and build a clear vertical of legal

regulations' interactions, especially in terms of economic incentives for energy efficiency measures that exclude declarative incentive mechanisms. It is also advisable to strengthen legal and economic responsibility for inefficient use of energy resources by the economic entities and to exclude their possibility to compensate inefficient use of energy from other sources. First of all, it concerns the scope of public services, where their suppliers have advantage of their monopoly position and are able to compensate all own expenses by including them into the tariff.

It should also be implemented streamlining the structure of state and local authorities for energy efficiency management, eliminating duplication of their functions and shifting in emphasis from authorities performance of mainly administrative and control functions to providing consulting and legal services, as well as ensuring creation of the national network of counseling centers for energy saving under the state support.

#### ***4.6. Settlement of the military and political conflicts in Ukraine, democratic reforms***

Today the military conflict in the Ukrainian East and the problem of Crimea are important destabilizing factors as for political, as well as for social and economic situation in the country. Solving these issues and eliminating the threat for territorial integrity of Ukraine will launch the processes of rebuilding the destroyed objects on current occupied territories, forecasting, planning and involving foreign and domestic investment in the restoration of territorial systems based on the use of innovation technologies.

It is necessary to conduct democratic political and economic reforms in the Ukrainian society aimed at introducing European approaches in management of the national and regional economies. First, it concerns overcoming any corrupt practices at all levels and enhancing the process of decentralization of powers in the country.

Eradication of corruption will enable the practical implementation of the state and local programs and plans of territories development according to their indicators and provide clear control of the associated financial flows. A key task of the authorities here is to create conditions in which not just any corruption will be severely punished, but also the formation of the corrupt schemes will become unprofitable for business entities. In addition, the transfer of the powers of central government to local administrations, in particular concerning increasing the degree of financial independence of regions due to the concentration of financial flows at the local level, will expand opportunities of territories to invest in energy efficiency.

It should be noted that Ukraine has already had some positive results for the proposed directions. Thus, there are introduced economic incentives for renewable energy on the basis of "feed-in" tariff, which ensured the rapid development of the domestic renewable energy market. At the state level there were implemented mechanisms of the Kyoto Protocol on emissions

trading. In 2015 the legal framework of public procurement of energy services was improved, enabling realization of long-term energy efficient measures in the public sector. The state program of preferential crediting energy saving measures was implemented for household sector, providing partial state compensation for the loans, etc. The process of increasing prices on basic energy resources is continuing with a view to bring them to the economically justified level. At the same time, there is a wide range of areas that need further development.

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## **5.2 THE ECONOMIC TOOLS FOR RENEWABLE ENERGY PROMOTION BASED ON GREEN CERTIFICATES USAGE\***

Formation of high-tech and competitive economy is largely caused by the state of the fuel and energy complex. Overcoming the crisis associated with the depletion of organic energy resources stocks, dependence on their imports and increasing anthropogenic load of energy sector on the environment is possible due to increasing share of the energy generated from renewable energy sources (RES) in the country energy mix.

At the present stage of renewable energy (RE) technologies development, deployment of its generating capacity is impossible without government support. In spite of technological progress, which caused a gradual decrease of the green energy generation cost, today almost all the existing RE technologies are subsidized and cannot be developed in market condition. Therefore, one of the priority tasks of the state energy policy should be the development and implementation of effective economic instruments aimed at stimulating RE sector investment attractiveness.

Today, one of the most popular economic mechanisms to promote the generation/consumption of energy from RES is the tradable green certificate system, which has been approved in many developed countries such as the USA, Australia, Japan, Sweden, Denmark, the Netherlands, UK etc. [1, p. 87]. There are many studies devoted to theoretical and methodological foundations of this mechanism [2, 3; p. 2187–2188; 1011–1012]; adaptation of the tradable green certificate systems to various national electricity markets [4, p. 1397–7187]; the impact of the tradable green certificate system on change of traditional and green electricity cost, electricity tariff for final consumers [5, p. 1257–1267]; evaluating the effectiveness of the tradable green certificate system [6, p. 374–379], combining two national trading markets [7, p. 611–616.], etc. However, despite a sufficient number of scientific publications aimed at studying this support scheme, the possibilities of green

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certificates usage implemented in additional motivational mechanisms for increasing the overall efficiency of the main tradable green certificate system in the part of electricity generation, require further investigations.

The main idea of the tradable green certificate system lays in separation of the physical electricity flow from its environmental benefits, which are materialized in the green certificates. This feature opens wide possibilities for their usage as supplementary economic levers for stimulating RE development outside the main trading system. The key purpose of expanding the green certificates usage is increasing demand for electricity generated from RES and getting extra financial sources for RE capacity deployment.

Among the potential applications of the green certificates outside the main trading systems, based on the fulfillment of obligations under the mandatory quota for the green electricity consumption, it can be considered the following ones:

- the tradable green credit certificate system;
- the voluntary tradable green certificate system;
- the international tradable green certificate system;
- the use of the green certificates under the Kyoto Protocol mechanism – International Emissions Trading.

Let us review the characteristics of each of the proposed options in detail.

**The tradable green credit certificate system.** It is based on the issue of the credit GCs and their sale on the GC market in order to obtain extra financial resources to provide investors to construct RE plants. It is likely that the amount of electricity generated from RES by operating RE plants will be insufficient to meet the quota fulfillment. In this case it offers to use green credit certificate mechanism.

The credit GCs take the form of securities with one-year maturing period, which are sold on the GC market. Final consumers buy such certificates, thereby paying for non-generated green electricity. At the expense of funds received from their sale, investors get interest-free loan or loan with a low interest rate to cover partially the cost for RE projects realization.

In our opinion, the process of this mechanism functioning should be built in the following way. Public authority, which regulate RE sector, announces a competitive selection of RE projects, which can be implemented with the involvement of the credit GCs. Determination of the selected projects list will be carried out by taking into account such criteria as total installed capacity of RE plant, a desired type of RES, a region for RE plant installation etc.

A potential investor enters into an agreement with the public authority for issue of certain amount of the credit GCs for RE project, included to the list of the winners. Having put, the

public authority issues the credit GCs according to the average annual predictable amount of electricity generation by such RE plant. Economic entities, which have obligations under the main TGCS, can cover them by the credit GCs in particular. The realization of the credit GCs is carried out under conditions of purchase and sale of ordinary GCs. The funds received from their sale are transferred to the investor, which uses them for the construction of new RE power plant. After putting into operation the owner of such RE facility will get ordinary GCs, which confirm the fact of electricity generation. However, such certificates will be repaid immediately without their selling on the GC market until their number will equal to the amount of credit GCs sold with the aim of funds accumulation for the construction that RE plant. Therefore, in order to achieve such ratio the owner of RE plant will sell the green electricity only by the price of conventional electricity. The funds from its sale will be sufficient to cover operation and maintenance cost and taxes, because RE power plants have low operating costs [8, p. 89-103].

It should be noted that the offset of credit and ordinary GCs will be carried out based on amount of electricity generation from RES (according to their number), but not based on GCs price. In other words, the State in the form of funds received from selling certain number of the credit GCs gives to investor of certain amount of the electricity from RES in MW·h, hence investor after putting into operation of RE plant must return to the State amount of electricity expressed in number of the ordinary GCs. Therefore, a ratio of the issued credit GCs cost and returned ones in money equivalent can vary under the influence of time factors, including changes of the convention electricity price, which directly affect the GCs price.

In order to approximate price conditions of accumulated funds via the credit GC to price conditions of their return based on ordinary GCs, it is reasonable:

- to issue and sell the credit GCs during the year, which is previous to the year of putting into operation of RE plant;
- to return the ordinary GCs to cover the funds attracted through the sale of credit GC in the first month of RE plant operation.

Given the above, it can be stated that the credit GCs can be used only for the partial RE projects financing; their usage is not intended for covering all investment cost, required for RE plants construction.

**The voluntary tradable green certificate system.** The essence of the voluntary tradable GC system is to establish voluntary obligations to consume green electricity more than it is established by the mandatory annual quota. First of all, taking voluntary commitments based on social responsibility of the consumers (a care about the environment state, climate change etc.) [9, p. 6–15].



Under this mechanism it is important for the consumers motivation to promote the green electricity consumption by informing the population about economic, social and environmental benefits of RE.

In addition, government can encourage consumers to join voluntary TGCS through the introduction of certain economic incentives:

- tax benefits. Government can provide tax privileges (for instance, reducing the income tax) for economic entities, who will take the obligation to consume 100% of electricity from RES and confirm it by amount of purchased GCs;

- to use special labeling for goods, confirmed using electricity from RES during their production, which has received considerable spreading in several countries [10, p. 352–351]. Sale of such goods focused on the ideologically convinced consumers who are concerned not only about personal achievement, but socially significant goals as well. The expression of consciousness in this case is in their willingness to buy such goods at a higher price. Environmental labeling may be interested for enterprises, which export goods to the countries, where buyers have the practice to consume such goods.

- Hence, in the part of taking voluntary obligations, consumers can be guided by sincere interest in RE development, the desire to show their support in order to create/strengthen the image and reputation of a socially responsible company/citizen or to receive some financial benefits.

- The functioning of the voluntary tradable GC system will help to increase the demand for the electricity from RES, and thereby it will strengthen the competition among economic entities, which have the obligations to buy the GCs under the main trading system. The increase of the demand for green electricity will provoke increasing its supply that will have a positive impact on the reducing of its price in the future.

- It is worth noting that the voluntary tradable GC system does not require a separate trading platform. Buying and selling of the GC to perform voluntary commitments can be carried out on a single trade market.

**The international tradable green certificate system.** The TGCS implementation at national level creates preconditions for a possible expansion of GCs trade in the future. Currently most of the GCs markets are limited by the national borders due to insufficient unification of the trading systems. At the same time, today there are a number of international standards applied for certification of electricity from RES. The most famous ones are: European Energy Certificate System and the Renewable Energy Certificate System [11, p. 668].

Since the electricity from RES which is accompanied by GCs can be exported by higher price, governments that use this mechanism to encourage RE development should orient certification of electricity from RES to the international standards.

It will let Ukraine to get access to international markets and to trade electricity from RES with member states of European Energy Certificate System and the Renewable Energy Certificate System.

The infrastructure of GCs trading in Europe is well developed. Economic entities that have obligations to consume electricity from RES and cannot fulfill them fully within the framework of the national trading system can provide their covering by the import of GCs from countries, which have their surplus. So, electricity import together with the GCs can contribute to solving the problems related to difficulties to achieve national goals to consume electricity from RES.

It should be noted that the GCs can be sold to abroad together with the electricity, generated from RES as a complementary product or separately. In the latter case, the final consumers with the help of the GCs, purchased on the markets of other countries, can convert the conventional electricity, purchased by them in their country, into green electricity.

In part of the international voluntary obligations the obligations within the framework of Corporate Social Responsibility, which is widespread in many countries of the world, present the special interest. Corporate Social Responsibility involves voluntary initiatives of a company to incur additional cost on social needs, based on moral and ethical considerations.

Companies, which behave themselves as socially responsible, form reports on corporate social responsibility or sustainability reporting [12, p. 10]. One of the items displayed in such reports are voluntary commitments related to the consumption of the electricity from RES. The fulfillment of ones may base on purchasing the green certificates on the international market. The volume of the green certificates sales on the international market depends on their attractiveness, which is caused by many factors (trust, type of RES, which used for electricity generation etc.). The green certificates price vary within wide limits and depends on a number of market factors such as: the electricity tariffs in the importing countries, the level of legislatively established penalty for default of obligations for the green electricity consumption, the green certificates price in competitor countries etc.

Export of the green certificates to the markets of other countries should be done after achievement of mark about covering of all obligations for the electricity consumption from RES at the national level. Subject to the fulfillment of the quota within the country, the demand for green certificates from foreign countries will contribute reducing the financial burden on final consumers and increasing the consumption of the green electricity environmental benefits in the country simultaneously.

Hence, the possibility of trading by the green certificates on the international market depends directly on the compatibility of trading systems, because in order to open new markets for national green certificates in the future should be harmonized them with the west-european trading systems.

**The use of the green certificates under the Kyoto Protocol mechanism – International Emissions Trading.** Electricity generation from RES is not accompanied by the greenhouse gases emission (excluding of biomass technologies) [13, p. 54] that opens great opportunities for its use in achieving the Kyoto Protocol goals.

The Kyoto Protocol is an international climate agreement aimed at reducing greenhouse gas emissions to curb global warming. In order to stabilize the concentration of greenhouse gases for each participating country of the agreement set the maximum permitted quota of emissions in the atmosphere.

Governments of States can perform quantitative commitments to reduce emissions through internal measures (implementation of energy efficiency and energy saving projects, RE development) or using flexible mechanisms of the Kyoto Protocol. Implementation of these mechanisms is not only an essential component of economic and energy policies of most countries, but also a reliable platform for forming global market of environmental investments.

Of particular interest there is the use of the green certificates in the mechanism of the Kyoto Protocol – International Emission Trading. In the case of the effective implementation of above internal measures, the country can form a reserve of unused emission reduction units, which can be sold to countries that exceed the level of allowed emissions. Therefore, countries, which exceed the level of established obligations for greenhouse gas emissions, must cover them by purchase of such emission reduction units in other countries.

It should be noted that in the first period of the Kyoto Protocol (2004-2012) was allowed to trade by emission reduction units, which emerged not as a result of effective and targeted measures aimed at to reducing greenhouse gas emissions, and as a result of a significant reduction of industrial production. However, lack of transparency and inappropriate use of funds received from the sale of such emission reduction units by some post-Soviet countries led to the position formation of the international community concerning the inadmissibility of them using in the second period of the global climate agreement (2012-2020) [14, p. 6]. That position stimulates countries' governments to activate processes of low carbon technologies development, among of points is renewable energy one.

Implementation of the tradable green certificate system at the national level involves repayment of the green certificates at the end of each reporting period. Thereafter the

function of the green certificates as an instrument for achieving the national indicative target regarding the share of electricity from RES in countries' energy balance is finished. At the same time, all financial obligations among economic entities involved in the tradable green certificate system are fulfilled. Therefore, the State can dispose of other environmental benefits of the green certificates.

In order to attract financial resources for new RE plant construction with the help of the green certificates under mechanism of the Kyoto Protocol mechanism – International Emissions Trading, it is necessary to convert the amount of the repaid green certificates into emission reduction units and to sell them on the international market.

At the legislative level, the priority in forming reserve of the emission reduction units should give units, which were formed as a result of green electricity generation. It will allow at excess of the emission reduction units under official mandatory commitments regarding greenhouse gases, first of all, to sell emission reduction units formed from electricity generated from RES.

Therefore, measures for performing official obligation for allowable level of emissions of greenhouse gases should be formulated as follows:

- 1) processes, which are not related to implementation of energy saving and energy efficiency policies, RE development etc., but at the same time have a positive impact on reducing greenhouse gas emissions (for instance, decline in industrial production);
- 2) energy saving and energy efficiency measures;
- 3) RE development.

Let us consider the environmental and economic benefits from this mechanism realization in the case of Ukraine, on condition that the green tradable certificates system will be implemented at the national level [15, 16; p. 72–73; 42].

It should be noted that the formation of the unused reserve of the emission reduction units for Ukraine is quite likely. It is caused by the fact that Ukraine will be able to fulfill commitments in the second period of the Kyoto Protocol at the expense of present economic stagnation.

At the legislative level in Ukraine there are no methodological approaches to calculate the reduction of greenhouse gas emissions from electricity generated from RES. So, for this purpose we suggest to use the methodology, which is used in Clean Development Mechanism ASM 002 Version 12.3.0 [17, p. 6–9] for RE plants, connected to the power grid.

According to [17, p. 6–9] the reduction of greenhouse gas emissions is calculated as follows:

$$ER_t = BE_t - PE_t, \quad (5.1)$$

where  $ER_t$  – emissions reduction in the period  $t$ , tonnes of  $CO_2$  equivalent (t.  $CO_2$  eq);

$BE_t$  – baseline emissions in period  $t$ , t.  $CO_2$  eq;

$PE_t$  – project emissions in period  $t$ , t.  $CO_2$  eq.

For generating capacity based on different types of RES, baseline and project emissions are calculated in different way. The method of calculating the reduction of greenhouse gas emissions by wind, solar and hydropower plans is simple. At the same time the methods for biomass power plants [18, p. 23] require taking into account a number of factors, which are difficult to summarize, because they depend on individual technical characteristics of definite plants.

Considering the above and the fact that 95 % of electricity from RES in Ukraine at the end of 2015 was generated by wind, solar and hydropower plans [19, p. 47–48], let us calculate reducing of greenhouse gas emissions by these plants.

So, according to [17, p. 6–9] the baseline emissions from electricity generated by wind, solar and hydropower plants can be calculated as follows:

$$BE_t = QE_t \cdot EF_t, \quad (5.2)$$

where  $BE_t$  – baseline emissions in period  $t$ , t.  $CO_2$  eq;

$QE_t$  – the volume of electricity supplied to the grid in period  $t$ , MW·h;

$EF_t$  – specific carbon dioxide emissions from electricity generated by thermal power plants, connected to United Energy Systems of Ukraine in period  $t$ , t.  $CO_2$  eq.

According to the above method, project emissions ( $PE_t$ ) for electricity generated by wind, solar and hydropower plants are zero.

Specific carbon dioxide emissions from electricity generated by thermal power plants, which are connected to the United Energy System of Ukraine, are determined by the order of the State Environmental Investment Agency № 75 dated 12.05.2011 and equal to 1.063 t.  $CO_2$  eq / MW·h (kg  $CO_2$  eq / kW·h) [20, p. 1].

Based on the foregoing and according to the volume of electricity generated by wind, solar and hydropower plants in 2015, let us calculate the annual reduction of greenhouse gases emissions (Tab. 5.2).

Table 5.2

Reduction of greenhouse gas emissions from electricity generated by wind, solar and hydropower plants in Ukraine in 2015, (t. CO<sub>2</sub> eq.) [19, 20; p. 47–48; 1]

Type of RE plants	The volume of electricity supplied to the grid by RE plants in Ukraine in 2015 (QE <sub>i</sub> ) (MW·h/year)	Specific carbon dioxide emissions from electricity generated by thermal power plants (EF <sub>i</sub> ) (t. CO <sub>2</sub> eq.)	Baseline emissions (BE <sub>i</sub> ) (t. CO <sub>2</sub> eq.)	Project emissions (PE <sub>i</sub> ) (t. CO <sub>2</sub> eq.)	Emissions reduction (ER <sub>i</sub> ) (t. CO <sub>2</sub> eq.)
Solar power plants	464710	1.063	493986.73	0	493986.73
Wind power plants	973680	1.063	1035021.84	0	1035021.84
Hydropower plants	208380	1.063	221507.94	0	221507.94
Total	1646770	1.063	1750516.51	0	1750516.51

According to the analytical center “Point Carbon”, the cost of CO<sub>2</sub> equivalent ton at the market of quotas ranged by 8.5-9 euro at the end of 2015 [21].

Thus, taking into account the average sale price – 8.75 euro / t.CO<sub>2</sub>-eq and volume of generated electricity by wind, solar and hydropower plants in Ukraine in 2015, with the help of the proposed mechanism the State can be attracted 1300000 euros to finance of new RE facilities construction.

Summarizing the above, it can be concluded that stimulation of RE development by using the tradable green certificate system will contribute to increasing effectiveness of the main trading system and obtaining additional environmental and economic benefits for society.

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### **5.3 SUSTAINABLE ENERGY INVESTMENTS IN LOCAL AUTHORITIES: PROJECT-ORIENTED APPROACH**

Sustainable development of modern world requires a well-balanced energy infrastructure. Fuel and energy resources act as material factor for environmentally sustainable development and poverty redressal. However, it is calculated that in 2015 about 2.8 billion people still have no accession to innovative energy services and over 1.1 billion by now do not even have electricity [1]. Nowadays challenges lie in searching directions to interlink the supply and demand for energy services and products with its effect on the ecological environment aiming to realize sustainable development goals.

Present levels of energy production and energy consumption in the contemporary world are not sustainable, especially because of increasing urbanization process in the world. Prices on energy resources are extremely rising. Through outdated and inefficient equipment, lacks of monitoring and control devices significant amounts of energy are being wasted. The trend towards increased mobility, urbanization and an integrated global economy will further increase total energy consumption. Major problem of today's world is that renewable energy resources are underutilized. For this very reason experts agree that particular attention should be paid to the implementation more efficient and innovative energy technologies as well as alternative energy sources.

It is important to note that sustainable development has been the overarching goal of the international community. Nowadays many governments develop their national strategies for



creating sustainable cities, incorporating policy measures outlined in strategically important documents. Despite the exertions of many governments around the world in implementation of such strategies, there are continuing causes for concern over global economic and environmental developments in many countries which are intensified by recent extended global energy, food and financial crises. While governments today are searching for powerful method to lead their nations out of these related crises, green economy in its various forms has been proposed as a mean for catalyzing renewed sustainable development.

Many international financial institutions recognize the enormous need for investment in energy sustainability and have already developed financing facilities specifically dedicated to medium- and small-scale energy efficiency and renewable energy investment projects. It is obvious that by engaging the financial sector many of the barriers that prevent the identification and financing of sustainable energy investment opportunities can be overcome. For example, European Bank for Reconstruction and Development (EBRD) successfully implemented through approximately 60 local banks in 15 countries one of the bank’s sustainable energy initiative, called Sustainable Energy Financing Facilities [2]. In 2015 the EBRD stepped up its Sustainable Energy Finance Facilities, whereby they have now been extended to 23 countries [2].

The share of climate change mitigation, adaptation and resource efficiency projects in EBRD total annual investments has proceeded to develop unhesitatingly over recent years. Cumulative investments topped €19.2 billion by the end of 2015 and supported 1,080 projects. Together these projects are estimated to result in around 77 million tonnes of CO<sub>2</sub> being reduced or avoided [2]. Projects range from the financing of wind, solar and hydro power generation to energy efficiency improvements in the corporate sector. They also include green transport and efficiency improvements in municipal infrastructure.

Ukraine is also in the list of countries which receive the support from EBRD for promoting sustainable energy efficient projects (Tab. 5.3).

Table 5.3

EBRD’s investments in energy efficient projects in Ukraine during 2006 – 2015 [2]

Investment pattern	Amount of projects	Amount sum (million EURO)
Corporate sector	60	844
Appropriation line (UKEEP)	11	232
Clean energy	9	397
Renewable energy	13	285
Municipal infrastructure	26	448
Total	119	2206

Presently, the most important global issue is the role of energy in climate change. Burning fossil fuels and biomass produces carbon dioxide gas as well as energy which act as a major driver of economic growth. Because almost all of the world’s countries depend on fossil, decisions to reduce CO<sub>2</sub> emissions have very direct economic and environmental impacts.

For example, the Kyoto Protocol sets binding targets for developed countries to limit or reduce greenhouse gas emissions and their cost of mitigation [3]. Hence, it is important to rethink how and why fuel and energy resources are used, as well as to identify and develop new sustainable energy options. By taking such steps towards the deployment of a clean and efficient integrated energy infrastructure, it is possible contemporaneously reduce emissions related to climate change.

It is important to note that in Europe there is a clear demand for action by the public authorities at all levels in order to promote the efficient use of energy resources and climate change. Many European cities have already demonstrated their commitment to reducing the amount of CO<sub>2</sub> emissions by joining the Covenant of Mayors, a European Commission initiative launched in January 2008 that unites together regional and local authorities for implementation climate and energy changes on their territory, by reducing carbon emissions at least 20 % by 2020 [4]. European Commission initiative during 2008 – 2015 was in rapid evolution, overpassing already three stages (Tab. 5.4).

Table 5.4

Evolution of Covenant of Mayors goals and activities from 2008 till 2015 [4]

Phase	Period	Main focus of activities	Types of activities
1	2008 – 2011	promoting ideas of “Covenant of Mayors”	<ul style="list-style-type: none"> <li>▪ explaining the Covenant of Mayors objectives and benefits to signatories and other direct stakeholders</li> <li>▪ supporting the efforts deployed by local authorities in the implementation of sustainable energy policies</li> </ul>
2	2011 – 2013	encouraging to sign and to join “Covenant of Mayors”	<ul style="list-style-type: none"> <li>▪ raising awareness and knowledge amongst the relevant decision-makers about the contributions of the Covenant of Mayors to climate and energy policies</li> <li>▪ increasing the overall project visibility</li> </ul>
3	2013 – 2015	highlighting concrete outcomes of the initiative “Covenant of Mayors”	<ul style="list-style-type: none"> <li>▪ promoting best practices from Covenant signatories and stakeholders, i.e. replicable energy-efficient measures or policy approaches within the municipalities and nationally by sharing experiences and results,</li> <li>▪ highlighting local authorities’ leadership in sustainable energy policies (despite centralized governance structures),</li> <li>▪ fostering networking between the Covenant stakeholders</li> </ul>

Now it is the world's biggest urban climate and energy initiative named as Covenant of Mayors for Climate & Energy, which commits new signatories to reduce CO<sub>2</sub> emissions by at least 40 % by 2030 and to adopt an integrated approach to promote idea of mitigation and adaptation to climate change [4].

Covenant actors share a common goal: to provide an environmentally, socially and economically stable environment to their citizens and contribute to resolving global issues related to exhausting resources and climate change.

Signatories of mentioned above EU initiative represent cities with different sizes from villages to major metropolitan areas that have committed to implement sustainable energy policies and increase energy efficiency through development of renewable energy sources.

Local authorities act as key players. The reason is that cities, towns and other urban areas have a crucial role to play in mitigating climate change, as they are responsible for over 70 % of current global CO<sub>2</sub> emissions. According to the research results of World Bank (2015), cities represent three quarters of world total energy consumption [5]. That is why they are providing a great influence on environmental policy challenge. Urbanization is only increasing importance of cities, as till 2050 they will cover a three quarters of the terraqueous globe. To cope with the tendencies of urban growth it is important to invent new directions to administrate cities more effectively and make them smart. It is important to create new services which will enable higher quality of life, reduce energy consumption and CO<sub>2</sub> emissions. Covenant of Mayors for Climate & Energy initiative promotes the development of such objectives.

By June 2016 the quantity of Covenant signatories numbers 6824 local and regional authorities all over the world [4]. In Ukraine, this process was intensified in 2010, when the first city of Ukraine signed the Covenant of Mayors. Today, according to the official site of the "Covenant of Mayors" [4] the number of Ukrainian cities that have signed the Covenant of Mayors for Climate & Energy initiative, has reached 99 (Fig. 5.7). The largest number of signatories numbers in Italy (3135 authorities) and Spain (1575 authorities) [4].

The Covenant signatories can benefit from an extensive support and networking opportunities provided by the Covenant National and Territorial Coordinators, Covenant Supporters, Covenant of Mayors offices and other involved stakeholders. Also the examples from other countries can help local authorities to build effective energy policy and act towards sustainable development.

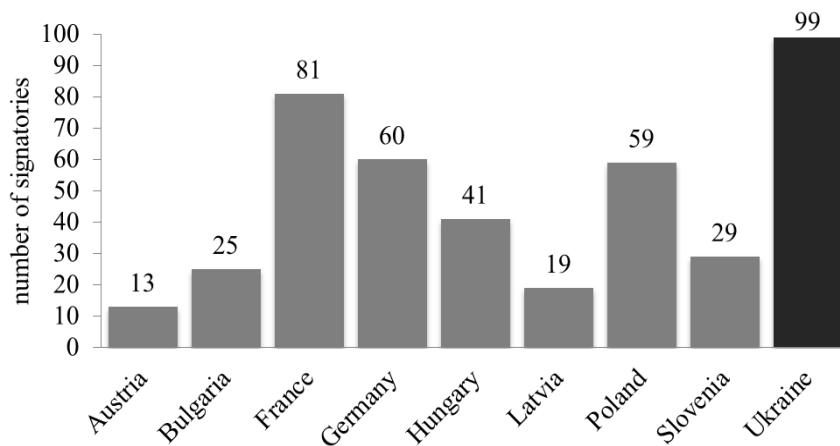


Figure 5.7 – Number of Covenant signatories in Ukraine and some countries of the European Union by the date of 15/06/2016 [4]

It is important to state that Covenant of Mayors for Climate & Energy initiative is encouraging the creation of a sustainable energy action plan for how cities can go about reducing their carbon impact, and what instruments are primarily needed. The sustainable energy action plan (SEAP) acts as a key document outlining how the Covenant signatory intends to fulfil its commitments. This comprehensive overview of key sustainable energy actions is submitted within the year following the signature of the Covenant. SEAP serve as roadmap towards achieving the energy and climate ambitions at local level. It uses the results of the baseline emission inventory to identify the key sectors of action and funding opportunities for reaching the local authority’s CO<sub>2</sub> reduction target. SEAP delineate concrete reduction measures reconciled with time frames and assigned responsibilities, which actually transform the long-term strategy into action.

Development status of sustainable energy action plans in Ukraine and some countries of the European Union is shown on a Fig. 5.8.

Sustainable energy action plans (SEAPs) have become a powerful toolkit for regional and local authorities in planning, implementing, monitoring and evaluation of climate and energy policies, global mitigation and adaptation achievements. The main target sectors of a SEAP usually are buildings, equipment/facilities and urban transport.

Energy efficiency plans provide systematic ground for municipal sustainable development. As by delivering the projects outlined in the SEAP, there is a clear expectation that the local

community will benefit from better energy services, lower energy bills, more energy efficiency investments, new job creations and additional income to municipal budget.

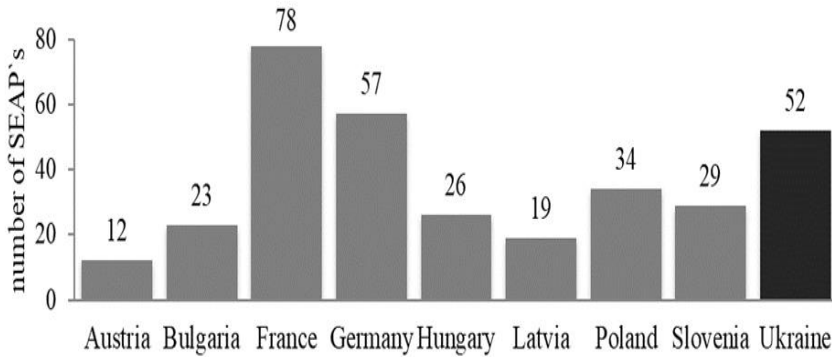


Figure 5.8 – Number of SEAP's in Ukraine and some countries of the European Union by the date of 15/06/2016 [4]

The Covenant of Mayors becomes an international community of local and regional leaders which benefits from a strong support from political (Commission, Committee of the Regions, national governments, etc.) and financial institutions (European Investment Bank, European Bank for Reconstruction and Development, World Bank etc.).

The present economic situation in Europe produces concerns for and barriers to the deployment of local sustainable energy services. Therefore, much attentiveness needs to be placed on developing and introducing innovative financing models, as well as reassigning and improving existing financing schemes. More incentives are needed to stimulate private investments and realize more comprehensive embodiment of the successful solutions for financing energy efficiency renovation in buildings. Currently investors act on energy efficiency measures in buildings with short or medium pay back periods of less than 10 years, leading to energy efficiency of less than 30 % savings. However, European targets for 2050 require energy savings of up to 80 % in buildings, requiring investments with a much longer payback period, ranging from 20 to 40 years.

In case of examining energy consumption pattern of Ukrainian cities, it can be seen that the dominant consumable energy resource is gas. At the same time the highest percent of energy consumption is accounted by sector of residential buildings (Fig. 5.9).

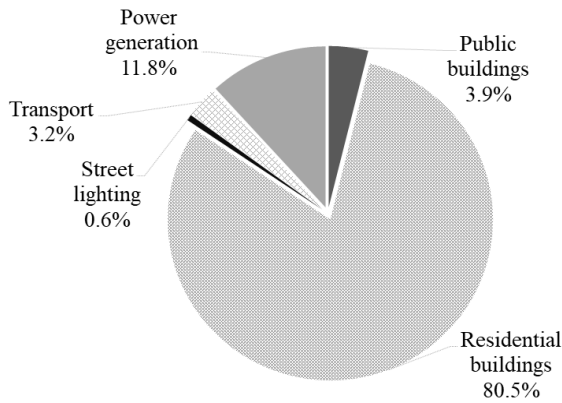


Figure 5.9 – Breakdown of energy consumption in Ukrainian cities by sectors [4]

Proposed realistic measures can significantly reduce energy consumption in municipal sectors, and therefore level of carbon emissions (Fig. 5.10).

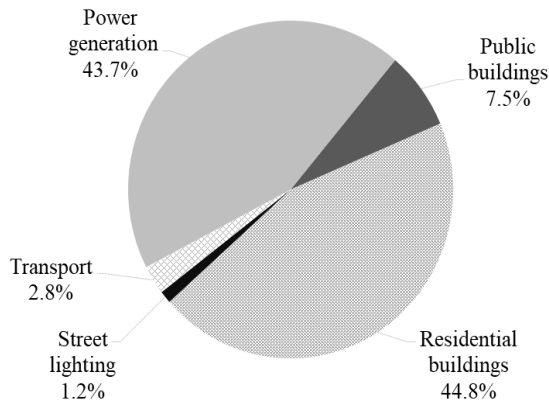


Figure 5.10 – Level of consumption reducing by sectors in Ukrainian cities in case of using project-oriented approach [4]

It is important to note that the main share of financial resources for implementing energy efficiency projects according to the developed sustainable energy action plans of Ukrainian cities, municipalities plans to direct into sector of residential buildings, sector of power generation and transport sector. Proposed financial resources for every municipal sector are indicated on the Fig. 5.11.

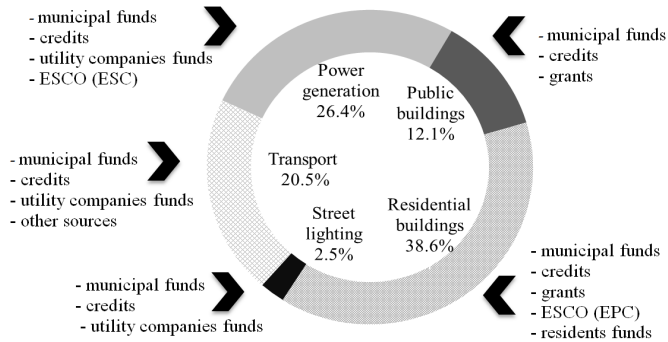


Figure 5.11 – Funding sources planned to be used by Ukrainian cities for implementing SEAP's [4]

On the other hand, the situation in European cities concerning the distribution of energy efficient projects by thematic field is different (Fig. 5.12).

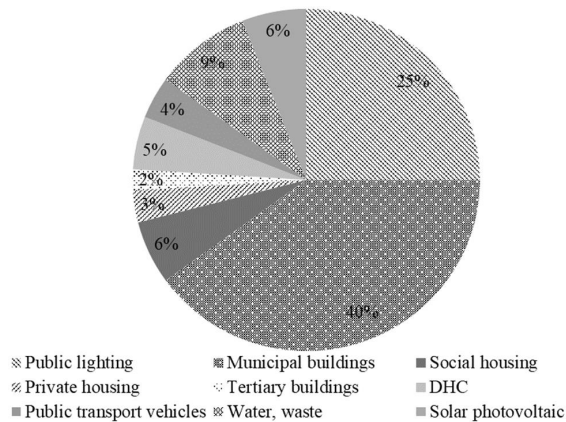


Figure 5.12 – Distribution of EU projects by thematic field [4]

For European cities public lighting is the most popular investment field, together with energy efficiency and renewable energy investment in municipal buildings: it represents 63 % of investment plans. Municipal buildings and public lighting account nearly 2.2 % of a city's total CO<sub>2</sub> emissions.

Basic financial resources which are used in municipalities for implementing energy efficiency projects are internal. External financial resources are involved by cities with great difficulty (Fig. 5.13).

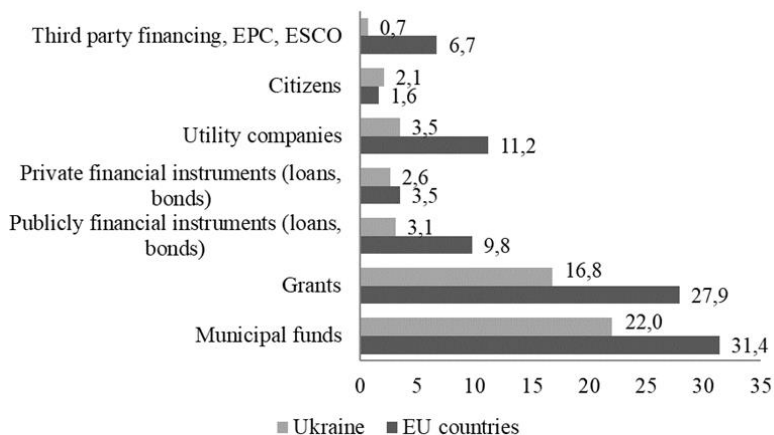


Figure 5.13 – Experience of local authorities in innovative financing of energy efficient projects in Ukraine and EU countries (calculated in percentage terms) [1; 4]

In particular, small cities and villages do not have enough capacities to develop appropriate initial financial appraisals and run cash-flow calculations for their energy efficiency projects in order to attract grant or loan funds. Very often small local authorities are not even aware of the existing financing opportunities. Additionally it is possible to emphasize main barriers to financing energy efficient projects in Ukraine and EU countries, which are shown on the Fig. 5.14.

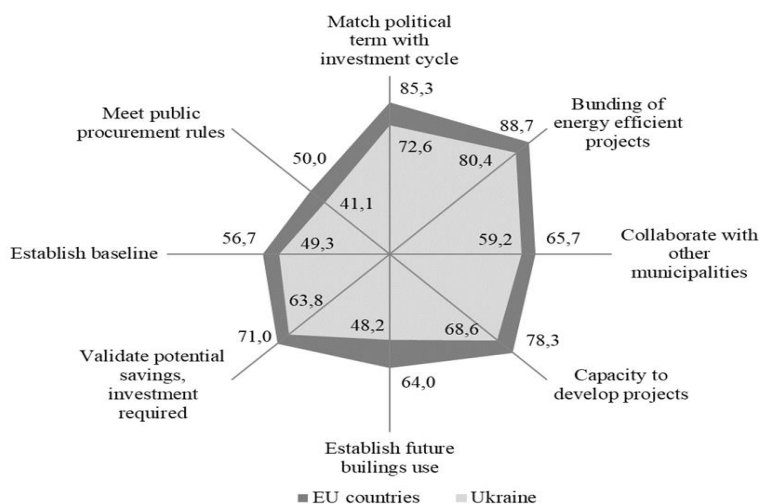


Figure 5.14 – Local authorities' barriers to financing energy efficient projects in Ukraine and EU countries (calculated in percentage terms) [1; 4]



Every city should decide which financial sources are the most appropriate for their financing energy efficient measures. Municipal budget or grants should be used for unprofitable (e.g. social) projects, preparatory studies (energy audits, environmental impact assessment, etc.), hiring of experts which are not attractive for private investors and financing institutions. Profitable projects with quick return on investment can be financed by international financial institutions or commercial banks. A combination of several funding sources is the most common solution. Ideally, SEAP needs to be transformed into a long-term multi-annual financial plan.

City councils have the possibility to finance their projects through loans or innovative financing schemes in cooperation with private partners. If they wish to benefit from grants, technical assistance, loans or guarantees provided by international financial institutions, they have to keep themselves updated about the new opportunities and pro-actively promote their priority projects towards potential financiers.

Municipalities should prepare initial financial appraisals for all projects which are planned to realize. It is extremely important to calculate main project indicators (e.g. total investment, energy savings, amount of CO<sub>2</sub> reduction, pay-back period, Net Present Value etc.) and identify main social, economic and environmental benefits as well as effects for every SEAP measure. This could help cities to prioritize their SEAP measures and allocate the budget and external financial resources that are available. The result is the prioritization of measures based on concrete indicators and existing financial opportunities.

Ranking of projects is a key stage as it is essential in terms of resource constraints to implement the most effective and strategically important projects.

The criteria for the ranking of energy efficiency projects should be considered the following: the amount of CO<sub>2</sub> reduction (K<sub>1</sub>), the amount of savings (K<sub>2</sub>), the amount of fuel and energy resources in physical terms (K<sub>3</sub>), belonging the project to the sphere of renewable energy sources (K<sub>4</sub>), number of stakeholders, who can benefit from the project results (K<sub>5</sub>), correspondence project subjects with city strategic vector (K<sub>6</sub>), availability of design specifications and estimates (K<sub>7</sub>), availability of additional project documents (report on energy surveys, feasibility studies, expert opinion etc.) (K<sub>8</sub>), social significance of the project (K<sub>9</sub>), need for additional funds for the following project examination (K<sub>10</sub>), the flexibility of the project (K<sub>11</sub>), the presence and significance of project nonfulfillment (K<sub>12</sub>), the availability of additional external funding (K<sub>13</sub>), presence of synergistic effect (K<sub>14</sub>), innovation aspects of the project (K<sub>15</sub>), generate effects for inflow of investments and budgetary receipts (K<sub>16</sub>), the profitability of the project (K<sub>17</sub>), payback period (K<sub>18</sub>) and others. They can be performed in three groups for analyses usage (Tab. 5.5).

Table 5.5

## Indicators for ranking energy efficiency projects [Author's research]

№	Groups criteria	Indicators
1	Financial criteria	K <sub>2</sub> *, K <sub>17</sub> *, K <sub>18</sub> *, K <sub>16</sub> , K <sub>13</sub>
2	Ecological and energy criteria	K <sub>1</sub> *, K <sub>3</sub> *, K <sub>4</sub> *
3	Criteria for project implementation	K <sub>6</sub> *, K <sub>7</sub> *, K <sub>8</sub> *, K <sub>9</sub> *, K <sub>5</sub> , K <sub>10</sub> , K <sub>11</sub> , K <sub>12</sub> , K <sub>14</sub> , K <sub>15</sub>

\* Criteria for express project ranking

While preparing investment propositions it is important to note, that smaller projects should be bundled into bigger investment packages as large-sized investments are more attractive for international financial institutions and donors. This approach also allows for pooling of expertise and efficient use of human and financial resources related to project design and implementation.

Financing energy efficiency projects in today's conditions with uncertain and often increasing energy prices is still a major challenge. Despite the proven cost-effective opportunity to reduce energy consumption, a significant proportion of the energy efficiency improvement potential is not being realized. It is extremely important to stimulate a more active uptake by successfully implementing energy efficient projects both at municipal and national levels in order to overcome existing barriers, promote sustainable energy efficient development and provide adequate level of energy security in the world.

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## PART 6 COUNTRIES' AND SECTORAL PROBLEMS OF SUSTAINABLE DEVELOPMENT

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### 6.1 ASSESSMENT THE SUSTAINABLE DEVELOPMENT IN MARSHLANDS OF IRAQ

Survey of biodiversity which includes aquatic plants, fishes and birds in the southern marshes of Iraq are an completely component of the Key Biodiversity Areas (KBA) the project of this study summarize to will knowledge some environmental characters from these wetlands which considers the source of livelihood to their inhabitants, appears from this study,that were recorded 28 species of aquatic plants , herbaceous tall emergent species were *Phragmites australis* and *Typha domingensis*.Survey of fishes will be clears,that a range of 41-52 species were recorded in marshes.Birds survey will be shows, that 375 species recorded as a total number and 134 of these species were water birds.The conclusion from study clears that, these marshes were rich in biodiversity which have a good economic value,further,for their environmental important in natural balance as a biological sustainable development and prevent desertification phenomenon. The conservation of the environment requires interaction with habitats in harmonize system to the continuity of the natural resource in renewal to sustain the biological diversity of the ecosystem and to take into consideration the three aspects of sustainable environmental, economic and social development to achieve natural balance. Marshlands are considered an ecosystem of human life with its environment, as well as the habitat and dwelling from the wild cane plant (*Phragmites spp*) and blady grass (*Typha spp*) also considers pasture for livestock and economic output of milk and its derivatives, fishes birds as food and economic resource where movement within the marshes through the Boat, where man, water, plants, animals, birds and fishes in a peaceful coexistence and security in the case of renewal. Where water is salty and becomes fresh without salt by aquatic plants.

The marshes were aquatic environment distributes in southern of Iraq received its water from Rivers by the reason of sinkage land during its terrestrial lands which consider dwelling for human,these marshes were the source of livelihood by the raising animal,poultry production and hunting fishery,birds.Characterizes marshes in great biodeversity,also marshes share in prevent desertification phenomenon by the large water surface and high aquatic plants density.The southern Iraqi marshes occupy the south and south eastern parts of the mesopotamian Valley. The climate of the area has long hot summers, rather cold winters, the prevailing north-westerly winds have pronounced influence on the area.These marshes are the most important geographical unit in southern Mesopotamian and form a complex lacustrine sedimentary environment.The a real

extents of this marsh system were not fixed. These wetlands have ranged from 8.000 to 30.000 km<sup>2</sup>, making them the largest wetland system in the region. Sources of water for this marsh system include several rivers, precipitation, and ground water. Flow from the Tigris and Euphrates rivers almost wholly regulate the area of the marshes since local rainfall average less than 100 mm/ year. Regulation of flows from the Tigris and Euphrates by Turkey, Iran, Syria, primarily for agriculture, has contributed to the reduction of these wetlands. Additionally, within Iraq, construction of impoundments, increased irrigation for agriculture as well as the draining of wetlands for agriculture, has also affected the quantity and timing of water delivery to these wetlands. The Al-kharka River contributes a limited amount of fresh water flow to the Al-huwayza marsh. The Tigris River contributes the greatest volume of water to the marshes near the city of Amara and Qurna, whereas the Euphrates feeds Al-hammar marsh. The shatt Al-arab River also contributes water to the eastern part of the Al-hammar marsh. These marshes once served as a natural filter for suspended particles and pollutants translocated by Tigris and Euphrates Rivers. This filtering process diminished sedimentation and pollutant loadings to the coastal marine environment of the Gulf. Central to the function of the marshes is the role of vegetation. Decomposition of emergent vegetation yields detritus that is a key to energy cycling. These plants are also important in nutrient recycling and removal of contaminants. These marshes known by their high biological productivity caused by thick plants growth. The Iraqi waters were known by their alkalinity and hardness. The water of the marshes is resultant of the mixing of Tigris and Euphrates Rivers [1].

The development of reliable information on the status of the Key Biodiversity Areas (KBA) of Iraq is designed to support long-term restoration and management planning for important habitats such as the southern marshes of the country. The definition of Key Biodiversity Areas (KBA) closely follows that developed and implemented by Biodiversity International (BI) with national partner agencies, including Nature Iraq, in several countries. This definition recognizes that biological richness and importance are more than plants, fishes and birds, thus extending the highly successful (BI) international program for important (KBA). The (KBA) program in Iraq, as discussed below. The Iraqi (KBAs) are thus considered to be sites of global significance for biodiversity conservation as they readily meet the International Union for Conservation Nature (IUCN) criteria based on an framework of vulnerability and irreplaceability [2].

There are many kinds of biodiversity in marshes such as aquatic vegetation, a study of the diversity and distribution of aquatic plants is an essential component of understanding aquatic ecosystem due to the important ecological role of aquatic vegetation and the ability of the

vegetation to characterize the water quality. Aquatic plants are an important part of the aquatic food web. They influence water quality by taking up nutrients, releasing dissolved organic matter, and increasing sedimentation by absorbing turbulent energy [3]. Wetland restoration refers to the return of a wetland from a disturbed or altered condition caused by human activity to a previously existing condition. The wetland may have been degraded or hydrological altered and restoration to re-establish previous vegetation communities [4]. Wetland functions are defined as a process or series of processes that take place within a wetland. These include the storage of water, transformation of nutrients, growth of living matter, and diversity of wetland plants. The term marshes means a frequently or continually inundated wetland characterized by emergent herbaceous vegetation adapted to saturated soil conditions. Aquatic biodiversity has enormous economic and aesthetic value and is largely responsible for maintaining and supporting overall environmental health. Aquatic organisms rely upon the great diversity of aquatic habitats and resources for food, materials, and breeding grounds. Factors including overexploitation of species, the introduction of exotic species, pollution from urban, industrial, and agricultural areas, as well as habitat loss and alteration through damming and water diversion all contribute to the declining levels of aquatic biodiversity in both fresh water and marine environments. As a result, valuable aquatic resources are becoming increasingly susceptible to both natural and artificial environmental changes thus, conservation strategies to protect and conserve aquatic life are necessary to maintain the balance of nature and support the availability of resources for future generations. The main objects of this study were to determine the species composition and biomass of various macrophyte species in the marshes. By a survey on aquatic plants that found 28 families were recorded during this study and another 10 species were found from another post flooding studies in the central marsh, compared with 47 species recorded prior to drainage. Where 62 of the pre-existing species have reappeared in the re-flooded wetlands, but 21 species had not returned as of 2007. Herbaceous tall emergent species, *Phragmites australis* and *Typha domingensis* [5]. Survey of fish in the marshes of southern Iraq is an integral component of the Key Biodiversity Areas (KBA) Project that was initiated in by Nature Iraq. This included sampling in several years by researchers. The fish species occurrence, relative abundance, and weight and length were recorded. Specific of importance for local consumption were noted. An initial project study included details and photographs of the species observed. Records based on interviews with local residents are noted. Species of special concern are proposed, considering both economic and ecological factors that may be relevant to a future national fish management strategy in Iraq. 106 species of fish (including freshwater and marine entrant species) have now been recorded in the non marine waters of Iraq significantly expanding earlier species lists

published by Al-Daham (1988) and coad (1991) for Iraqi freshwaters. Additional marine fish species also occur in the marine territorial waters of Iraq but are not yet of new studies in Iraq. The native fish of the southern marshes have historically been dominated by cyprinid species (Barbaeus spp). The key biodiversity Areas project, based on a rapid assessment approach by nature Iraq has identified significant information on the status and distribution of ecologically and economically critical fish species for Iraqis. In three years of surveys, a range of 41-52 species were recorded in marshes of southern Iraq. Several recommendation are presented for further scientific and management studies. 60 species of fishes are proposed as possible species of special concern in consideration of the design of a fisher management strategy for Iraq based on ecological and economic factors [6]. The marshes of southern Iraqi were the largest wetlands of Middle East. These marshes were considered as feeding and nesting area for many resident and migratory waterbirds. Twelive of the wetlands of lower Mesopotamia were listed as wetlands of international important.Huwyzah and hammar include both Suq-shuykh and East Hammar marshes have site 36 and 39 respectively and have been identified as important bird areas by bird life international .Bird life international has also identified the Mesopotamia marshes of Iraq as an Endemic bird area, an important concentration of bird biodiversity where habitat destruction would cause disproportionately large number of species extinctions .In 1960-1962 mentioned that the total number of bird species was 375 of these 134 species were water birds. Several surveys were done on water birds in some marshes of Mesopotamia. During the seventies of the last century surveyed marshes of Iraq showed the observation and abundance of water birds in the vicinity of Basrah [7]. Tab. 6.1 and Fig. 6.1 show biodiversity in three marshlands of Iraq.

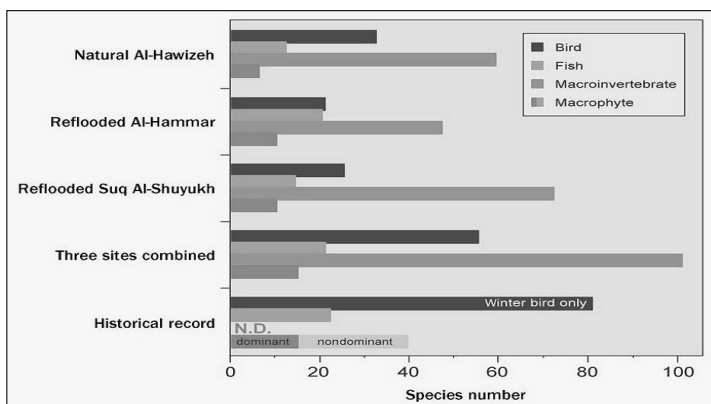


Figure 6.1 – The numbers of bird, fish, and macrophyte species in three marshlands (Al-Hawizeh, Al-Hammar and Al-Suq Al-shuyukh) [7]

Table 6.1

A list of the five most common or abundant species of bird, fish, and plant species in three different marsh areas, based on surveys done by faculty and students at the University of Basrah, 2003–2005

Al-Hawizeh (natural marsh)	Suq Al-Shuyukh (reflooded marsh)	Al-Hammar (reflooded marsh)
Bird species	<i>Bird species</i>	<i>Bird species</i>
<i>Phalacrocorax pygmeus</i> <i>Egretta garzetta</i> <i>Tachybaptus ruficollis</i> <i>Larus canus</i> <i>Larus ridibundus</i>	<i>Egretta garzetta</i> <i>Ceryle rudis</i> <i>Ardeola ralloides</i> <i>Ardea purpurea</i> <i>Vanellus leucurus</i>	<i>Egretta garzetta</i> <i>Larus ridibundus</i> <i>Larus genei</i> <i>Larus canus</i> <i>Sterna albifrons</i>
Fish species	<i>Fish species</i>	<i>Fish species</i>
<i>Barbus luteus</i> <i>Aspius vorax</i> <i>Aspius vorax</i> <i>Carassius carassiusa</i> <i>Barbus sharpeyi</i> <i>Liza abu</i>	<i>Liza abu</i> <i>Carassius carassius</i> <i>Barbus luteus</i> <i>Aspius vorax</i> <i>Alburnus mossulensis</i>	<i>Liza abu</i> <i>Liza carinata</i> <i>Carassius carassiusa</i> <i>Barbus luteus</i> <i>Alburnus mossulensis</i>
Plant species	<i>Plant species</i>	<i>Plant species</i>
<i>Phragmites australis</i> <i>Ceratophyllum demersum</i> <i>Salvinia natans</i> <i>Lemna minor</i> <i>Typha domingensis</i>	<i>Phragmites australis</i> <i>Ceratophyllum demersum</i> <i>Typha domingensis</i> <i>Panicum repens</i> <i>Schoenoplectus littoralis</i>	<i>Ceratophyllum demersum</i> <i>Myriophyllum verticillatum</i> <i>Phragmites australis</i> <i>Schoenoplectus littoralis</i> <i>Potamogeton pecti</i>

Marshlands an integrated ecosystem; social, economically and ecologically for achieves sustainable development by interaction of the above three factors. From study it was concluded, that high intensity for aquatic plants all months was observed at a rate of 73 % *Typha sp.*, followed *Phragmites australis* impressive 65 % then *Ceratophyllum demersum* 33 % less abundant for being non-indigenous, Evaluation the species of aquatic plants in marshes communities response to the change of climate, focusing on the type it, submerged, emergent and floating so depending on differences and similarities with responses to factor, temperature, O<sub>2</sub>, CO<sub>2</sub> exposure, level rise water and other expected environmental alterations with natural weather in the region .Advantages environmental climate have an important influence on plant diversity of Iraqi marshes. Based on environmental factors ten ecological regions with the specific plant which is located climate factors interact to plant influence distribution and they play an important role in creating ecological biodiversity of Iraq. However, any change in economic and ecological impacts would threaten this ecosystem. Growing aquatic plants in or near water can be classified as floating plants, emerging, submerged or emerged, used aquatic plants to remove different

contaminants, including elements from water bodies. Biomass depends on in surfaces rivers water and geographical distribution of Mass plants by biological diversity in changing distribution. In quality aquatic marshes was determined by the interaction of all the physical, biological and chemical through environmental monitoring , therefore use of environmental directories can be defined it as environmental characteristics which provide quantitative information on the situation environmental resources. Environmental monitoring used to boundaries environmental with any changes of Iraqi marsh by periodically time (monthly or weekly) to assess and determine the nature reserved of marshes to control the dominated plants and organism and water flow, especially the properties physical and chemical in study area and developing new data very important to effectively control and monitor to get bioassay aims and challenges starting with indicators global apply in network to support reporting. Aquatic plants diversity achieved with a clean environment and the level of water being stable with a temperate climate to get a better ecological character. Restoration of water quality in material marshes.

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## **6.2 SUSTAINABILITY IN AGRICULTURAL ECONOMICS**

Considered separately, financial, food, fuel and climate crises are serious problems. Together, their impact is gradually becoming more dangerous and even catastrophic for the world economy. Currently, the world is facing many complex challenges including adaptation to and mitigation of climate change; rapid urbanization; increased demand for natural resources; growing human food, water and energy insecurity; increased natural disasters; and the resolution of violent conflicts. Most of these challenges have a precise land dimension: unequal access to



land; insecurity of tenure; unsustainable land use; and weak institutions for land administration, and dispute and conflict resolution. Responding to these challenges is particularly difficult since land resource. Definitely, land is the single greatest resource in most countries, and land-based resources are natural capital at the disposal of societies – acting as a central ingredient in development choices. Also, it is a basic factor of economic production as well as a basis for social, cultural and religious values and practices.

Agriculture and the Economy. Agriculture in Ukraine including fisheries and forestry is the mainstay of the economy, contributing about 12 percent of the GDP and providing employment for about 18 percent of the population. Tab. 6.2 shows the composition of the sector and sub-sectoral contribution to agricultural GDP.

Table 6.2

Agriculture in Ukraine

Sub-sector	2010	2011	2012	2013	2014	2015	2016
Crops	3.8	3.8	3.7	4.3	4.8	6.7	6.4
Livestock	1.4	2.1	1.8	2.2	3.1	3.2	3.1
Forestry	1.5	1.5	1.4	1.4	1.4	1.4	1.3
Fishery	0.8	0.8	0.9	0.9	0.8	0.8	0.8
Agriculture's Contribution to GDP	7.5	8.2	7.8	8.8	10.1	12.1	11.6

The crops sub-sector dominates followed by fisheries. Contribution of the forestry sector has declined over the years from 1.5 percent in 2010 to 1.3 percent in 2016 whilst livestock has maintained 3 percent contribution over the last 7 years.

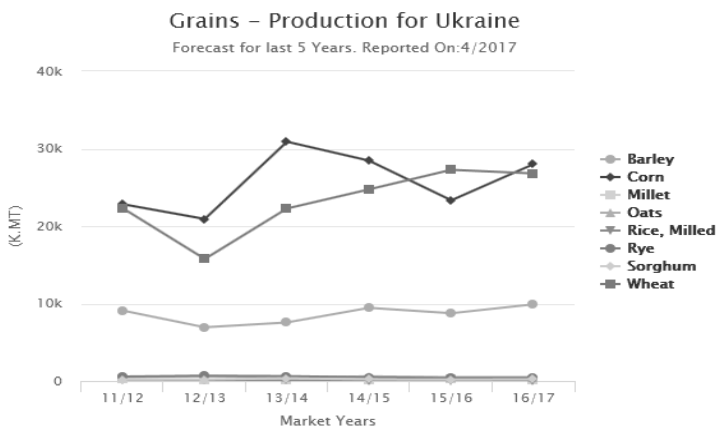


Figure 6.2 – Grains Production for Ukraine [1]

Diversity is the word that best describes Ukrainian agricultural production (Tab. 6.3).

Table 6.3

Market and Trade data (Ukraine Vs World)

Commodity	Country	Rank	Qty (K.MT)	Region share, %	World share, %	World (K.MT)
Barley	Ukraine	4th	9.900	28.55	6.73	147.012
	European Union	1st	60.042	100	40.84	
Corn	Ukraine	6th	28.000	59.04	2.66	1.053.758
	United States	1st	384.778	90.54	36.51	
Millet	Ukraine	18th	190	21.69	0.62	30.708
	India	1st	11,500	95.27	37.45	
Mixed Grain	Ukraine	N/A	0	N/A	N/A	15.653
	European Union	1st	15,233	100	97.32	
Oats	Ukraine	10th	500	8.35	2.14	23.399
	European Union	1st	7.858	100	33.58	
Rice, Milled	Ukraine	73rd	42	3.33	< 0.01	481.143
	China	1st	144,850	90.77	30.11	
Rye	Ukraine	5th	390	10.35	2.99	13.047
	European Union	1st	7.997	100	61.29	
Sorghum	Ukraine	26th	225	100	0.36	62.503
	United States	1st	12.199	69.32	19.52	
Wheat	Ukraine	8th	26.800	20.58	3.57	751.357
	European Union	1st	144.658	100	19.25	

The economy of Ukraine largely depends on exports, and almost a third of our exports are agricultural products. This means that the welfare of Ukrainians, economic stability (and, of course, the dollar exchange rate) is now largely determined by how much corn, wheat, sunflower oil, cheese and other agricultural products our country can sell to other states.

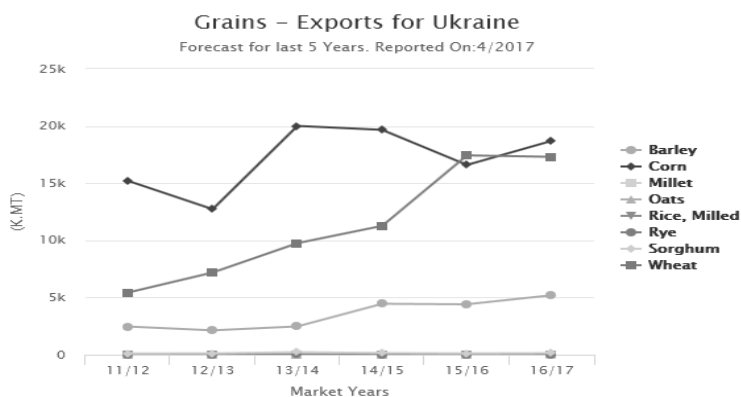


Figure 6.3 – Grains Exports for Ukraine [1]

Sustainable development, as a movement, was officially set off by the United Nations Conference on the Human Environment in 1972 and the term was further popularized by World Commission on Environment and Development which was chaired by Norwegian Prime Minister Gro Harlem Brundtland in 1987. It was defined as “a development that meets the needs of the present without compromising the ability of future generations to meet their own needs” in the Brundtland Report of the World Commission on Environment and Development. Sustainable development emerged as a concept among the academics in the 1960s, much obliged to the photograph famously known as “Earthrise” taken by astronaut William Anders during the Apollo 8 mission in 1968 that created a collective awareness of the environment [2].

What is Agricultural Sustainability? What the meaning we include in understanding of agricultural sustainability? There are many different views and definitions, many different terms are used for designation of agricultural sustainability, such as: ecological agriculture, permaculture and organic agriculture, green agriculture, ecological, low-cost, biodynamic, environmentally-sensitive, community-based, wise-use, farm-fresh and extensive. There is continuing and intense debate about whether agricultural systems using some of these terms qualify as AgSustainable. Systems high in sustainability are making the best use of nature’s goods and services whilst not damaging these assets. The key principles in sustainability understanding are:

- Sustainability is not a point with a scientific optimum.
- Sustainability is an evanescent socio-political space.

Sustainability combines some views (Fig 6.4).

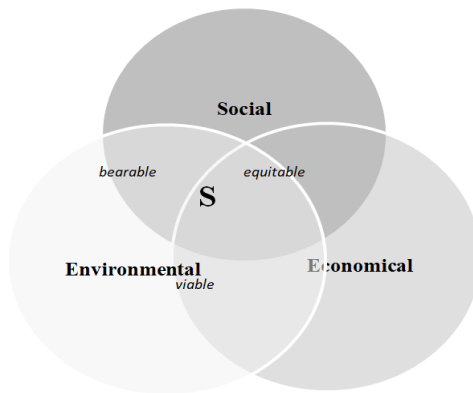


Figure 6.4 – Combination of Sustainability views

Sustainable agriculture refers to the system of agricultural production and distribution, which (Fig 6.5):

- ❖ Achieves the integration of natural biological cycles and control measures in accordance to climate change.
- ❖ Optimizes resources management.
- ❖ Protects and helps to regenerate soils, renews and increases its fertility.
- ❖ Reduces non-renewable resources using; and purchased production resources.
- ❖ Promotes using of alternative energy sources.
- ❖ Provides high-quality food products, affordable pricing and beneficial to human health and nutrition.
- ❖ Provides sufficient and reliable income for farms.
- ❖ Promotes opportunities for family farming and farming communities.
- ❖ Minimizes adverse impacts on health, safety, wildlife, water quality and the environment in general.

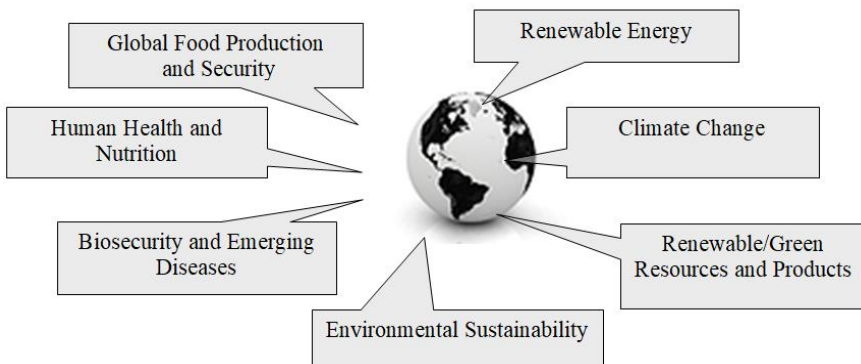


Figure 6.5 – Unprecedented world issues and opportunities for sustainability

What “pillars” of the Board of Directors fulfill each of these criteria?

It’s important to promote Agricultural Sustainability development that has an impact on the local environment and the ability of future generations to thrive. Therefore the main directions to develop, redevelop, and remodel in ways that incorporate sustainable design principles:

- Food Security, Production and Human Health;
- Environmental Quality and Sustainability;
- Advanced BioEnergy and BioBased Products.

Systems high in sustainability are making the best use of nature's goods and services whilst not damaging these assets [3]. The key principles are to:

- integrate natural processes such as nutrient cycling, nitrogen fixation, soil
- regeneration and natural enemies of pests into food production processes;
- minimize the use of non-renewable inputs that damage the environment or harm the health of farmers and consumers;
- make productive use of the knowledge and skills of farmers, so improving their self-reliance and substituting human capital for costly inputs;
- make productive use of people's capacities to work together to solve common agricultural and natural resource problems, such as for pest, watershed, irrigation, forest and credit management.

The idea of agricultural sustainability does not mean ruling out any technologies or practices on ideological grounds. If a technology works to improve productivity for farmers, and does not harm the environment, then it is likely to be beneficial on sustainability grounds. Agricultural systems emphasizing these principles are also multi-functional within landscapes and economies. They jointly produce food and other goods for farm families and markets, but also contribute to a range of valued public goods, such as clean water, wildlife, carbon sequestration in soils, flood protection, groundwater recharge and landscape amenity value.

As a more sustainable agriculture seeks to make the best use of nature's goods and services, so technologies and practices must be locally adapted and fitted into place. These are most likely to emerge from new configurations of social capital, comprising relations of trust embodied in new social organizations, new horizontal and vertical partnerships between institutions, and human capital comprising leadership, ingenuity, management skills and capacity to innovate. Agricultural systems with high levels of social and human assets are more able to innovate in the face of uncertainty.

A common, though erroneous, assumption has been that agricultural sustainability approaches imply a net reduction in input use, and so are essentially extensive (they require more land to produce the same amount of food). All recent empirical evidence shows that successful agricultural sustainability initiatives and projects arise from changes in the factors of agricultural production (*e.g.* from the use of fertilizers to nitrogen-fixing legumes; from the use of pesticides to emphasis on natural enemies). However, these have also required reconfigurations on human capital (knowledge, management skills, labour) and social capital (capacity to work together). A better concept than extensive, therefore, is to suggest that sustainability implies intensification of resources – making better use of existing resources (*e.g.* land, water,

biodiversity) and technologies. For many, the term intensification has come to imply something bad – leading, for example, in industrialized countries, to agricultural systems that impose significant environmental costs. The critical question centers on the ‘type of intensification’. Intensification using natural, social and human capital assets, combined with the use of best available technologies and inputs (best genotypes and best ecological management) that minimize or eliminate harm to the environment, can be termed ‘sustainable intensification’. There are main thematic areas:

- Sustainable land and water management system;
- Rural infrastructure and trade related capacities for improved market access;
- Improved food production to reduce hunger including emergencies and disasters that require agricultural support;
- Agricultural technology development, dissemination and adoption Sustainable use of forestry, fisheries and livestock resources;
- Cross-cutting issues: policy formulation and review, agricultural statistics, M&E, women in agriculture, agrotourism, youth in agriculture and farmer health.

Let us consider the elements of Sustainable Agriculture (Fig 6.6).

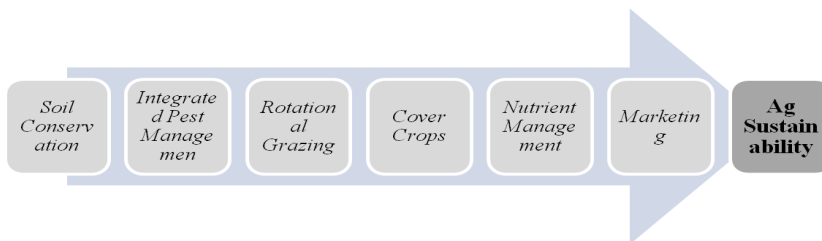


Figure 6.6 – Elements of Sustainable Agriculture

**Soil Conservation:** Many soil conservation methods, including strip cropping, reduced tillage and “no-till”, help prevent loss of soil due to wind and water erosion.

Conservation programs protect soil, water, wildlife, and other natural resources on privately owned agricultural lands to limit environmental impacts of production activities both on and off the farm, while maintaining or improving production of food and fiber. Some of these programs center on improving or restoring resources that have been degraded, while others create conditions to limit degradation in the future. Very interesting is an example of the USA in this direction [4]. Currently, more than 20 agricultural programs for the conservation of US

agriculture (USDA) exist to support private landowners with problems with natural resources. Although there are some common features between these programs, each of them is applied with slight differences.

*Working Lands Programs* – typically classified as programs that allow private land to remain in production, while implementing various conservation practices to address natural resource concerns specific to the area.

*Land Retirement and Easement Programs* – land retirement programs provide federal payments to private agricultural landowners for temporary changes in land use or management to achieve environmental benefits.

*Watershed Programs* – NRCS partners with local sponsors to carry out activities for soil conservation; flood prevention; conservation, development, utilization and disposal of water; watershed surveys; and dam and flood structure rehabilitation.

*Emergency Programs* – provide disaster assistance for farmland rehabilitation and impairments to watersheds. Programs are usually funded through supplemental appropriation acts.

*Compliance* – prohibits a producer from receiving many federal farm program benefits (including conservation assistance) when conservation program requirements for highly erodible lands and wetlands are not met.

*Technical Assistance Programs* – provides landowners with science- based conservation information and technical expertise (e.g., engineering and biological) unique to the region and land use type. Usually does not include financial assistance.

The great success of industrialized agriculture in recent decades has masked significant negative externalities, many of which arise from pesticide overuse and misuse. There are also growing concerns that such systems may not reduce food poverty. At the same time, land and water degradation is increasingly posing a threat to food security and the livelihoods of rural people who occupy degradation-prone lands. Some of the most significant environmental and health problems center on the use of pesticides in agricultural systems.

**Integrated Pest Management (IPM):** IPM is a sustainable approach to managing pests by combining biological, cultural, physical and chemical tools in a way that minimizes economic, health and environmental risks. In the past 50 years, the use of pesticides in agriculture has increased dramatically, and now amounts to some 2.56 billion kg per year.

A growing number of countries are now reporting reductions in pesticide use as a result of the adoption of agricultural sustainability principles. These have occurred as a result of two very different types of approach:

- policy-led and primarily top-down pesticide-reduction programs in industrialized countries, such as in Sweden, Denmark, the Netherlands and some provinces in Canada;
- farmer field school-led and policy-supported community IPM in rice programs, beginning in South East Asia, and then spreading throughout Asia and then to other continents.

Several OECD countries set ambitious national targets in the mid-1990s to reduce the use of inputs. Sweden's aim was to reduce input consumption by 20 % by the year 2000. The Netherlands also sought a cut in pesticide use of 50% by the year 2000 as part of its Multi-Year Plan for Crop Protection. The cost of this reduction program was estimated at \$1.3 billion, most of which was raised by levies on sales. Denmark aimed for a 50% cut in its pesticide use by 1997, a plan which relied mostly on advice, research and training. Canada set a target for a 50 % reduction in pesticide use by 2000 in Quebec and by 2002 in Ontario. In the USA, the administration announced in 1993 a program to reduce pesticide use whilst promoting sustainable agriculture. The aim was to see some form of IPM on 75 % of the total area of farmland by the year 2000. A third of the world market by value is in the USA, which represents 22 % of active ingredient use. In the US, though, large amounts of pesticide are used in the home/garden (17% by value) and in industrial, commercial and government settings (13 % by value). India and China are the largest pesticide consumers in Asia. Pesticide consumption in Africa is low on a per hectare basis. There is also considerable variation from country to country in the kinds of pesticide used. Herbicides dominate the North America and European domestic markets, but insecticides are more commonly used elsewhere in the world. The assumption of conventional agriculture is that pesticide use and yields are positively correlated.

**Rotational Grazing:** New management-intensive grazing systems take animals out of the barn and into the pasture to provide high-quality forage and reduced feed costs while avoiding manure build up.

**Cover Crops:** Growing plants such as rye, clover or vetch in the off season after harvesting a grain or vegetable crop can provide several benefits, including weed suppression, erosion control, and improved soil nutrients and soil quality. Growing a greater variety of crops on a farm can help reduce risks from extremes in weather, market conditions or crop pests. Increased diversity of crops and other plants, such as trees and shrubs, also can contribute to soil conservation, wildlife habitat and increased populations of beneficial insects.

**Nutrient Management:** Proper management of nitrogen and other plant nutrients can improve the soil and protect the environment. Increased use of on-farm nutrient sources, such as manure and leguminous cover crops, also reduces purchased fertilizer costs.



**Marketing:** Farmers and ranchers across the country are finding that improved marketing provides a key way to enhance profitability. Direct marketing of agricultural goods to consumers is becoming much more common, including through farmers' markets, roadside stands and community-supported agriculture.

Providing marketing services to food and agricultural sectors to help retain and create jobs and enhance their competitive advantage.

Markets Division can assist agricultural companies that are interested in expanding by providing them with data and market research, as well as assisting businesses that want to export their products. "Agriculture is Cool!"- providing school kids with opportunities to promote and teach them the importance of food and agricultural industry.

Obviously that food production will have to increase in the coming years, and that this will have to come from existing farmland. But solving the persistent hunger problem is not simply a matter of developing new agricultural technologies and practices. Most hungry consumers are poor, and so simply do not have the money to buy the food they need. Equally, poor producers cannot afford expensive technologies. They will have to find new types of solutions based on locally available and/or cheap technologies combined with making the best of natural, social and human resources. Increased food supply is a necessary though only partial condition for eliminating hunger and food poverty. What is important is who produces the food, has access to the technology and the knowledge to produce it, and has the purchasing power to acquire it. The conventional wisdom is that, in order to increase food supply, efforts should be redoubled to modernize agriculture. But the success of industrialized agriculture in recent decades has masked significant negative externalities, with environmental and health problems increasingly well-documented and estimated, including Ecuador, China, Germany, the Philippines, the UK and the USA. These environmental costs change our conclusions about which agricultural systems are the most efficient, and indicate that alternatives that reduce externalities should be sought. There are surprisingly few data on the environmental and health costs imposed by agriculture on other sectors and interests. Agriculture can negatively affect the environment through overuse of natural resources as inputs or through their use as a sink for pollution. Such effects are called negative externalities because they are usually non-market effects and therefore their costs are not part of market prices. Negative externalities are one of the classic causes of market failure whereby the polluter does not pay the full costs of their actions, and therefore these costs are called external costs. Externalities in the agricultural sector have at least four features:

- their costs are often neglected;
- they often occur with a time lag;

- they often damage groups, whose interests are not well represented in political or decision-making processes;

- the identity of the source of the externality is not always known.

For example, farmers generally have few incentives to prevent pesticides escaping to water bodies, the atmosphere and to nearby nature as they transfer the full cost of cleaning up the environmental consequences to society at large. In the same way, pesticide manufacturers do not pay the full cost of all their products, as they do not suffer from any adverse side effects that may occur. Partly as a result of lack of information, there is little agreement on the economic costs of externalities in agriculture. Some authors suggest that the current system of economic calculations grossly underestimates the current and future value of natural capital. Such valuation of ecosystem services remains controversial because of methodological and measurement problems, and because of its role in influencing public opinions and policy decisions. The great success of industrialized agriculture in recent decades has masked significant negative externalities, many of which arise from pesticide overuse and misuse. There are also growing concerns that such systems may not reduce food poverty. Poor farmers, at least whilst they remain poor, need low-cost and readily available technologies and practices to increase local food production. At the same time, land and water degradation is increasingly posing a threat to food security and the livelihoods of rural people who occupy degradation-prone lands. Some of the most significant environmental and health problems center on the use of pesticides in agricultural systems.

Two things are now clear from evidence on the recent spread of agricultural sustainability:

- some technologies and social processes for local scale adoption of more sustainable agricultural practices are increasingly well-tested and established;
- the political conditions for the emergence of supportive policies are least well-established, with only a very few examples of real progress.

As indicated earlier, agricultural sustainability can contribute to increased food production, as well as make an impact on rural people's welfare and livelihoods.

Concluding the narrative about the sustainable development of world agriculture, I would like to note that the task of increasing the sustainability of the agricultural business does not have a simple solution. This process requires manufacturers to find the right combinations of those tools that are available.

"There is no single right way to increase the sustainability of agriculture". Agricultural producers should consider all possible mechanisms of influence, as in any other business, "the president of the plant protection department, BASF Markus Heldt, summed up the discussion.

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### **6.3 ANALYSE OF DEMOGRAPHIC PROFILE AND MIGRATION OF THE REPUBLIC OF ARMENIA**

Migration – has long been well-known and significant event in the history of mankind. Geographical movement of populations is always accompanied by demographic growth, technological change, political conflicts and wars. So, what is migration and what are its causes? It is quite difficult to explain this phenomenon.

The migration with all its forms has been studied for centuries and was subjected to analysis by many theorists. A number of economic and sociological schools and directions are constantly trying to find the answer to just a one question: How to regulate the huge flows of migration from one country to another? Eventually, freedom of movement, mobility rights, or the right to travel is a human rights concept encompassing the right of individuals to travel from place to place within the territory of a country, and to leave the country and return to it. The right includes not only visiting places, but changing the place where the individual resides or works [1]. Meanwhile, the migration and especially the social and economic consequences of migration in the world definitely has unappreciated impact in every country. All efforts are aimed at regulation of these flows. There is no doubt that the migration continues to be an opportunity and threat to the economic development of any country. The impact of migration on the economic development of both recipient countries and donor countries and even on entire world can't be rejected.

Modern migration processes acquire qualitatively new characteristics, affecting on well-being of families and countries. Qualitative changes in the phenomenon of migration lead to revise the definition of the term “migration” in the modern sense. However, there is no generally accepted international definition for migration.

According to the International Organization for Migration [2]: migration is the process of movement of the population across the international border or within the country.

Migration covers any type of movement, regardless of their duration, composition and causes. Migration includes the movement of refugees, displaced persons, evicted people and economic migrants.

Streams of migrants in the world continue to grow. The regulation of this process requires a coordinated approach of the international community. The number of international migrants worldwide increased from 173 million in 2000 to 244 million in 2015 [3] from which 150 million people are labour migrants [4].

On January 2017, the total number of de jure population in RA formed 2,998,600 declining with around 12,000 people compared with the January 2016 (Fig. 6.7). Starting from 2013 population in the RA decreases continuously but at significantly lower pace compared with 2008-2011 (The Demographic Handbook of Armenia, 2015, 2016). The last population census in Armenia was conducted in 2011. According to legislation population census must take place every 10 years.

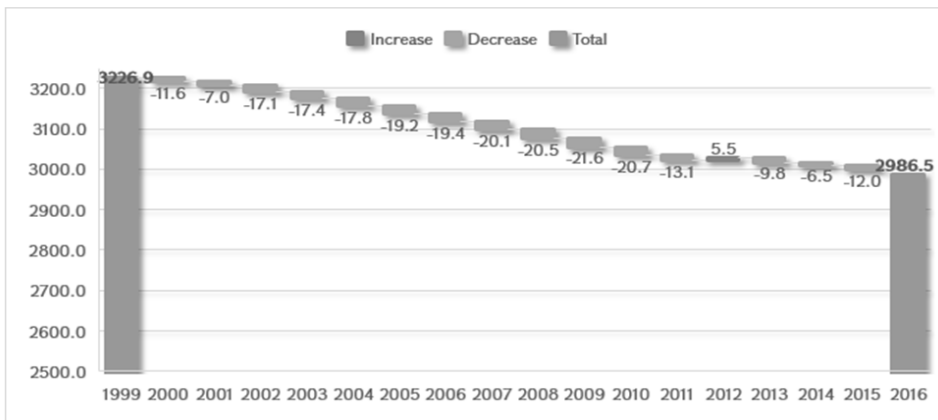


Figure 6.7 – Waterfall chart on de jure population of the RA, 1999-2016, thousand people [5]

Gender distribution is almost equal among youth and young woman form 50.3 %. 33.1 % of total young population leaves in Yerevan and 59.6 % live in urban areas. 21.6 % urban population is young people when at the same time the RA average of youth is 23 %.

Young people have highest influence to the dynamics of demography in the RA. Fig. 6.8 shows that two lines have opposite trends and the number of young people decreased by

13.5 % over 2011-2016, while the number of all other age groups together increased by 3.9 %. All 3 groups together and also separately have increasing trend during 2011-2016, which are children (0-14), elderly population (60 and over) and middle-aged people (30-59). As a negative aspect, it worth to mention that the only reason of population downward trend in RA during the last five years is the decreasing number of young population (Fig. 6.8).

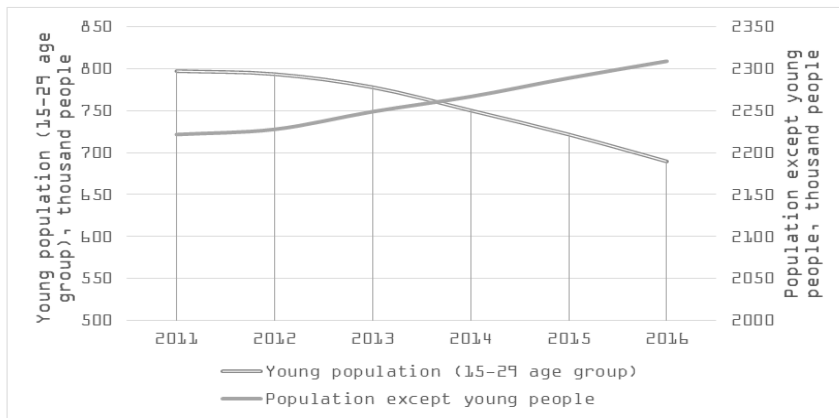


Figure 6.8 – Young and the rest population in the RA, 2011-2016, thousand people [5]

There are specific fluctuations within age groups of young population versus other age groups between the last census of population (2011) and current state (2016). Over the period the number of 15-19 and 20-24 age groups declined in comparison to 25-29 age group increase. From the other side, there is an increase in 30-34 age group which is close to youth age group top border. As for dynamics over 2011-2016 despite of total decrease of 15-29 age group, 25-29 age group has an increase with 5 thousand people and 30-34 age group also has an increase with 32.8 thousand people. Those fluctuations are mainly from a consequence of migration. A clear picture is that even within age groups for 2016 (Tab. 6.4) 5-9 and 10-14 age groups are one of the risky groups of migration. Over 15-19, 20-24 and 25-29 age groups, which are the potential zone of marriage, inflow migration can be assumed because of the increase from one group to another. Over the higher age groups especially from 40 to 54 ages outflow migration also occurs. As a result of the migration of men, one third of the households in Armenia are headed by women, and there is a growing trend, which is especially noticeable in rural settlements of the country. Households managed solely by women as a result of migration of husbands are highly vulnerable.

Table 6.4

## Youth in numbers in total population [5]

Age cohorts	Population (thousand)	% in total population
Cohort 0-14	588.8	19.60 %
Cohort 15-19	179.7	6 %
Cohort 20-24	233	7.70 %
Cohort 25-29	276.9	9.20 %
Cohort 30-64	1391.8	46.40 %
Cohort 65+	328.4	11.10 %
Total youth	689.6	22.9
Total, rest population	2998.6	77.1

Another positive fact is that the biggest share in age groups of RA population has 25-29 age groups with 9.23 % in total. The second and third biggest shares are 30-34 and 20-24 age groups with respectively 8.53 % and 7.77 %.

One of the main demographic restructurings related to youth is also that average age of mothers when having first child has a significant growth – from 25.3 in 2011 to 26.4 in 2016.

Fig.6.9 shows most lower sized population youth age group, two bordered age groups to youth from top and bottom and 80 and over age group. The picture shows increase in 30-34 and 80 and over age groups and noticeable decrease in 25-29 age groups over 2011-2016.

There is official statistics published by NSS showing number of people by sex and age groups solely for received residence permit and in 2016 totally 2621 (1503 men and 1088 women) 15-29 aged people received residence permit. In 2016 47 % of migrants left Armenia for seeking job, and 53 % of them left Armenia permanently.

Based on NSS data, medium term net migration linear trend for the whole period of 2000-2015 is in the positive direction, which means that during the mentioned period outmigration is decreasing. However, there is a negative trend, or outmigration is growing, starting from early 2010s (Fig. 6.10).

There is no official statistics related to migration diversified by youth and other age groups in the RA. Permanent migration data received from the Passport and visa control office of RA for 2015 shows that for outflow migration most active age group of youth is 25-29 with 1454 men and 5497 women migrants. Another interesting fact is that young women are around twice more active in permanent migration than men.

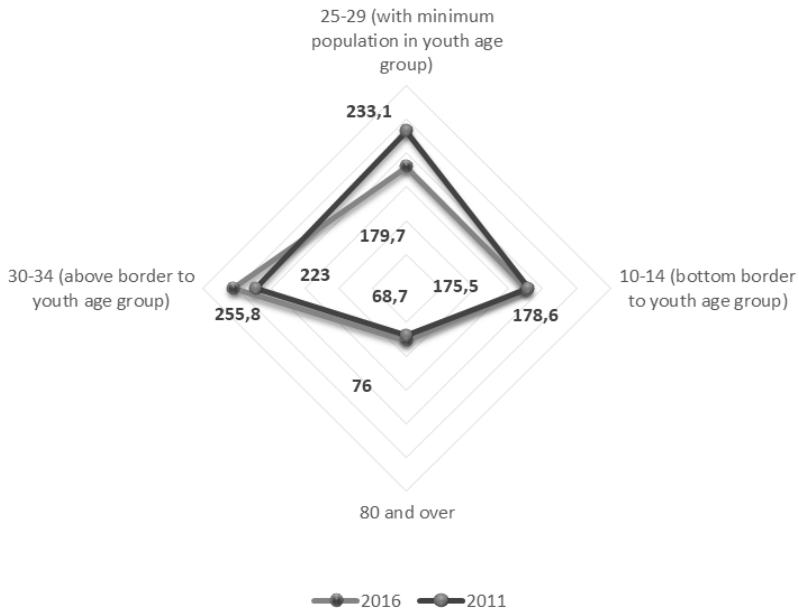


Figure 6.9 – Selected age groups population comparison in the RA, 2011 and 2016, thousand people

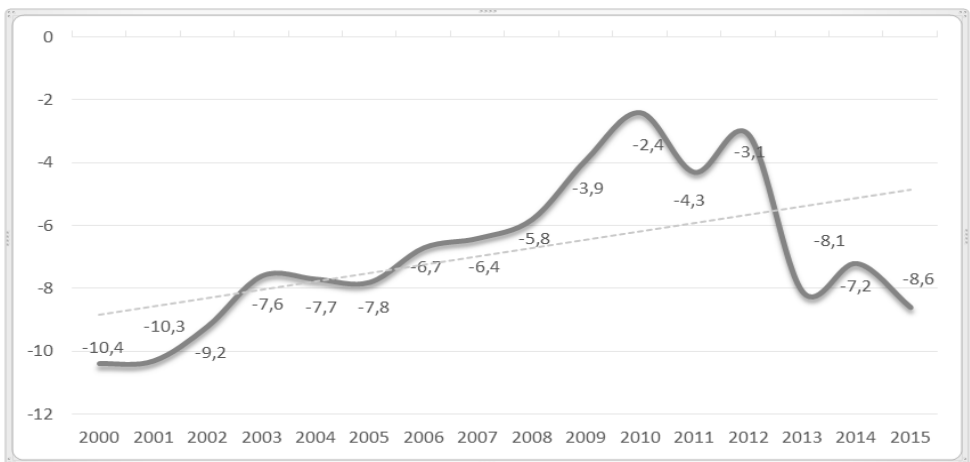


Figure 6.10 – Net migration balance in the RA, 2000-2016, thousand

According to the NSS 2.3 % of household young members (age 15 and above) involved in migration processes for the study and training purposes over 2012-2015 and having

returned as of 2015. 8.1 % of mentioned youth were absent less than 3 months, 0.7 % – 4-11 months and 1.2 % more than 12 months (The Demographic Handbook of Armenia, 2016). 2.8 % of household young members (age 15 and above) involved in migration processes for the study and training purposes over 2012-2015, and having not returned as of 2015. 10 % of mentioned youth are absent less, than 3 months, 2.9 % are 4-11 months and 0.9 % is more than 12 months.

Generally, reasons for migration from Armenia are associated with low living standards in the country and the lack of jobs. Besides of economic reasons, there are social motives for migration, for example education and health care. The condition of health and education in Armenia is the reason for people to move with their families for the aim of earning money.

Speaking about economic integration of Armenia it is important to mention about the Eurasian Economic Union (EAEU). EAEU has been functioning in the framework of Eurasian integration since January 1, 2015. The members of EAEU are: the Republic of Armenia, the Republic of Belarus, the Republic of Kazakhstan, the Russian Federation and the Kyrgyz Republic [6].

In the context of a possible expansion of the EAEU labour migration is a key issue that required careful study and analysis. Above all the opportunities, it should be emphasized that joining the EAEU is freedom of movement of citizens of Armenia.

In the context of a possible expansion of the EAEU labour migration is a key issue that required careful study and analysis. Above all the opportunities, it should be emphasized that joining the EAEU is freedom of movement of citizens of Armenia. The deeper the integration happens in the economy and in the creation of a single labour market, the better conditions are created for the free movement of citizens and reducing the necessary migration procedures.

After the ratification of the agreement about joining of Armenia to the EAEU a lot of privileges have been implemented for Armenian migrants. Labour preferences allow migrants from Armenia to work in Russia without any quotas and special permit established by law for foreign labour. Also, migrants and their families are allowed not to pass registration processes within the 30 days. It is very profitable for Armenia, as more than 90 % of the remittances are received from Russia. As we have mentioned above, the remittances are very important for supporting Armenian economy. Thus, labour migration is an important factor of social security for the citizens of Armenia and the country's economic growth. Comprehensive assessment of the agreements about the EAEU shows that the regulatory and legal framework is very noticeable step towards strengthening cooperation in the area of migration in the region post-Soviet countries.



According to the Agreement migrants should follow the employment legislation of the host country, as well as respect their culture and traditions. Such processes will lead to the development of actions for the integration of migrants into local communities. The membership of Armenia in EAEU is strategically important not only for the development of the economy of Armenia, but also for the entire region, including the recipient countries of migrant workers.

This is due to such economic and social effects as a more rational and cost-effective reallocation of labour (including the highly skilled), regulation of migration flows, increasing the degree of foreign workers protection from risks and threats associated with illegal employment, reduction of deterring irregular migration costs, GDP growth, employment growth, and the federal budget revenue through taxes and the growth of remittances.

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5. Data from National Statistical Service of the Republic of Armenia, Number of De Jure Population of the Republic of Armenia, 1999-2016 [Electronic resource]. – Access mode: <http://armstat.am/en/>.

6. Official site of the Eurasian Economic Union [Electronic resource]. – Access mode: <http://www.eaeunion.org/#about>.

## **PART 7 PRACTICAL ASPECTS OF PROJECT MANAGEMENT FOR SUSTAINABLE DEVELOPMENT**

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### **7.1 THE RISK INSURANCE MECHANISM IN THE IMPLEMENTATION OF PUBLIC-PRIVATE PARTNERSHIP PROJECTS**

At present, one of the world economy problems is the deficit of infrastructure services. A huge gap between the demand for infrastructure and the available resources that can be invested in meeting these needs is becoming widespread everywhere. Therefore, the issues of public-private partnership (PPP) development are relevant.

The concept of PPP was developed back in the late 80's, the XX century in the West. Its essence lies in the creation of a special normative legal framework, a system of management and regulation that would allow attracting private capital for the development of infrastructure entities, reducing the financial burden on the liquidation budget of unforeseen circumstances related to the impact of natural disasters, modern technological processes and other consequences.

In our opinion, public-private partnerships (PPP) can be defined as a combination of public sector and private business competencies with the aim of transforming them into a new quality of mutually beneficial relations based on the risk distribution (in terms of the specific functions and obligations) of the participants to resolve priority problems of the social and economic development of the national economy.

Thus, PPP is aimed at financing, designing, implementing and operating of public sector facilities and providing services. Among the main characteristics of PPP can be identified as follows: long-term provision of services (up to 30 years); risk transfer to the private sector; various forms of long-term contracts with legal entities and the public sector.

It should be noted that the Interdepartmental Infrastructure Coordination Council (IICC), the Public-Private Partnership Center under the Ministry of Economics was established in Belarus, more than 30 different trainings were held with the participation of more than 1.5 thousand belarusian specialists and international experts for the development and implementation of the PPP mechanism. Also, seven pilot PPP projects are now being prepared and developed.

The foreign experience has proved that the private sector participation in infrastructure projects allows to speed up the project implementation, to minimize the costs, to increase the level of consumer satisfaction in provided works and services. The PPP mechanism is successfully used in countries such as the United Kingdom, the United States, Croatia, Poland, Canada, etc. One of the main advantages of PPP projects implementation is the optimal risk allocation between the state and the private sector. This makes it possible to ensure more an efficient distribution of the state budget funds and, as a result, the public funds. The main principle of risk sharing within the PPP projects framework is the following: each risk shall be taken by the party, which has the best ability to manage this risk at lower costs [1, p. 29; 2, p. 45].

Successful implementation and application of the PPP mechanism in various countries contributed to its development in the Republic of Belarus. On December 30, 2015, the Law of the Republic of Belarus No. 345-3 “On the Public-Private Partnership” was signed, which defined the legal conditions for public-private partnership in the Republic of Belarus, regulates conditions that develop in the process of concluding, executing and terminating agreements on public-private partnership, and is aimed at attracting investment in the economy of the Republic of Belarus.

In accordance with this law, a public-private partnership is a mutually beneficial partnership, legally formalized for a certain period of time, by the public and private partners for the purpose of pooling resources and distributing risks, meeting the goals, objectives and principles defined by this Law, in the form of an agreement on public-private partnerships [3]. In other words, PPP is an agreement between the government and the private sector on the provision of public services and / or the improvement and development of infrastructure. The United Nations (UN) defines PPPs as “innovative long-term contracts for the development of infrastructure and provision of public services with the financial resources, expertise and motivation of the private sector in those areas that traditionally fall under the responsibility of the state” [2, p. 10].

Art. 5 of the Law “On the Public-Private Partnership” states that this mechanism can be implemented with respect to infrastructure facilities in the areas of transport activities, utilities, energy and other areas, leaving this list open.

For the development of the Law on Public-Private Partnership, the Resolution of the Council of Ministers of the Republic of Belarus No. 532 of 6 July 2016 “On Measures to Implement” the Law of the Republic of Belarus of December 30, 2015, “On the Public-Private Partnership” was adapted. This legal document determines the procedural

moments of a public-private partnership project background and establishes the basic requirements for the necessary documents.

In July 2016, the Ministry of Economy adapted Resolution No. 49 “On the Public-Private Partnership Projects”, which defined the requirements for a feasibility study of the proposals for the PPP projects implementation and bidding documents, the evaluation methodology for proposals of the PPP projects implementation, and established concept forms and the PPP project’s passport. As a result of the PPP definition as a form of cooperation in the Republic of Belarus, the Interdepartmental Infrastructure Coordination Council and the Ministry of Economy of the Republic of Belarus, in 2015, the National Infrastructure Plan for 2016-2030 was created. (NIP). This document identifies 100 potential infrastructure projects for the Republic of Belarus with a total investment volume for these projects of more than 3 billion USD. From this list of projects in the future, it is planned to allocate a list of projects that can be implemented on the principles of PPP.

At the moment 7 pilot PPP projects have been selected:

1) the reconstruction of the M-10 highway: the border of the Russian Federation (Selishche) – Gomel – Kobrin, km 109.9 – km 184.5 (the estimated project cost – 343 million USD);

2) the construction of a highway in Gomel with a length of 41.35 km, taking into account the construction of a bridge over the Sozh River and 5 overpasses (136.5 million USD);

3) the construction of Beshenkovichi HPP (33 MW) on the Zapadnaya Dvina river in the Vitebsk oblast (186 million USD);

4) the reconstruction of the City Clinical Hospital No. 3 complex in Grodno under the Grodno Regional Clinical Oncology Center (200 million USD);

5) the construction of a garbage incinerator (heat capacity up to 1.2 MW and electric capacitance up to 1.0 MW) in Bobruisk, Mogilev oblast (\$ 130 million);

6) the construction of children preschool institutions in the regions of the Minsk oblast (25.24 million USD);

7) the overhaul with the restoration of facades and the hotel complex reconstruction located in the western part of Kobrin fortification of Brest Fortress (31 million USD) [4].

It should be noted that the cost analysis of the infrastructure facilities financing carried out through the NIP framework shows that the amount of annual investments in the period from 2006 to 2014 in the Republic of Belarus, amounted to about 2 billion USD. The total demand for investments for the 2016-2030 period is estimated at 62.3 billion USD. If the previous level of financing is maintained, only about 30 billion USD can be invested in the infrastructure

construction and reconstruction, which is 48% of the total investment demand for infrastructure. Thus, the infrastructure gap (deficit) is projected at 32.3 billion USD, or 2.15 billion USD annually. One of the promising options for reducing this gap is the use of the PPP mechanism [4].

Among the main obstacles to the development of the PPP mechanism in Belarus are the following:

- a high proportion of state-owned enterprises;
- lack of a clear model for determining the financing of PPP projects;
- lack of qualified personnel;
- Low level of awareness and knowledge of PPPs among regional authorities.

In this regard, the following solutions can be suggested:

– the activation of entrepreneurial initiatives, in order to increase the efficiency of the activities of publicly-owned enterprises;

– the legislation update in the field of tender documentation preparation for the selection of private partners, development of private partners selection criteria and an update on terms of concession or investment agreements; the definition of a clear structure for PPP projects financing;

– training of qualified personnel in the framework for PPP project management;

– raising awareness of the PPP mechanism and encouraging regional authorities to cooperate.

Thus, it can be concluded that the implementation of the public-private partnership mechanism will allow to expand the possibilities for financing the infrastructure projects in the Republic of Belarus by attracting the private investors' funds, and will increase the economic efficiency of implementing infrastructure projects for investors. The proposed set of measures will make it possible to intensify the process of developing a legislative framework that will provide a way to determine effective regulators of the relations that develop between the entities in the process of implementing public-private partnerships. This shows the public interest in developing this type of cooperation with private sector entities. Involving private partner may improve the efficiency of project implementation, since the marketplace often has more experience in the use of advanced technologies, and also more efficiently manages risks, including through the adaptation of operational management decisions.

However, before proceeding to the risks management mechanism, it is necessary to classify them. In the scientific literature there is no single approach to the classification of risks. For example, one of the authoritative PPP researchers J. Delmon, who was a senior specialist of

the World Bank on private sector participation in infrastructure – in the practical guide “PPP in Infrastructure” offers the following risk classification: political risks; legal and regulatory risks; a risk of non-completion of construction on time; default risks; operational risks; financial risks; currency risks; a risk of demand; environmental and social risks. A. Strauss in the report “Risk Management in PPP Projects” identifies seven categories of risk that may arise and should be envisaged in PPP projects: design or development risk, construction risk, income risk, financial risk, risk of unexpected events, risk of default And environmental risks [5, p. 5]. Specialists of the United Nations Economic Commission for Europe highlight the following main types of risks in PPP projects: land acquisition; risk of design, construction and commissioning; sponsorship risk; environmental risk; financial risk, which includes tax and interest rate risks; political risks; the risk associated with the maintenance of the tangible and intangible assets and the payment mechanism; market risks; risk of interconnections and interactions; production relations risks; the risk of legislation changes and the risk of changing government policies; risk of force majeure; ownership risk [1, p. 77].

It is important to define the term “state risks” for the development of a public-private partnership program. The definition of such risks includes the necessity to understand property, political, social, financial, public, and also decision-making risks. The criteria for classifying state risks, we distinguish the following: the risk insurance criterion (insurance and non-insurance risks); the functional criterion (political, social, economic, military, administrative-administrative); the criterion for the scale of the risk spread (local, regional, national, international and global), the impact possibility criterion (managed and unavoidable risks), the criterion for the possibility of sharing risks (clean, not separable with other structures, persons, organizations, and distributed when risk transfer is possible) As part of the development of the conceptual provisions of state risk management, the concept of “risk transfer” as one of the effective methods of risk management. The risk is directed from one party to another for the purpose of its fragmentation, distribution. The most common notion of the risk transfer in risk management and insurance is the minimization of risk. The transfer instruments are guarantees, sureties, contracts and contracts. The effective way of transferring risk is insurance, i.e. the direction of risk to the professional insurance organizations, which is clearly manifested in the PPP program implementation form in the insurance sector, and these risks are most required to be identified, assessed and monitored [6].

Thus, PPP projects endure risks at all stages of project implementation: at the planning and consultation stage, at the implementation stage, at the contract management stage. In this

regard, risk assessment and management are equally necessary in order to successfully implement the project. Risk management is an ongoing process of identifying, analyzing and eliminating risks, as well as timely engagement or neutralization of the consequences of their impact. Risk management is carried out throughout the project and includes three main stages: risk identification and assessment, risk allocation, mitigation and risk revision (Tab. 7.1).

Table 7.1

The stages of risk management in a PPP project implementation [1, c. 74]

Risk management stages	Actions
Risk assessment and identification	The process of identifying all the risks associated with the project, at the stage of both construction and operation stages. The determination of a likelihood of the identified risks occurrence and the magnitude of the consequences, as a result of their possible occurrence.
Risk Allocation	A transfer of responsibility for eliminating the consequences of each risk by one of the responsible parties within the PPP framework or the coordination of a specialized risk-elimination mechanism that may include an element of risk sharing.
Risk mitigation	An attempt to reduce the likelihood of the risk occurrence and the scale of its consequences for the party responsible for the risk management. Monitoring and review of identified risks and new risks as the PPP project develops and changes in the project environment. This process continues throughout the lifetime of the contract.

It should be emphasized that the main advantage of PPPs lies in the risk transfer to the private sector. However, the transfer of too many risks to partners in the private sector can lead to excessive project costs, as the private sector tries to include in the project price the disproportionate risks it assumes. All this can lead to a rise in price and the adverse effect on the success of the project, if in reality the public sector is better suited in risk management than the private sector.

A thorough risk assessment helps the parties determine whether to apply risk mitigation actions and how to implement them. Risk mitigation should be understood as set of actions taken:

- to reduce the likelihood of risk occurrence;
- to reduce the impact in case of risk.

Depending on the type of risk and a side that can potentially experience the impact of risk, certain actions should be taken to mitigate the risks. The following ones are some general risk mitigation measures used by financial institutions to protect against the potential impact on cash flows (Tab. 7.2).

Table 7.2

The measures to neutralize the risks arising during the implementation of  
PPP projects [1, p. 83]

Risks	Neutralization measures
Portfolio management	The syndicated loan mechanism is used for risk distribution.
Guarantees	A financing organization may require sponsor guarantees to fulfill debt service obligations.
Financial deals	The escrow accounts are used for the placement of project revenues. Many creditors also require the opening of a debt reserve account for the balance of cash.
Swap deals	This agreement, according to which the two parties agree on the exchange of currencies, interest payments or goods in the future, with dates agreed in advance.
Interest swap deals	This mechanism can be used to mitigate risks arising from unexpected changes in interest rates. Swap deals are used to switch from a floating rate to a fixed rate.
Currency swap deals	This mechanism allows the parties to exchange payments at certain dates on pre-determined terms.
Insurance	It is possible to obtain insurance to protect the project against certain risks including political risk and force majeure.
Interest swap deals	This mechanism can be used to mitigate risks arising from the unexpected changes in interest rates. Swap trading is used to change the floating rate to a fixed rate.

To assess risks, the project uses a variety of methods, from empirical (based on past experience) to complex simulation models. One of the most common methods is the construction of a risk matrix. The risk matrix is developed on the risk assessment basis which lies in quantitative and qualitative measurements of all possible risk factors. It is compiled for each project separately, in order to provide a detailed description of every possible risk. The volume of the matrix depends not only on the PPP project features, but also on the investment environment of the state where it is planned to be implemented.

It should be noted that there are many different ways in which the public and private sectors can mitigate risks. Using appropriate technical solutions, the private sector can manage the operational risk and the risk of failure to meet performance indicators (that is, the risk that the project will not reach the targets defined by the technical specification), primarily to prevent emerging risks or to reduce their impact on the project. The public sector can reduce the risk of failure to meet the performance indicators that violate the activities of consumers, using a legal protection mechanism that includes guarantees for the work executed by a PPP contractor and guarantees to reach the necessary indicators.



One of the main conditions for the successful implementation of a PPP project is the distribution of risks among the project participants. The risk must be transferred to the party that can best manage it. The ability to manage risk to achieve a positive long-term outcome of a project depends on a number of factors: whether the party fully understands the risk involved and its consequences for a correct assessment; whether the party has technical resources and the ability to manage risk; whether the parties have incentives to do so.

The main approaches to the risk reduction include: transparency of the whole process, including the participation of key stakeholders from the outset; properly completed project evaluation with the detailed information on a set of risks, their possible consequences and expected returns; cash flow projections based on technical, market and financial analysis; legal measures developed to ensure the safety of the project; project and compliance monitoring within the contract terms. The most commonly used risk reduction tools are: measures that can reduce risks or minimize the possibility of their occurrence; insurance when necessary; the financial instruments (hedging, swaps, etc.); the development of a financial structure to minimize the default risk.

Therefore, it seems quite logical to form a state program for the development of the public-private partnership in the insurance business. The allocation of the most significant terms of PPP forms allows us to determine the constituent elements of it: a legal mechanism that includes legislative consolidation of PPP at the appropriate level of management (development of laws, government regulations, internal legislation of insurance and reinsurance companies); institutional foundations - the creation of a special institution with the definition of the organizational and legal status; the formation of the mechanism of its functioning; the financial mechanism, including the scheme of financial flows and the definition of the public funds share and private capital in the PPP implementation process, as well as the possibility of attracting third parties (participants) along with the state and private companies of a specific profile to ensure financing, lending, insurance protection, etc.); social unit (solving a social problem in a specific area to ensure national interests, the quality of life of the population and the introduction of social innovations); risk distribution, risk mitigation and neutralization (the state transfers part of its risks to business - insurance and reinsurance companies).

It is important to define the role of the state in the economic support of priority sectors for the society (sub-sectors) in a PPP development program. These definitions should have the status of PPP programs. It is necessary to carry out legal, institutional, organizational and financial measures in those programs.

The implementation of the insurance mechanism in the framework of a PPP program form will allow the state, *firstly*, to perform its immediate functions in supporting low-profit and unattractive business sectors, which have social significance, and *secondly*, to protect their own financial risks associated with a possible loss of budgetary funds, which are used to subsidize the priority sectors and their producers, and *thirdly*, to protect their specific interests in the entities managing public funds, *fourthly*, to establish a set of guarantees for foreign investors in such projects.

The implementation of a development program for public-private partnership requires the distribution of a legislative framework that clearly regulates the legal relationship between subjects of insurance relations and the state.

The need for insurance protection will make it possible to improve the effectiveness of the inclusion of both insurance companies and government agencies designed to ensure the implementation of socially significant activities. It is necessary to develop a scheme of financial flows within a state program framework for neutralizing risks within the framework of the public-private partnership in order to ensure efficient and transparent distribution of income (insurance and reinsurance premiums) and expenses (insurance payments) between participants as an important principle of PPP programs and projects. The following principles will be observed in the determination of an insurance mechanism in PPP conditions: voluntariness; equal availability of state financial support to all business entities; the guarantee of damage compensation; insurance at actual cost, continuity (long-term nature); territorial proximity of the insurer and financial accessibility; fair regional distribution of government subsidies; mandatory membership of insurers in the professional association.

Thus, the effectiveness of this program will be expressed in the following results: the state receives control over the planned public funds; any potential illegal schemes are excluded; insurance becomes real and provides reliable insurance protection; all insurance companies are allowed on the market; the level of debt financing allocated by banks for insurance is significantly reduced; the insurance costs for the insured are halved; the insurance mechanism in the PPP projects works with the attraction of additional financial opportunities provided by commercial insurance and reinsurance organizations.

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## **7.2 VERTICAL INTEGRATED COOPERATION OF ADJACENT WINE INDUSTRY MARKETS: ESSENCE OF THE INTEGRATED MARKETING MANAGEMENT**

Wine market, which is a constituent of agricultural business, largely depends on governmental regulation and thus, requires special attention under conditions of the reformatory transformations in Ukraine. Nowadays in the Ukrainian economy the market in general and at the regional sectoral level, particularly in wine industry sector, is formed slowly with great deviations from the planned results. The problems of market mechanisms to control agricultural business sectors, transformation of the modern marketing paradigm and specificity of new sectors formation in economy, based on innovative constituent, determine necessity to use integrated approach as the most perspective way to form conceptual marketing model.

Wine production consists of producing and technological cycles, where agricultural and industrial productions are components of the chain, on the basis of which grape is grown and made. The regulatory impact on the viticulture and winemaking has to be concentrated on the conditions and enterprises' behavior, directly or indirectly to influence their business-processes efficiency, taking into account integrated processes, which show levels and character of the interconnection between market self-regulatory mechanisms and regulatory impacts on the part of the government. It is urgent to observe issues concerning formation of the wine production market, its balancing with wine market, domestic market protection from aggressive expansion of the foreign production and effective development of wine industry, from marketing aspects position.

Project of Law of Ukraine “On amendments to the Law of Ukraine “On grape and grape wine” concerning business regulation in viticulture and winemaking”, worked out by Ministry of agricultural policy and food supplies of Ukraine and divulged on the official web-site

(www.minagro.gov.ua), proposes to create favorable conditions to develop viticulture and winemaking farms of all property forms; to produce high-quality products with special features, caused by ecological conditions of the original territory, via new wine products approval simplification; to conform concepts and definitions in the wine goods production with demands of the international rules.

In this regard the integrated marketing management is a base to provide demand-supply, to control export-import activity, innovative development of the enterprises in the sector (Fig. 7.1).

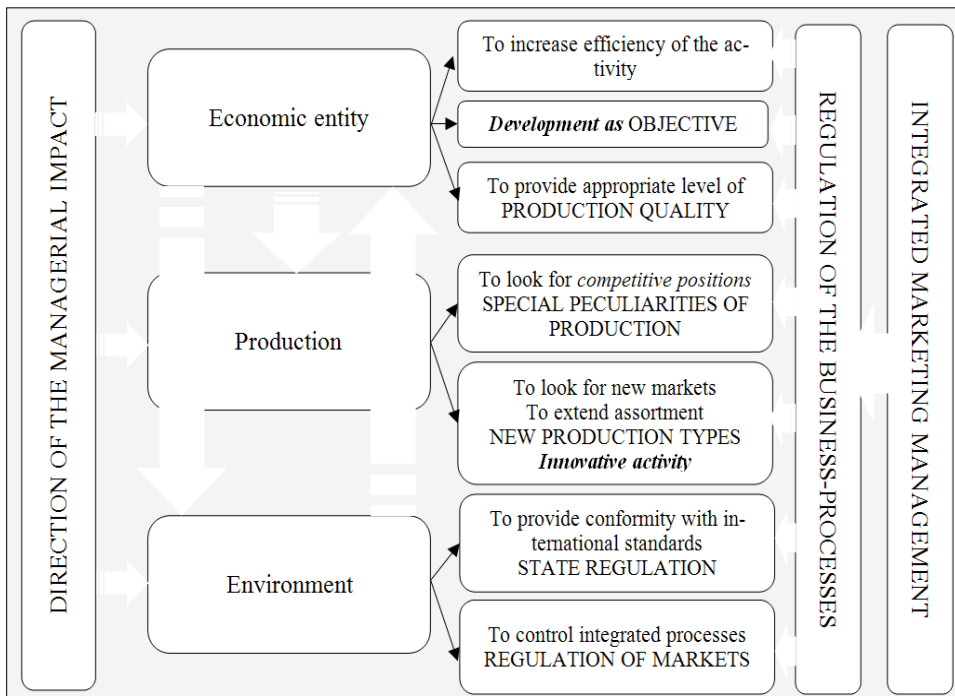


Figure 7.1 – Subject-oriented decomposition of the integrated marketing management of innovative development in the viticulture and winemaking sector [Author’s research]

According to the theory of the reproduction cycle and methodology of integrated commodity markets’ sectoral analysis [1], the wine market structure can be represented as a complex of four interconnected sectors in accordance with creation stages, transformation and product quality consumption, particularly: raw material, productive, infrastructural and consumer (Fig. 7.2).

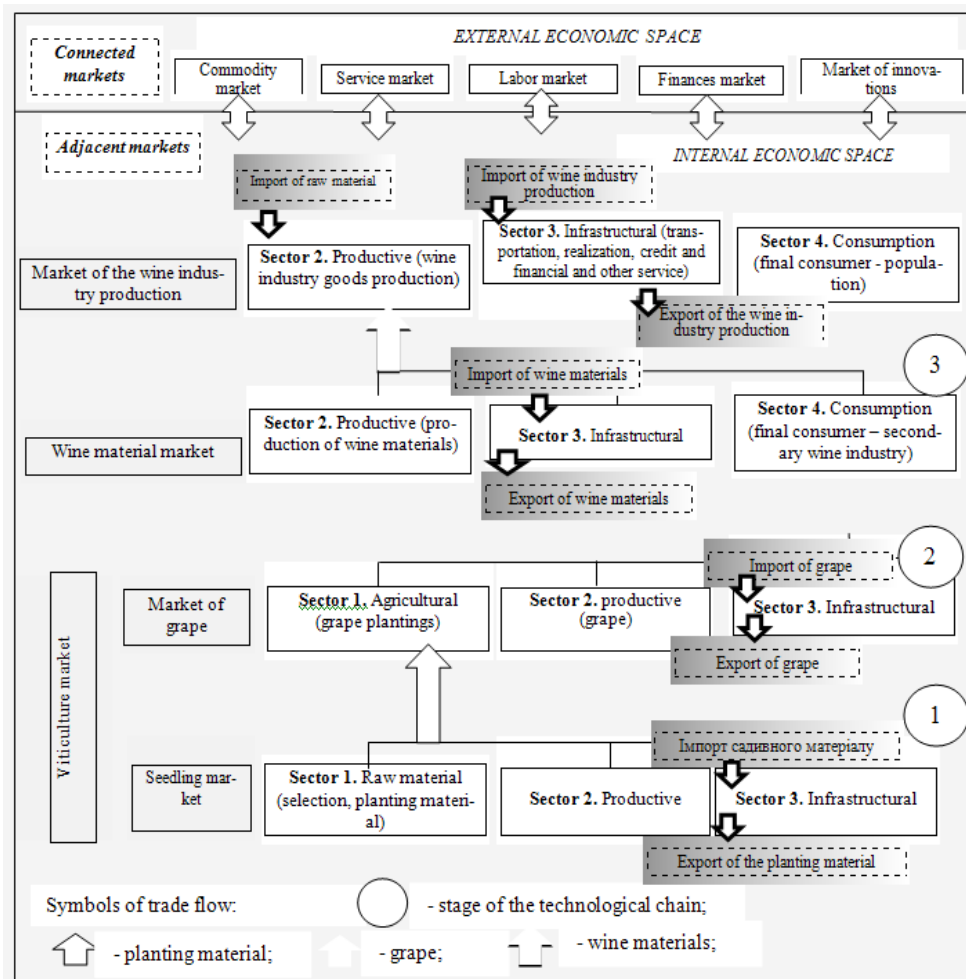


Figure 7.2 – Sectoral structured model of the adjacent wine markets [Author’s research]

The given model presents vertically integrated interconnection between adjacent wine markets. Wine market is represented by two directions: seedling and viticulture. Grape market includes agricultural sector (planting and growing of grapes), production sector (gathering, storing and cultivation of grape) and infrastructural sector (transportation of grape, product labeling and certification). Vineyards (thousand ha) on examples of states in Europa, Asia, Moldova and Ukraine are presented in the Fig. 7.3. There are small areas of vineyards in Ukraine; moreover one can see the decreasing tendency.

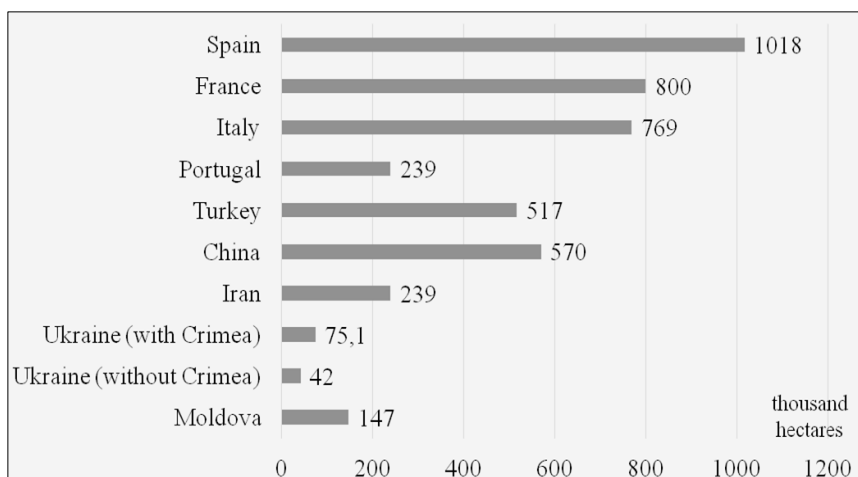


Figure 7.3 – Vineyards areas on the examples of some states in Europe, Asia, Moldova and Ukraine (in thousand ha) [2]

Besides, imbalance of the grape variety assortment greatly reduces productive potential of the domestic winemaking. Today the main task of the wine market is to provide population with local acceptable ecologically fresh grape, and the market of wine materials with qualitative raw material.

The most vineyards of the country are located in Odesa region, particularly in the south part – in Ukrainian Bessarabia. The annexed Crimea took the second place, rest (about 17 % of vineyards) were in Mykolayiv, Kherson, Zakarpatya and Zaporizhya regions.

The structure of vineyards in Ukraine, occupying about 89 % of areas, is planted with wine grape, 11 % – table sort (variety). The culture of table sort grape growing, in comparison with wine grape, is characterized by high profitability and allows lading production from the field, granting scientifically based conveyor, during 3-4 months [3].

However, problem, which grape growers faced in 2015, can lead to the situation that country can lose its grape and wine.

Wine producers need to find new sales markets. It means that although there was good harvest in 2014, firstly in the history of Odesa region, remains of the unrealized wine materials was over 2.5 mln dal. The reason is a problem to realize wine grapes, which make up 95 % of the harvest and are used to produce alcohol drinks.

The current market of wine materials is characterized with great imbalance. The global tendencies and Ukrainian realities of the proper market greatly differ from each other. Tendency

at the global market of wine materials focuses on more qualitative production. More and more wine producers try to produce wine, taking into account various objectives, likes and markets. Wine materials became ideal allies for producers and large shops, which are looking for competitive product's profile, appointed for consumers, who understand what they drink.

For example, during 2015 13.9 million hectoliters were evaluated at the Spanish market in the amount of 504 million Euro, in average 0.36 Euro per liter, 17 % of which (2.4 million hectoliter) were defined as “qualitative”, bringing profit at the rate of 122 million Euro, i.e.: almost 25 % of the total income. Wines with different titles were placed by the price 39 Euro, wines from GVP (geographical value is protected) by price 0.36 Euro and wine materials from PTO (protected title of the origin) by 1.10 Euro. Countries which have made conscious choice in favor of wine materials quality and their selling, to achieve the following prices: New Zealand: 2.47 Euro per liter, France: 1.36 Euro per liter, Germany: 1.27 Euro and United States of America: 1.16 Euro per liter [4].

It is complicated situation in Ukraine. During the last decades sparkling wines worked on wine materials from Odessa region in Kyiv, Kharkiv and Dnipropetrovsk. Most Crimea wines were bottled in Crimea. Nowadays wine materials from Odessa are not required in the annexed peninsula by Russian, and combat operations in the East of Ukraine lead to the situation when ties with Luhansk and Donetsk regions are lost. Besides, sales market of Russia is problematic for Ukraine.

It is a real tragedy for sector to lose main markets (Crimea, CIS, east of Ukraine), which traditionally worked during the last 40-50 years.

Markets of India and China are perspective. Chinese market capacity by the dry wine consumption is about 300 billion deciliters. Structure: 150-180 mln deciliters are import (Europe, North and South America), 110 mln – own winemaking, and deficit includes 25-30 mln deciliters. It means that this direction is perspective for wine materials from Odessa (2.5 mln deciliters). The Chinses are not interested in Ukrainian wine materials, but China is comfortable with joint enterprises. For example, they suggest to supply our wine materials, and to bottle wine in China. One can observe the deployment of production part in Ukraine. Approaches are absolutely different. Everything requires resources and time [5].

Until China is a remote perspective, today Ukraine is losing possibilities to grow wine grape. If local producers of the promoted brands, which formed total producing cycle based on the principles of agroindustrial integration from grape growing to the ready production bottling (there are a few such enterprises in Odessa region, but they produce 70 % of all wine amount), close their needs owing to own vineyards, wine materials of the farms are not been demanded.

Taking into account the fact that the third part of 27.5 thousand ha of fruitful vineyards belongs to farms and households, many agrarians seriously think about reasonability to grow wine grape. One more problem for small households is price for the produced good. Candidate of Agricultural Sciences, Head of one farm in Kili region Georgiy Stoyanov told that a good was sold by the price 2.3-2.5 UAH/kg [5] with prime cost 2.7 UAH/kg, even with record harvest.

In return, there is a problem of table grape in Ukraine: if there is no demand for wine grape varieties, there is a deficit of table wines. For example, in 2014 Ukraine provided itself with own table wine only for 10 %, but it arrived from Turkey, Moldova. Thus, local agrarians have to focus on the table wines.

Pricing policy for grape and its storing is problematic. Until the table grape is brought from farmer to consumer, its price is tripled. Representatives from Association of wine growers and wine producers-amateurs in Odessa region think that price reduction will be provided by retail markets of agricultural goods in the region with refrigeration equipment. It is necessary for municipal authorities to participate.

There are some difficulties at this level as for the wine production market. Wine production promotion at the internal market is a slow process. Attempts of the domestic wine to enter foreign market have more random, but not meaningful planned character. Solving of the above problems is located within two interconnected planes: on the one hand, increase of the products quality by the innovative technologies introduction into the producing process under constant scientific control, and on the other hand, providing of the scientific and experimental process adaptation to needs of the market economy by transferring to the innovative development model. Ukrainians' purchasing power has great impact on this market. Besides, considering the fact that Agreement on deep and integrated free-trade zone (FTZ) between Ukraine and European Union came into force on January, 1, 2016, purchasers prefer cheaper, but not always qualitative imported wine production, under conditions of the openness and unprotecting of domestic wine production market. In this case experts have pessimistic predictions: "Finally, in five years only 30-40 % will remain from 120 Ukrainian enterprises of the food industry... Our production will not be able to compete with imported goods", – Petro Kovalenko supposes [5].

According to the wholesale audit data, a part of the Ukrainian wine has been gradually increased since 2012 and in 2016 it was about 83 %. Therefore, one should notice that although there are positive factors, amount of the Ukrainian wine market, without Crimea, is gradually decreased, and in 2016 it is 100 mln deciliters, that is 15 % less, than in 2013. According to the data of State Statistics, wine production in 2016 in comparison with 2015 was



reduced by 3 %. It means that although we have all reasons for Ukrainian wine development, but market tends to decrease [6].

Besides, there can be one more problem. It is necessary to change geographical titles of varieties. If we take into account the probability of the Ukrainian production to enter European market, in this direction amateurs have more prevails, who can present in EU his or her special wines. To sell Sauvignon and Chardonnay wines in France is improbable perspective. According to results of 2016, realization of the domestic production at the European market does not have mass selling; it is only market's attempt. European market is saturated with wine and although consumption there is higher, the market is more complicated. In spite of the domestic market, the European market tries to protect its producer, putting exporters, including Ukrainian ones, to the unequal conditions.

Current misbalance of markets, which are formed, based on producing sector functioning, leads to great difficulties in the economic practice, because sector does not have a system of complex reasonable recommendations of the appropriate mechanisms creation to achieve the proper effectiveness.

According to the scheme (see Fig. 7.1), it is necessary to create fitting space to develop all economic entities of the viticulture and winemaking sector. The managerial impact has to be oriented to improve business-processes at every level of integration via market mechanisms regulation means. Considering high role of the governmental control in the viticulture and winemaking development, it is necessary to point out that it is important to move away from previous model of the state governance (bureaucratic – strictly hierarchical) and to come to the service model of the state governance, based on the management process. It means that to optimize state governance it is necessary firstly, to identify business-processes, which are peculiar for adjacent markets in the sector, and secondly, to provide conditions of their harmonization (rational cooperation). Task of the state sector is to substitute management to “manual” regulation of the market mechanisms by tools and means, which are maximum accepted by the market, i.e. marketing ones.

It is possible to solve the problem concerning the effective functioning of viticulture and winemaking integrated markets by means of the marketing approach, based on several marketing conception interaction, used by different market subjects at all levels of the marketing space. In this case interaction is an integrating factor, which presents uniting of several marketing conceptions into one model, which foresees the most effective marketing strategies both at the micro- and macrolevels. The most holistic idea concerning marketing management of integrated winemaking markets is suggested. The essence of the holistic approach is to define complexity,

nonlinear nature and integrity of systems, on which managerial impacts will be focused. The concept holism (from Greek “holos” (integral), in philosophy is a methodological principle of integrity, which was realized in the theory of systems via concept “emergence”. A modern holistic paradigm appears in various spheres – medicine, economy, politics, and give possibility to evaluate integrally complicated, but familiar things. During marketing formation and establishment different scientists gave their own ideas concerning its conceptions evolution. The conception of holistic (integrated) marketing, represented by F. Kotler and K. Keller, is based on planning, investigating and introducing of the marketing programs, processes and actions, considering their broadness and interaction. Holistic marketing is a conception, which integrates all elements of business-interactions between firm and clients, suppliers and mediators, allows constantly to extend an idea about consumer’s needs to search new ways for service provision considering values of the target audience, and also to evaluate contribution of each worker and subdivision into the holistic marketing realization. Conceptual fundamentals of approach, given by F. Kotler and K. Keller, concerning holistic marketing are shown in the Fig. 7.4.

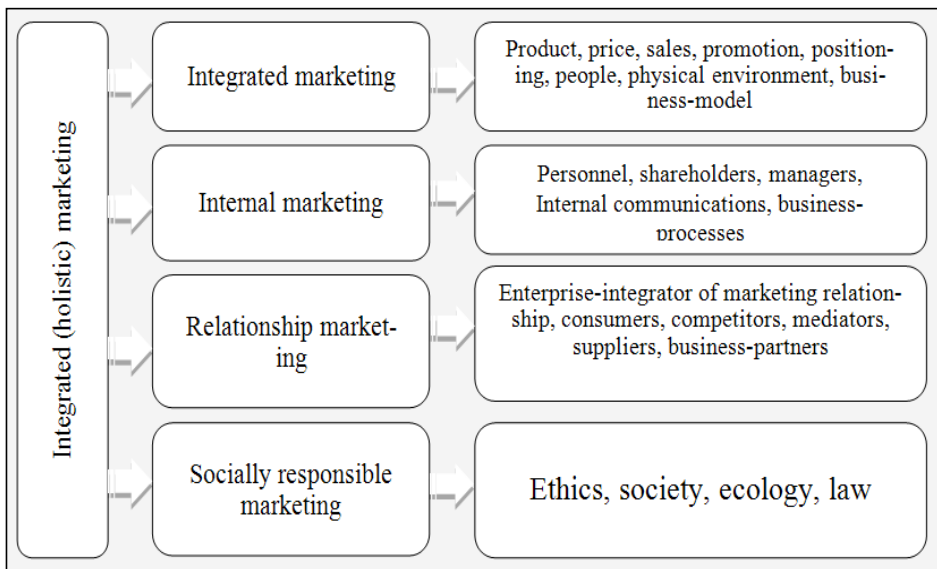


Figure – 7.4 Constituents of the holistic marketing [7, p. 43-44]

According to the opinions of F. Kotler and K.L. Keller holistic marketing conception is an approach of the marketing management, based on synthesis of four marketing conceptions [7, p. 43-44]:

– integrated marketing includes a conception, based on the marketing methods: mass marketing, personal marketing and direct-marketing. The main goal is to complement and to strengthen marketing impact of every method, and to use received market data in production development, pricing, formation of distribution channels etc [8];

– internal marketing includes managerial conceptions, based on such principles, as learning of key values by workers, improvement of relations inside the staff, increase of workers' self-identification degree as members of the enterprise's staff;

– relationship marketing includes conceptions, oriented to form and to develop trusting long-term relationships with great number of interested participants and control them, which occurs based on the data base formation to satisfy their needs and to support relations;

– socially responsible marketing includes conceptions, based on the principle that enterprise's activity is added with the third constituent, namely consumers' and society long-term welfare, together with consumers' satisfaction and receiving of profit.

Considering the Ukrainian market specific nature, marketing role in wine industry has educational and training nature. It is especially relevant for Ukraine under conditions of European integration processes. There is very low culture of wine consumption in Ukraine. Wine producers together with marketing experts have to work many years in order to increase the consumption culture and to explain: what is wine, how one can define qualitative wine, how one can drink it and the fact, that wine is not an alcohol drink, but is a food product as in the whole Europe. It is important to form conception in the Ukrainian wine consumer's mind that wine is a part of gastro-culture, to teach how to choose wine, how to combine it with some dish, how to distinguish wine "for every day" from the real "great" wines. That is why, education in this field is a way to the right choice and meaningful consumption of wine, and thus, to harmonization of consumer's relation to the native wine product.

Besides, taking into account the crisis state of the viticulture-winemaking sector, marketing management must have anti-crisis orientation.

Moving to the market model for winemaking sector means formation of the wine producing market of consumer, on the regulating base of which it is necessary to use client oriented approach principle, on which modern marketing is based. Such marketing of wine production is a complex of the focused actions, oriented to create consumers' demands for wine production. Such demand is based on the key idea concerning product value, which is broadcasted by communication means, and forms proper degree of consumer's readiness to wish to possess it. Marketing environment of new economy is based on digital technologies to control information about clients, goods, prices, competitors. On the one hand, it introduces new

demands, because it requires to have special knowledge and competence, but on the other hand, it greatly quickens speed of information flow, gives additional access channels to consumers. The problem has clear boundaries: to reveal clients' needs, to work clear in the direction to satisfy consumers' expectations and needs.

Thus, the modern marketing management concepts in viticulture and wine industry are the following: 1) wine and health; 2) problem of the international cooperation on the wine sale; 3) right titles and design of wines; 4) to train consumer's taste; 5) to improve viticulture and wine production.

Since a share of markets for mass production is reduced in the informational society, viticulture and wine industry has to be reoriented to the individual approach, product exclusivity and innovative development. Therefore functions and tasks of marketing are extended. An adequacy in analysis plays a significant role in choosing right variant of the enterprise's restructuring, directions of the production diversification, investment policy alternatives and making other strategic decisions.

The direction of the integrated marketing management is new and is not investigated for wine industry.

Taking into account vertically integrated interaction of the adjacent markets in the viticulture and wine industry, holistic conception has to include blocks, by the levels of marketing management, considering horizontal and vertical (raw material) integrations: international, macromarketing (state/regional), mesomarketing (sectoral – integration of the adjacent markets), micromarketing (Fig. 7.5).

Let us observe the role of every structural constituent in the holistic marketing conception in harmonization of the adjacent markets of wine industry and viticulture.

Block 1. Macromarketing. The holistic marketing structure, which analyzes scientific research on marketing problems, has to include the following key elements: state marketing; territorial marketing, which integrates image marketing and marketing of the country's (region's) attractiveness; infrastructural marketing; marketing of innovations; socially oriented marketing.

Transaction of viticulture and wine industry adjacent markets to new model of the marketing management is via social and economic, marketing and ecological policy. Its realization means, which provide strategic development in the country and international competitiveness of national business, and finally, competitive advantages of the country generally, are state tools. Absence of these tools leads to dissonance of the consumers', producers' and society interests, which appears at the agricultural business market. It is reasonable to use state marketing conception, which provides creation of additional specific tools

also based on ecological marketing principles. Interest in the international marketing is associated with attractive international market of the organic (ecological) production, and, with possibility to strengthen competitive positions not only of the separate enterprises, but the whole country in general, owing to the standardized or adaptive marketing technologies.

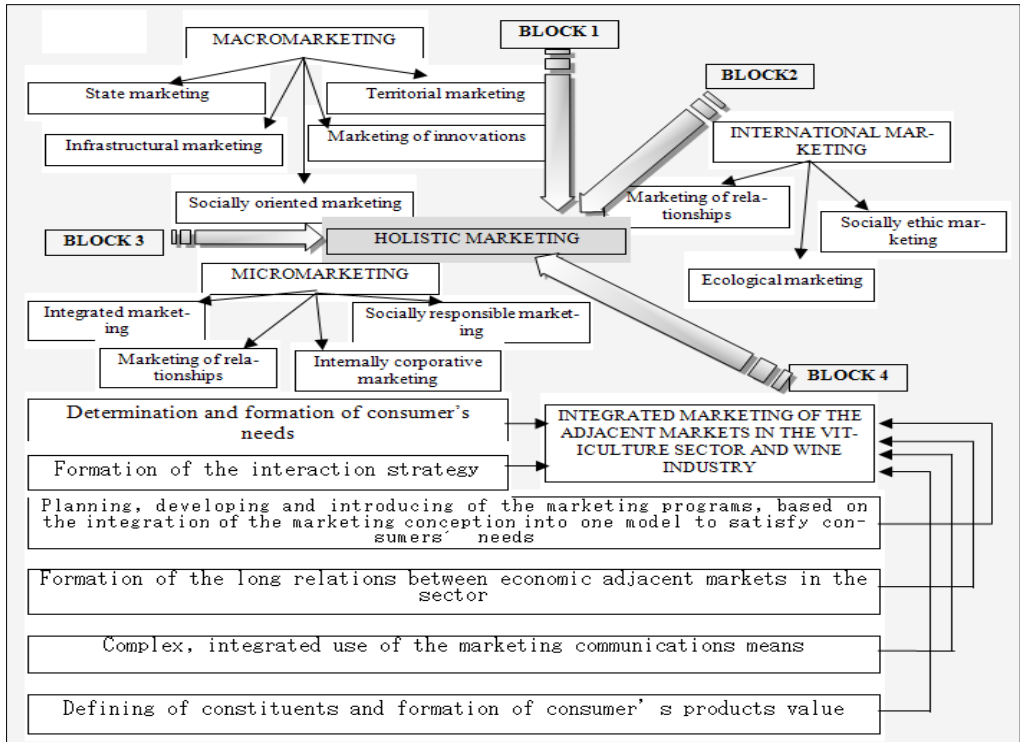


Figure – 7.5 Model of the holistic marketing conception, based on the integrated approach for viticulture sector and wine industry [Author’s research]

Territorial marketing is the most significant constituent of the holistic marketing. It is possible to distinguish elements there, which aim to increase regional market’s attractiveness: marketing of image and marketing of attractiveness. It is necessary to use tools of both ecological and territorial marketing for successful entering the international markets, because at the moment quality factors (security, ecological compatibility, reliability) and image factors of goods are often defined by the place of goods production, its territorial aspect. Distinguishing territorial factors in the context of other factors, it is necessary to note, that ecological image of the country or its cities (regions, territories) plays here an essential role. It connects consumers’ associations with some product quality and is a very important issue, while bringing ecologically oriented

goods to the market. Perspectives of the ecological and ethic labeling in Ukraine depend on the fact how successfully interested companies will be able to find a contact with its audience – a part of population, worried about ecology and social justice problems through marketing tools. It is necessary to mention that other market subjects, such as state and consumers also have to be socially oriented. That is why, the given market cannot be observed without consideration if social marketing tools in different spheres of the marketing activity. Additionally, as agricultural business enterprise experience shows, complex marketing activity is usually more effective while cultivating partnership relations of enterprises, both with consumers and with other representatives from micro-space of the enterprise: competitors, suppliers, mediators, that is carried out based on the relationship marketing conception.

Within the framework of communications, holistic marketing takes highest level, without limitations of communications by details and products characteristics, or by some ideas. Communications essence is directed to the whole regional market, including the whole community of regional production consumers and head's personality of the enterprise. The holistic approach is not oriented on human's needs and values; it is oriented on the consumer's personality of the wine production market.

Image marketing allows achieving creation, development, extension and provision of the territorial positive image public recognition. It does not require great cost. Level of cost and efficiency depends on the formed image and current situation in the region. Image marketing concentrates its efforts to promote existing factors of the regional attractiveness. The main arguments of the regional functioning include tax incentives, possibilities to use early created advantages of the region. The leading tools of the image marketing include communicative measures, which demonstrate regional openness, contact and allow of external subjects to cognize it better, being sure of existing advantages significance. Attractiveness marketing is oriented to increase regional attractiveness for external consumers.

Infrastructural marketing demands great work to provide effective functioning and development of the country (region). It is important to provide high degree of market relations civility in the country (region). Among perceptiveness arguments there can be the following: appearing of new and development of old productions, dynamics of the producing and market infrastructure, communications, employment degree, welfare degree, investments dynamics, development of higher and post graduate education.

The main objective of the socially oriented marketing is to improve citizens' quality of life in the country (region) including high level of the food security and its peculiarities as for example, protection of population from poor quality goods consumption.

Marketing of innovations has to be simultaneously observed as: 1) philosophy of business, when changes are sources of income; 2) as analytical process, which provides market possibilities for innovative development; 3) as a mean of active impact on consumers and target market in general, which is related to introduction and promotion of innovations to the market; 4) as a function of the innovative management, oriented to reveal possible directions of the innovative activity, their materialization and commercialization [9].

Block 2. International marketing includes the following elements: marketing of relationships; socially ethic marketing; ecological marketing.

In order to enter external markets all represented tools of various marketing conceptions can be changed and have the greatest relevance at some lifecycle of the sector. Taking into account all studied theoretical and methodological marketing conceptions, analysis of development of the adjacent markets' production global market in viticulture and wine industry and factors, which assist formation of this market, one can define a number of key conceptions, demonstrated in the Tab. 7.3.

Table 7.3

Factors, which define choice of marketing conceptions for wine industry with their interaction, based on dominant conception [Author's research]

Factors of wine industry development	Key conception
<ol style="list-style-type: none"> <li>1. Adaptation of the legal, normative, informational, legislative base to the European standards.</li> <li>2. Socialization of demand and consumption by educational work means with consumer.</li> <li>3. Stimulation of producers to perform ecological and social programs.</li> <li>4. Determination and strengthening of the competitive positions in the country at the international market</li> </ol>	State marketing
<ol style="list-style-type: none"> <li>1. Producers' entering of the foreign markets.</li> <li>2. Domestic producers' export potential increase.</li> <li>3. Formation of the transnational segments, which prefer ecological and ethic labeling.</li> <li>4. Involving of foreign investment for realization of ecological programs.</li> </ol>	International marketing
<ol style="list-style-type: none"> <li>1. Solving of social problems.</li> <li>2. Attractiveness of the ethic constituent in a product.</li> <li>3. Attempts to maximize quality of life and sustainable development of society in general.</li> </ol>	Social marketing
<ol style="list-style-type: none"> <li>1. Producers' preference, in relation to the production place.</li> <li>2. Associate of the production place with ecological attribute and quality of a product.</li> <li>3. Attractiveness of territories for tourism.</li> </ol>	Territorial marketing
<ol style="list-style-type: none"> <li>1. Providing of producers' interactions with consumers and partners.</li> <li>2. Reducing of cost while performing marketing actions.</li> <li>3. Extension of ecological, ethic and social activity.</li> </ol>	Marketing of relationships

If we suppose ecologically oriented conception to be dominant with priority of the organic (ecologically clean) production, in this case the sector development at the international level depends on economic entities', product and development stages competitiveness. It allows to provide harmonious and effective integration of social, economic and ecological directions of society development.

Block 3. Micromarketing. Holistic marketing at the enterprise level includes four components: marketing of relationship, integrated marketing, intracompany marketing and socially responsible marketing [10, p. 84–90]. According to the opinion of F. Kotler, at the micro-marketing (firm) level marketing of relationship is based on long-term beneficial relationships with key partners, with whom enterprise is cooperating at the market: consumers, suppliers, distributors, with purpose to establish long privileged relations. The relations are based on high service, culture of contractual relations and reasonable prices. Establishment of the long-term economic, technical and social beneficial relations with partners allows to reduce transactional cost and to save time, which turns transactions from the subject of negotiations into routine process.

Final result, which marketing of relationship tries to achieve, is to form unique asset of the enterprise, called marketing system of interaction. The marketing system of interaction includes enterprise and all groups, interested in its work: consumers, employed workers, suppliers, distributors, retailers, advertising agencies, workers of the scientific and research field and everyone, with whom enterprise establishes beneficial business relations.

Integrated marketing is observed as mutual coordination of the enterprise's marketing policy tools in order to maximize their total effect. The conception of integrated marketing obliges enterprises to perform some rules:

- To produce such goods, which will be sold, but not to sell those goods, which can be made;
- To like a consumer, but not a product;
- To satisfy needs, not to sell a product;
- To study market problems, but not own productive capacities;
- To connect aims, purchasers' needs and resource possibilities of the enterprise;
- To adapt the enterprise to changes of consumers' features;
- To be oriented to the long-term perspective.

It is reasonable to form integrated system to control demand, resources, and partnership networks.



Intracompany marketing, as an element of the holistic marketing at the microlevel, includes workers' employment and training, and their stimulation to high degree of service for clients. The main objective of the intracompany marketing is to provide accepting of the marketing principles by all departments and workers of the enterprise. It is formed based on principles concerning key values of the enterprise, relationship culture improvement in the staff, and increase of self-identification degree among workers as members of the staff. Intracompany marketing is based on and forms corporative culture of the enterprise, ethic norms of behavior and interactions of all staff members between each other, and main goals positioning for external relations with all participants and partners.

The main objective of the socially responsible marketing conception is harmonization of consumers', producers' and society's interests.

Taking into account the above conceptions of the holistic marketing at the enterprise level, the process of marketing adaptive management of enterprise development is formed, which functionally unites enterprise's ability as socially economic system:

- To change purposefully marketing impacts and components of the holistic marketing, i.e. to adapt marketing system to conditions of manifestation initial uncertainty and changeability of the exogenous factors of impact, i.e. passive marketing adaptive management;

- To change purposefully "controlling impacts" in the marketing policy of the enterprise, i.e. to realize searching of tools to change parameters of the existing marketing space functioning, i.e. entering the platform of the active marketing adaptive management of enterprise's development depending on the environment uncertainty degree.

Block 4. Integrated marketing of the adjacent markets in viticulture and wine industry. Investigations show that necessity to form integrated marketing of the adjacent markets in the viticulture and wine industry is caused by the vertically integrated interactions of these sectors. That is why, in order to introduce the domestic wine production to the global market, it is important to coordinate interactions and relations parity. Integrated marketing management gives possibility to coordinate long-term sectoral aims of development, to determine current tasks, to make reasonable managerial decisions. Market mechanisms, which are characterized with purchasers' ability to influence the trade, price, distributive and communicative policy of the economic entities in the proper sectors, defines parameters of their industrial and economic activity in such a way. At the same time, state institutions, local governments and public movements increase their influence.

Thus, integrated marketing in the viticulture and wine industry gives tools to combine business subjects and science of various sectors, oriented to harmonization of relations in economic, social and ecological spheres.

The main principles of the integrated marketing are:

- To create favorable conditions for: 1) harmonization of the adjacent markets in the viticulture and wine industry, 2) development of the parity relationship between agricultural sector and other sectors in economy;

- Planning, investigating and introducing of the marketing programs, actions concerning development of the wine market infrastructure, diversification of the realization channels and production quality provision, control of demand and supply, protection of market from imported wine production and raw material of the low quality;

- Increase of the competitiveness in the sectors via integration means into economic space, carrying out of events to increase wine market capacity and its recycling goods considering citizens' needs, their purchasing capability and export maximization;

- Complex, integrated use of the marketing communications means to define components and formation of the consumers' value of the products in the sector;

- Improvement of the management system in the viticulture and wine industry based on the innovative model of the structural modernization, increasing of the science and education role, development of advisory service.

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### **7.3 PRAXEOLOGICAL AND SITUATIONAL APPROACHES TO THE FORMATION OF STRATEGIC ACCOUNTING**

Axiomatic statement for advanced studies on the problem of conceptualization of strategic based accounting is a statement that its theoretical and methodological principles derived from fundamental distinction between strategic and traditional management paradigm. Summarizing results of comparative analysis of these paradigmatic approaches to management allows to conclude that fundamental requirements for the formation of strategic oriented accounting as an information service subsystem of company strategic management are:

- assessment, accounting and analysis of external factors and risks;
- management hierarchy that is based on using of communications;
- permanent increase of intellectual knowledge (strategic thinking, innovation management, sustainable development management, change management, knowledge generation);
- using of network economy advantages;
- possibility of consumers and suppliers selection;
- organization of accounting in space and time.

There are six theoretical and methodological approaches: praxeological, situational (scenario), process, architecture, integration and synergy. Complex combination of these approaches can be considered as an integrated interdisciplinary quintessence of company strategic oriented accounting construction. These approaches are logical extension of theoretical and methodological changes that are realized due to the determinants of the emergence of modern

strategic accounting paradigm (Fig. 7.6). Each of them is used to solve some group of problems in general complex of necessary changes that are realized in accounting paradigm in modern conditions. However, using of any theoretical and methodological approach separately from others does not allow to achieve transformation to strategic global accounting paradigm, which can be made only on the basis of their combination.

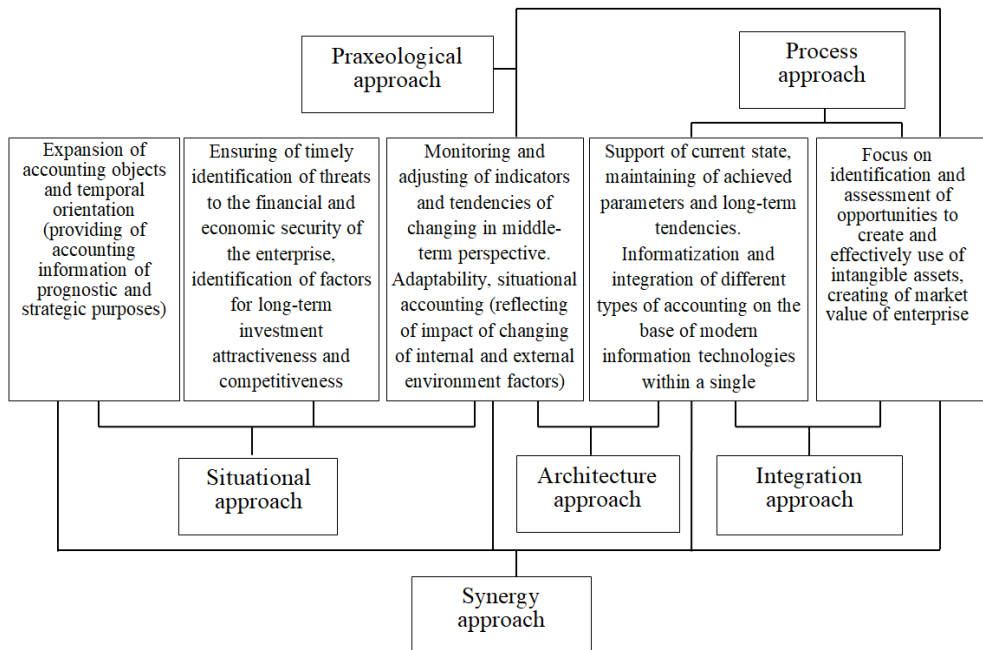


Figure 7.6 – Grouping of theoretical and methodological approaches in areas of accounting paradigm shift [Author’s research]

It is necessary to highlight that praxeological and situation approaches have the most important role in realization of the concept of strategic oriented accounting. These approaches consider possibility to identify and achieve targeted results on the base of cooperation of enterprise with external environment and taking into account necessity of its adaptation to the changing conditions of operation.

Basic concepts of praxeological approach realization in strategic oriented accounting are decision-making theory and value based management (VBM) concept. Praxeological orientation of accounting, control, informational and analytical support of strategically oriented accounting system implies formation of its elements in accordance to the principle of existence of capabilities of successful achievement of strategic goals of company development. Praxeological

mode of thought and management paradigm require combining with situational approach, which, in turn, assumes development of several probabilistic scenarios under which the company adapts variants of development, choosing the most effective methods and techniques of problem solving, taking into account likelihood of realization of combination of factors in some scenario.

Different aspects of situational approach realization in organization of enterprise accounting are researched in numerous publications in strategic accounting sphere. In particular, peculiarities of management on the base of strategic analysis of situation and situational control are researched by V. Vasylenko [1], N. Klunko [2], I. Lesnyak [3], formation of situational nad matrix accounting – by O. Kolvah [4], accounting and analysis of situation in time and space – M. Bolduev [5], G. Krohicheva [6; 7; 8], organization of network situational (eventual) accounting – A. Maksymenko [9] and others.

In general, methodology of situational management approach has some peculiarities: 1) understanding and consideration in decision-making specific features of individual and group behavior; 2) prediction and forecasting of positive and negative consequences of realization of factors of appearance and application of management measures to regulate specific situation; 3) assessment of situation in quantitative terms of expected socio-economic impact with taking into account differences in strength of influence of individual factors in specific situation, phenomenon of collinearity in their interaction and significance level of changes occurring under their influence; 4) optimization of administrative measures complex (methods, techniques and tools) in accordance with criteria of the most effective variant of objectives achieving in specified circumstances.

Situational approach has such key directions of its realization that are used in formation of theoretical and methodological background of strategic oriented accounting systems: hypothesis of external factors, risks and uncertainty, fractals, theory of evolutionary and adaptation reporting, reflection and situational and matrix accounting.

Hypotheses, which are basis of situational approach, can also be mentioned as a methodological background of conceptual basis of strategic oriented accounting system, because “external factors determine 80 % of company strategy” [5], and risk and uncertainty are objective and integral characteristics of external business environment, which exists in the objective parameters of being – fractals of time and space. Adequate characteristic of these factors impact into complex of control and accounting and information and analytical support of strategic oriented accounting is the main reason of developing new instruments of accounting reengineering in modern accounting methodology. These new reengineering instruments are dominantly realized in evolutionary and adaptive balance theory, theory of reflection and concept of situational and matrix model of accounting.

Implementation of the hypothesis of external factors causes emergence of the triple-entry bookkeeping, one embodiment of which was proposed by Y. Ijiri [10] in the 80's. XX century. This system is based on the framework of traditional double-entry bookkeeping that is designed to account real value of companies' property and financial income and expenses, level of which causes the change of its value. The triple-entry bookkeeping system includes some additional to traditional system elements such as system of measuring and recording of factors leading the change of income and expenditure levels [10]. This approach allows to display in the accounting system information on the impact of the external environment factors in the form of assessment system that includes two functional components:

- economic momentums, which characterize dynamic of change in equity over time due to current yield at the beginning of the period; its registration can be realized through expanding of the double-entry bookkeeping by implementation of momentum accounting system;

- impulses (shocks) that caused by realization of momentums in reporting period; quantitative measurement of these impulses is realized by calculating the rate of change of economic momentums; its assessment has predictive nature and requires implementation of the third level of bookkeeping – predictive accounting of expected momentums [11].

It is necessary to highlight that triple-entry bookkeeping has some methodological problems such as: lack of scientifically substantiated methods of economic momentums formation that could allow to determine the checklist of them in medium and long term perspective of enterprise operation and perform complex measurement and assessment of these momentums from perspective of their impact on equity and company market value formation.

Theories of external factors, risks and uncertainty, fractals that are realized in evolutionary and adaptive balance theory, which, in turn, includes theoretical and methodological rules and principles of formation and using of derivative balances (transformed or corrected at any position).

So-called “system-stepped mechanism of decision-making” [12], which is characterized by a change in goals and objectives with transition to the next stage of administrative process, led to the formation of three directions of realization of the evolutionary and adaptive accounting theory, each of which offers several variants of types of derivative balance sheets according to the target orientation of its transformation and adjustment, information needs of management system:

- 1) assessment and analysis of company value – zero, actuarial and system derivative balances;
- 2) planning and strategic management of financial and economic activity – situational, strategic and fractal balances;
- 3) crisis management – monitoring, immunization, hedge balances and balance of integrated risk.

It is necessary to highlight that:

1) all types of derivative balances should be used in formation of strategically oriented accounting, because they have unique characteristics that are necessary for effective realization of some stages of company strategy formation and implementation due to system-stepped mechanism of decision-making (Fig. 7.7);

2) zero balance is a unique methodic component of transformation and adjustment due to development any other type of derivative balance sheets (process of zero balance formation is also called «zero algorithm» and consists of complex of analytical measures, which are focused on assessment and reporting of salvage value of assets and liabilities);

3) derivative financial reports for planning and strategic management have is a tight connection with each other because of technology and methodology of their formation; this technology includes five iterations of transformation and adjustment of the initial balance sheet: a) characteristic of economic situation; b) formation of situational balance; c) making of hypothetical records on possible changes in the situation as a result of making decisions; d) formation of strategic or fractal balances (depending on the correlation between goals and expedients of its realization that are established by the control system); e) development of multivariate management decisions;

4) types of derivative balances should be classified by the type of provision in information system of strategically oriented accounting due to the specificity of balances using and its methodological capacity.

Thus, derivative balance sheets in accordance with its methodological capacities that are provided by financial reports while its formation can be classified by the criterion of its orientation on information support of short term and long term management decisions into such groups (Fig. 7.8):

– current and retrospective type of derivative balances, which is used in subsystem of accounting and control support of strategically oriented accounting systems (for example, zero, actuarial, system, monitoring and hedge balances);

– prognostic type of derivative balances – used as a part of the subsystem of information and analytical support (for example, situational, strategic and fractal balances);

– not specified in subsystems of information support system type of derivative balances that combines types of derivative reports that does not have methodological limitations on use in operating and strategic management (for example, immunization balance, integrated risk balance).

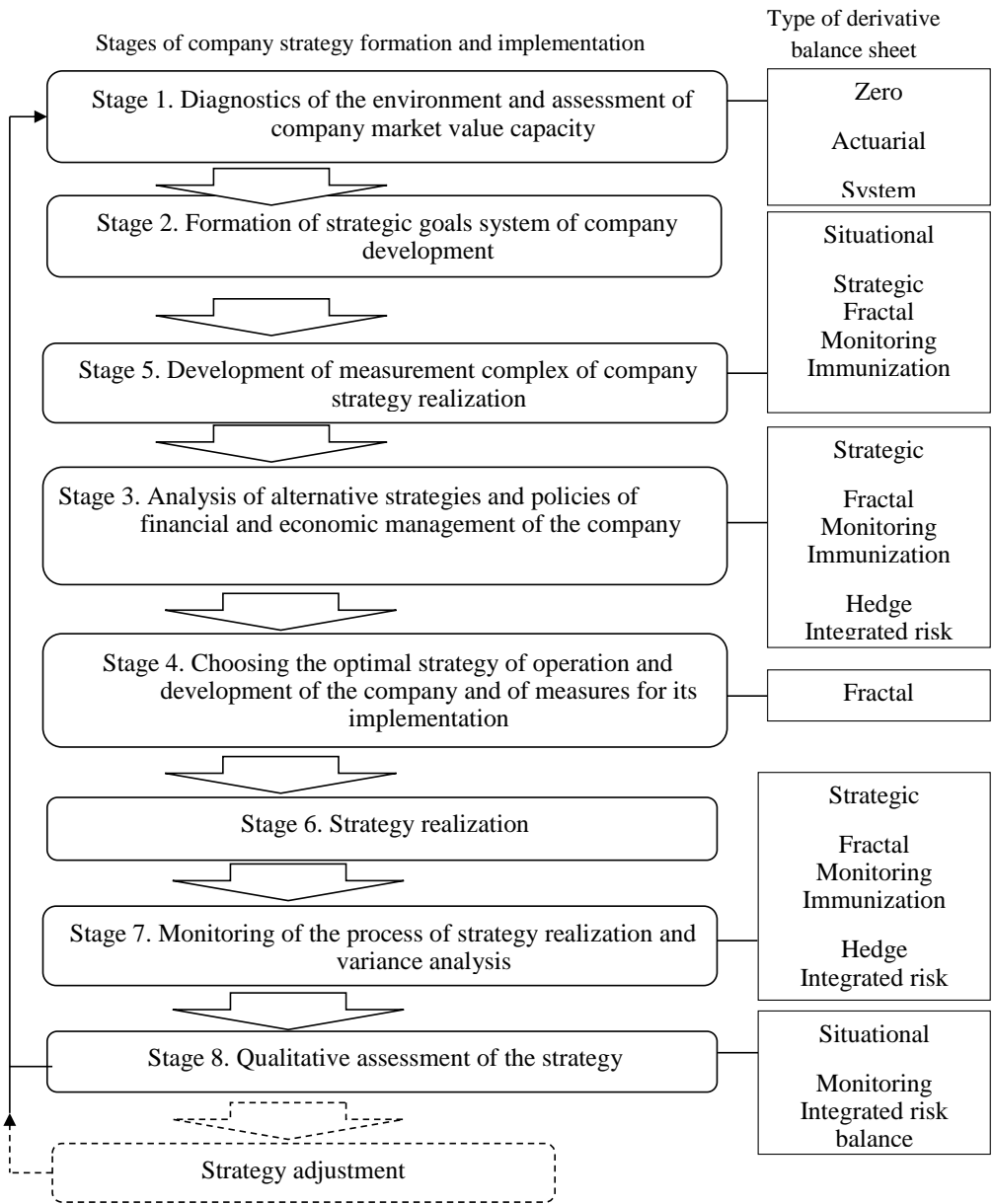


Figure 7.7 – Using of derivative balances in formation and implementation of company strategy

[Author's research]



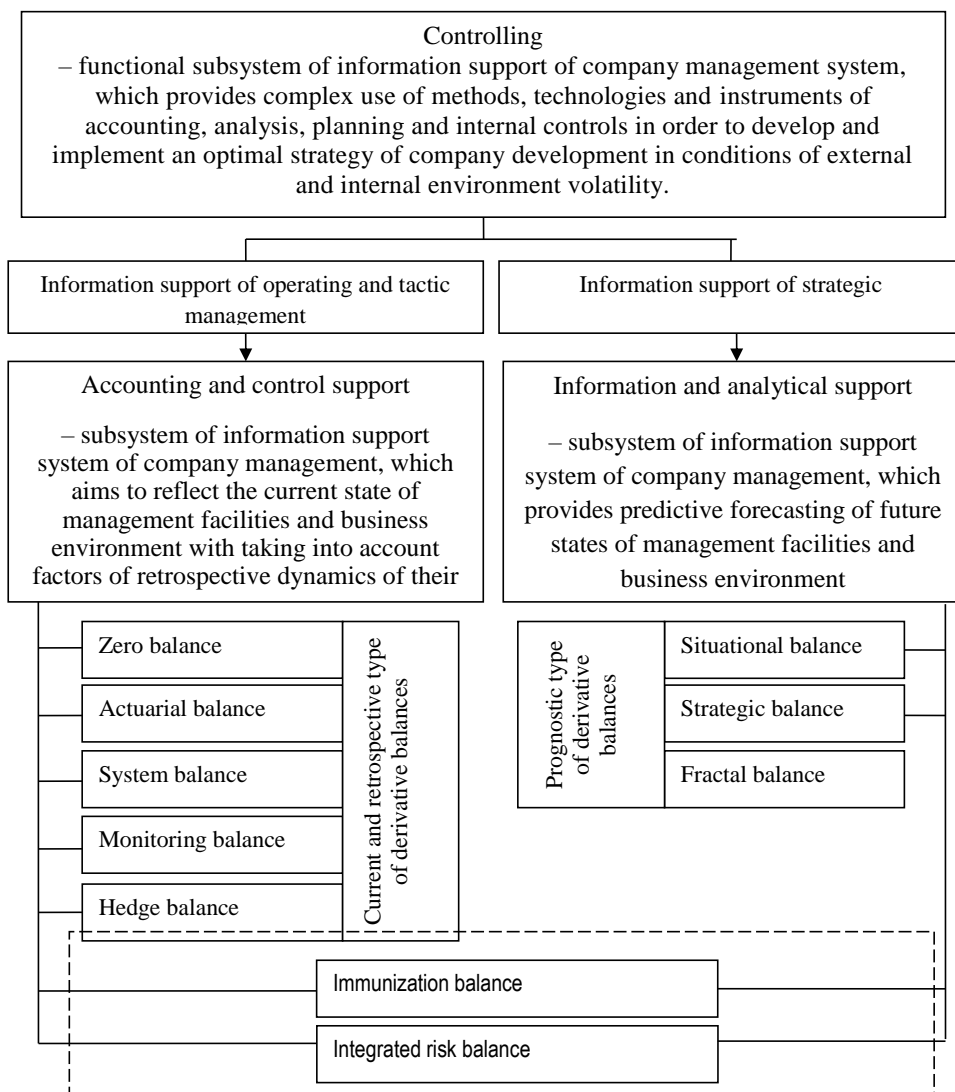


Figure 7.8 – Classification of derivative balances by the type of support in information subsystem of strategically oriented accounting system [Author’s research]

Transformation capabilities of flexible adaptive changes of accounting and reporting data in transformation that is aimed to harmonize accounting indicators, which are obtained in strategically oriented accounting system (in case if it is necessary to replace one principles of

accounting policy to another), are provided by methodological instruments of situational and matrix modeling and depends on different factors of external environment (including regulatory framework of national accounting system formation), provided methodological tools situational matrix modeling [4; 13; 14].

Thus, theoretical and methodological background of strategically oriented accounting system is complex, multifaceted and multidisciplinary, which combines different statements and principles of modern economic theories.

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## **PART 8 UNIVERSITIES AND PROMOTION OF THE SUSTAINABLE DEVELOPMENT IDEA**

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### **8.1 TECHNOLOGY TRANSFER AND ITS INTERNATIONALIZATION WITHIN THE UNIVERSITY DEVELOPMENT STRATEGY**

Modern education paradigm is oriented for training specialists with corporate innovation and entrepreneurship culture, intellectual environment of expanded reproduction of knowledge and dissemination of advanced technologies and core competencies, which are adequate for current scientific and technological challenges of global economy.

Technology transfer is an important source of innovations generation [1]. This is one way that allows companies in the short term to enter new stages of development through the science-to-business cooperation. But today the complexity of high technologies as well as speed of development no longer allow even large international corporations rely on their own resources and research centers, which puts the relevance of technology transfer on a new level. Therefore, technology transfer, along with the creation of internal innovation environment is an integral part of business development.

The innovation purpose of technology transfer is target result of introduction of technologies, implemented within limited period with limited resources, aimed at the best possible development of organization. At the same time many companies often refer to a bad experience in introducing new technologies. This results in significant financial loss or inefficient processes.

Therefore, the implementation of high technology transfer in different sectors can become a complicated task. This is particularly important for high-tech, the development of which in modern conditions is associated with the improvement of industry or enterprise technology package based on inter-sectoral collaboration and implementation of high technologies, which is expensive process.

Technology transfer is a new kind of business, actively developing in knowledge economy. It differs from a conventional business because it is a business of contacts and communications, technology trade, search the required solutions and new technologies development. Often technology transfer is considered even as an alternative career in science.

The process of the development of science in the most general terms, begins with the appearance a plurality of separate, unrelated areas of knowledge, such as zoology and botany, mechanics, chemistry, etc. Later the unification of knowledge in the areas of larger complexes started, and as they expand tend to specialize appeared again [2].

Technology development is initially different: technology was developing interconnected, and usually breakthroughs in one area were linked to achievements in other areas. In the distant past often such as “catalysts” of technological progress were achievements in the development of new materials (appearance of bronze, glass, steel, etc.).

This trend continued until the present day, and not so long ago, for example, distribution of composite materials made possible the cheap and reliable private space launches. Also, scientists are hoping that the appearance of long (centimeter) of carbon nanotubes in the near future will make possible the construction of a space elevator.

Einstein's well known saying states that we cannot solve problems by means of which we created them. One of the basic postulates of systems theory says that the problem cannot be solved at the level at which it arises. As applied to the above problems, this would mean that solve their remaining “narrow specialist” is almost impossible.

Fig. 8.1 shows the conditions of education development and changes in it.

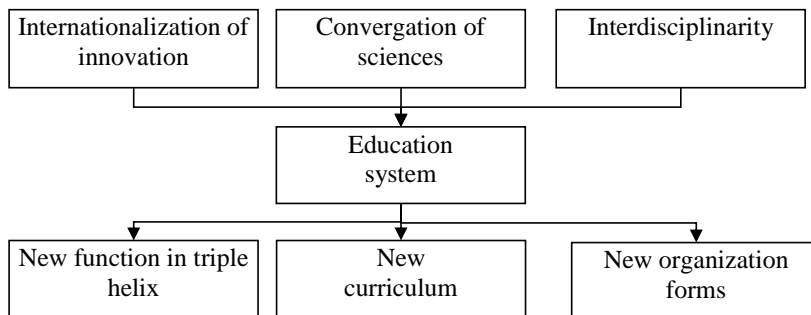


Figure 8.1 – Environment of education development

Today there is a group of people who paint “product space” – set of industries and products, and they say that those countries which produce and export more related product and this is the more developed countries. One of the results of their research says that even visually different countries are arranged differently. In Western countries, more related products

than in the developing countries of East Asia, if you look at Africa, where they will be even less connected.

The new mission of higher education in situation of aggravation of global problems of humanity and moving to sustainable development is that [3; 4; 5]:

1) universities are centers of regional development programming, not only in economic but also in social, cultural and environmental sense;

2) new innovative and entrepreneurial university model is formed in which university is transformed into scientific, educational and industrial complex with academic core and interdisciplinary project-oriented periphery consisting of a plurality of network structures and innovative high-tech small businesses that are active on the orders of the authorities, industry, business and society as a whole;

3) the concept of “lifelong education” (life-long learning) becomes extremely relevant: lifelong (lifelong learning) and life wide (study of life in its entirety) or study carried out over the entire range of human life in any its manifestations; learning in lifewide style provides high proportion of informal and non-formal learning that can take place in the family, at your leisure, in public life and daily work.

Adoption of innovations by firms and workers is an important part of the process of technological change. Many prior studies find that highly educated workers tend to adopt new technologies faster than those with less education. Such positive correlations between the level of education and the rate of technology adoption, however, do not necessarily reflect the true causal effect of education on technology adoption [6].

Evolution of models of innovative university should also be considered (Tab. 8.1).

The concept of technology transfer has relevance for all technology education programs, including programs in elementary and secondary schools, technology teacher preparation, and industrial technology at the university level. While technology development has been a central aspect of technology education programs through the years, issues dealing with the transfer of technology and its diffusion through society have been neglected. If a goal of technology education programs is to help students understand their technological future, the curriculum must provide a comprehensive study of technology that covers the entire range from technology development to utilization. Technology transfer seems to be the missing element in a comprehensive technology education program [7].

On this basis the aim of this work is to analyze the strategic aspects of integrated marketing of scientific research in universities and review it on a practical example of Sumy State University (Sumy, Ukraine).

Table 8.1

## Comparisons of institutional mechanisms of innovative education [8]

	Technology Transfer Unit	Entrepreneurship Education
Goals and Mission	Commercialize inventions; generate income	Develop leadership skills; integrate courses and disciplines; provide the foundation for new businesses; forge links between academic and business communities; promote university technology transfer
Influence of Market Conditions	Significant	Less
Time Horizon	0-10 years	0-40 years
Assessment	Straightforward: inventions commercialized; licenses executed; revenue	Difficult: student enrollment and evaluations; correlations with later behavior and career success
Providers and Constituency	Administrators and firms (that may involve faculty and/or students)	Faculty and students

Marketing in field of R&D we propose to consider as a comprehensive system that allows to link existing (or potential) intellectual abilities of university with the needs of the society (environment) and business [9]. In modern conditions to the forefront of technologies development integrated marketing comes, which is implemented in the framework of Kline-Rosenberg model chain (chain-link model). Integrated marketing requires an entirely different approach to conducting research and development activities, to develop and implement innovations. It is no longer thought of the scientist determines the direction of development, and the change and development of consumer preferences, anticipation of new demands and needs. Thus, there is a consideration of the various sources of innovation associated with both information and knowledge and the needs of market.

Today, among the main problems of implementation of the philosophy of integrated marketing in innovation system of universities are follows:

- problem of interaction between the structures of university (implementation of interdisciplinary projects), as well as between the structures of university and business (difficulty matching technology transfer process, delaying the negotiations, distrust of business to universities, the lack of commitment to implement business technology);

- lack of unique technologies and inadequate assessment of potential financial results, availability levels of access to university technology because of their separate development (there are such types of technologies: available, requires efforts to adapt, difficult to adapt, it is extremely difficult to access (adaptation));

– lack of effective infrastructure for technology transfer and inadequate funding and lack of marketing approach using. This aspect is reflected in the fact that the projects do not comply with the commercialization of investment criteria, namely the Pareto Law: only 20 % of the information give 80 % of final result.

To resolve these problems, you should carry out the evolutionary transition to the introduction of new management approaches and organizational forms of innovation. In the case of developing strategy of university development is proposed to use such areas of integrated marketing:

– Marketing foresight – development of high-tech projects are based on scientific and technological potential to meet current market and technological trends. Foresight involves project work with technology trends (add-pool studies and project ideas for the logical development of existing trends), search for inconsistencies in trends and integration into their project ideas.

– Internal marketing to manage the implementation of scientific developments and the competitive implementation of interdisciplinary projects involving various departments and laboratories of university.

– Cooperation marketing to promote cooperative preparedness and image of the university in creating innovative chain and projects. In context of globalization and transition from the developed world post-industrial society to society based on knowledge, international cooperation of universities in scientific and technical and in innovation sphere gets particular importance. The innovation process in the fifth R. Roswell model is not only a cross-functional, but also has multi-institutional and network character. Thus, the marketing aspect is proposed as an instrument for shaping innovation networks. This development should be considered from the point of view of its members; if it is possible to use a focus group of consumers for detection of defects in goods or services. This is easiest to do in the presence of an innovative network.

– Intellectual Property Marketing to promote research results. This marketing strategy in terms of excess of supply over demand of scientific product must necessarily include the provision of legal protection developments in their respective regions that is foreign patenting.

– Consumer marketing to promote the services and finished products. For development of marketing can be used as the implementation of prototypes, which limited by production capabilities of university and delivery times, and the implementation of various plan of cooperation agreements.



However, despite a number of difficulties, the process of innovation in the university and provide significant additional opportunities. When consumers are interested in a technology, that is being developed and which has not yet received any documents of title, it can be concluded an option agreement with the developers and copyright technology. In the agreement it is advisable to give the expected results of development; participation of future licensee in the development; the possibility and conditions of the license agreement for priority testing technology with the possibility of a licensing agreement; the formula for determining the price of the license; Developer obligation to patent development and convey an exclusive license to the licensee.

As a result of integrated marketing as a management tool facilitates the creation of high-tech research entrepreneurial universities with an efficient management structure and international academic reputation, that can meet the world trends and to respond flexibly to global changes. Notable examples of these are Oxford University, Harvard University, George Washington University and others.

In dynamic innovation landscapes research leading to the emergence of new products that require a concentrated international effort to field of study. Based on this mechanism in the development of effective technology transfer we offer to consider such methodological approaches for research universities strategy:

1. Implementation a package approach for technology transfer. In general technology package is a set of functionally related technologies, which has systemic properties and is aimed at specific purpose, such as product creation. In university this approach should help to develop innovations with the cooperation with other universities and business.

The technological development of civilization is linked not only to the creation of new technology, but with the creation of opportunities for the development of one or more technology package, which is an important task during application research.

2. Implementation of project approach (marketing potential) – Integrated technology transfer projects (complex automation, supply of equipment for the petrochemical industry).

3. Implementation startup methodology that involves close contact with consumer (marketing ideas). The classic product-focused fragmented approach involves attracting users in data collection requirements, but completely exclude them from further process up to the stage final run. This is what we have seen in scientific work in University. Contacting with potential users in all stages of the research project or startup is a baseline and necessary element of the entire workflow, allowing companies to reduce risks by adopting write decisions and save resources.

Let us consider the results of TETRACOM project (“Technology transfer from research to production, process improvement commercialization of research results”), which was started in October 2014 as part of the first phase of the project “Innovation and Leadership University.” The main objective of the project was to create a single interactive space for communication between science and business. Within this in Sumy region the authors of project consider Center of Scientific, Technical and Economic Information (CSTEI) of Sumy State University [10].

The objective of CSTEI is associated with organizational and methodological support of management at university level process of intellectual property protection, advertising and innovation on the implementation of research results, participate in grant programs of scientific direction, increasing publication activity and authority publications, maintenance of university scientific publications and activities scientific, methodological and the other direction (conferences, seminars, further – activities).

CSTEI main objectives include:

- research in the field of scientific, technical and economic information;
- information support of science and technology, innovation and grant activities;
- perform the functions of interregional center of innovation;
- bringing the results of research, development and scientific and technical activities to the scientific and educational community, representatives of industry and business, government, and other interested organizations and individuals;
- establish of new contacts and deepening of existing scientific contacts between scientists from different regions of Ukraine and other countries;
- creating of conditions for the realization of innovative potential of the University, including through implementation of the results of scientific and scientific and technical activities;
- ensuring of publication enhance the activity of SSU scientists and credibility of publications in international scientific community.

Among the prospects for further research, as defined above stated project should highlight the following:

- analysis of experience SSU participation in the National Technology Transfer Network (NTTN), the creation of a university office NTTN;
- mechanisms for creating successful technology profiles in international technology transfer network;
- analysis of prospects for constructing the interaction between science and business through research funding instrument of the EU Horizon 2020.

CSTEI has significant bank multilingual promotional materials for research and development and services. These materials are available on the university site and CSTEI, including their English version. Templates for describing the main research activities of university departments are developed. They allow to form the investment project on the basis of scientific development. Innovative design, services and technologies developed at SSU combined into one service “Scientific and technological developments SSU”, and communication with potential enterprise customers, by using the service “Technological requests.” In order to integrate scientific achievements of SSU to market innovative products and services created “Regional innovation resource”, which is a “bridge” between science and industry. This resource allows you to combine on a single information platform about innovation research institutions and companies in the region, service requests for works in various industries, a forum for the exchange of information between scientists and entrepreneurs, news, innovations in the plan of scientific and technological activities.

In SSU National Contact Point (NCP) for the thematic areas “Health, demographic change and well-being” under the “Horizon 2020” is established.

NCP at SSU (<http://horizon2020.sumdu.edu.ua/>) is included in the national network of contact points established by the Ministry of Education and Science of Ukraine. The purpose of the NCP is the implementation of the Association Agreement between Ukraine and the European Union under the Agreement between Ukraine and EU on scientific and technological cooperation and to increase the participation ukrayinskyhnaukovtsivu projects program “Horizon 2020”.

The main directions of NCP are advising researchers at the submission of applications in thematic areas, conducting of information days, seminars, preparation of information materials etc.

So international experience shows that technology transfer network based transfer centers make it possible to exchange technology. Nowadays success in global scale is possible only through the technological strategy ahead of the competition. To ensure priority development is possible only through complex work towards commercialization of research results and further support advanced research by international donor funds.

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## **8.2 BALANCED SCORECARD: FORMATION WITH PERSPECTIVE TO PROVIDE ECONOMIC SECURITY AND SUSTAINABLE DEVELOPMENT OF HIGHER EDUCATIONAL INSTITUTIONS**

Under conditions of increasing competitiveness between higher educational institutions (HEI) for entrants, employees for qualified potential graduates from HEIs and graduates at the domestic and international labor markets, there is a necessity to balance income and expense items of HEI after liquidation or decreasing of nonproductive cost for various resources (particularly time to perform activities, which help to increase HEI efficiency) and to orient released cost to create the investment structures, such as scientific parks, startup-companies, business-incubators, innovative laboratories, intellectual property departments.

The question to form the balanced scorecard (BSC) within the strategic management by economic entities, particularly by HEIs, is studied in works of its investigators R. Kaplan and D. Norton [1; 2; 3]. In the work [3] authors focus their attention on the logic to establish relations between indicators of internal processes organization and strategic activity with purpose to increase effectiveness of the strategic tasks realization. The general character of such relation on the example of HEI is shown by authors in works [4; 5]. The scientific literature [6] observes main aspects of HEI's functioning, taking into account their specific activity and carrying out the research (they concern HEIs as economic entities), the result of which consists in estimation of the economic security; however there is no constant interpretation of the category "economic security of HEI", it is more often determined as a state of HEI, in which there are enough resources to prevent, weaken or protect HEI's activity.

If the balanced scorecard is not widely used in the public institutions' activity (even in the developed countries) with proved efficiency approaches, there is a reason to carry out studies of its use in HEI's administration, particularly those, which are included to the group "Technological, building and transport" [7] according to MES-2017 rating. Among famous variants of the indicators balance by constituents for such HEIs, strategy of "total cost reduction" is the most acceptable under conditions of the domestic educational market. Supply of educational service "by the total cost reduction" or with the best ratio "price-quality" is related to the high level of price competition and mass character of demand for educational service. Under conditions of such market conjuncture to reduce main educational service assortment (number of specialties, educational programs), providing related service (accommodation, food etc), reducing expenses for educational process provision and organization, let to suggest cheap and thus, valuable service to consumer with its quality and convenient supply acceptable degree.

Competitive advantages of cost minimization and their structure optimization are provided by the low prime cost of the study by an educational program owing to efficiency increase to use current assets, constant improvement of the internal processes without great investments, supply of the non-strategic service by the third party (outsourcing), reduction of the internal processes cycles duration (their uniting).

Therefore, in order to have enough incomes from educational (main) service supply, it is reasonable to improve not only the quality of educational processes, but also their organization, particularly as a result of informational systems and technologies use. As a rule, such improvements in organization (economic entity) are followed by the labor efficiency increase under conditions of existing resources effective use, by finding of the proper reserves or making small investments with high profitability degree.

Considering one of the main conditions to realize strategy “by total cost reduction” (constant improvement of educational process organization quality through cost reduction and effective use of resources), analysis of the labor efficiency (spending time by activity types) of the scientific and pedagogical workers (SPW) indicators of the HEI’s activity can be a statistic base to analyze and to control the fulfillment of above conditions. Taking into account the fact that specific weight of the item, which demonstrates wage and social insurance financing, is 60-70% [8] in cost estimates of domestic HEIs, results of such evaluation can be reasons to find essential reserves to control cost owing to labor efficiency growing and effective use of the labor resources.

Given the essence of the national security (which is interpreted as “protection of the human’s and citizen’s, society’s and states’ s vital interests, by which sustainable development is provided, real and potential threats for national interests are revealed, prevented and neutralized in time) in the Law of Ukraine “On National Security” [9], economic security (is a component of the national security and according to Methodic recommendations concerning Ukrainian economic security degree calculation, approved by the Ministry of economic development and trade in Ukraine, from 29.10.13 № 1277 [10] is “a state of the national economy, which enables to keep firmness in relation to the internal and external threats, to provide high competitiveness in the global economic space and characterizes the ability of national economy to sustainable and balanced growing”) and role of HEIs in sustainable economic growth provision, much attention has to be paid to develop measures, which will assist improving of their financial and economic indicators. It can be achieved, particularly owing to balancing of HEI’s income and expense items.

Analyzing the structure of actual time consuming factor (by some types of activity – time consuming factors) of SPW is carried out via spreadsheet MS EXCEL as a result of ABC-analysis use (its modified variant, which provides the distribution of indicators into four

groups – ABCD). The received results in the analysis show distribution of different works by the following groups:

A – the most labor intensive activity, which define the main result of organization’s activity, content and quality of the internal processes and have growing specific weight to 50 %;

B – activity, which can play significant role in realization of strategic and current tasks and take at least 2 % of general labor-intensive activity;

C – activity with labor intensity less than 2 %, which make at least 10 % of working time by the growing specific weight;

D – activity with labor intensity less than 1 %, which make 5 % of working time by the growing specific weight.

The carried out calculations show that only 18 types of activity (Tab. 8.2) from 96, which can be performed by SPW, have specific weight over 1 % and together are 87.2 % in SPW’s total time consuming factors of the whole university. Therefore only first five activities are characterized by the specific weight that is at least 6 % each one, and as a result their specific weight is 58 %. That is why, practically 1/5 (18.8 %) of SPW’s working time is spent to organize (prepare) the educational process that under conditions of strategy “by total cost reduction” is justified, because there is an opportunity to concentrate on improvement of educational process organization without great investments with more effective use of existing resources (time consuming factor while fulfilling SPW’s activity).

The research was continued through defining of labor-capacity impact degree of activity (regression), which have specific weight at least 1 % of the SPW’s total working time fund (1548 hours), for effectiveness (quality) of the internal processes by some educational programs or specialties (their related groups) of specialists’ training. Calculations were carried out for specialties, which are demanded at the labor market [11] and are perspective under conditions of transition to the knowledge economy.

Realization of the above mentioned is carried out through using of software product Statistika (to simplify complicated calculations), based on multiple regression to define meaningful regressors in the SPW’s time consuming factor model.

In order to form SPW’s time consuming factor model, one calculated matrix of the researched factors correlation – SPW’s activity, among which there is a high level of impact on internal processes effectiveness in: preparation to all types of classes (correlation coefficient is 0.99306); preparation of the electronic educational and methodic complex on discipline (correlation coefficient is 0.970509); examinational consultations (correlation coefficient is

0.966930); consultations on the academic disciplines (correlation coefficient is 0.963181); practical lessons, seminars, laboratory and individual classes (correlation coefficient is 0.962644).

Table 8.2

ABC (ABCD) – analysis of the time consuming factor structure by SPW's activity of university

№	Activity of SPW, included to group A and B (internal process or direction of activity)	Specific weight	Cumulative specific weight
1	Preparation of lectures, practical lessons, seminars (methodic)	18.8	18.8
2	Practical classes (educational)	17.9	36.7
3	Consultations on academic disciplines (educational)	7.9	44.6
4	Lecturing (educational)	6.6	51.2
5	Laboratory classes (educational)	6.3	57.5
6	Supervising of degree works (projects) (educational)	5.4	62.9
7	Preparation of electronic educational and methodic complex on the discipline (methodic)	3.7	66.6
8	Semester control (educational)	3.1	69.7
9	Supervising of educational and manufacturing practice (educational)	2.5	72.2
10	Publishing of articles in the native editions (including specialized ones) (educational)	2.4	74.6
11	Checking of: tests, calculating and graphic works, analytical reviews, translations, projects (educational)	2.1	76.7
12	Supervising and accepting of course papers, projects (educational)	1.9	78.6
13	Publishing of monographs; explanatory vocabulary, guide; dictionary (scientific)	1.8	80.4
14	Preparation and publishing of textbook (manual) (scientific)	1.7	82.1
15	R&D by the international program, by the governmental program, by economic contractual topic; receiving of grants by the international programs (scientific)	1.4	83.5
16	Supervising of the students' scientific work (scientific)	1.4	84.9
17	Publishing of the article in foreign scientific editions (scientific)	1.2	86.1
18	Thesis defense (scientific)	1.1	87.2

There is a connection between collinear regressors practically for all activities, except: preparation and publishing of textbook (manual), publishing of the article: in native editions (particularly specialized ones); publishing: monograph; explanatory dictionary, guide dictionary;



publishing of the article in foreign scientific editions; organization and carrying out scientific and methodic seminars with participation of lecturers, representatives from foreign and native enterprises; supervising of post graduates; defense of doctorate and candidate theses.

Results of the carried out regressive analysis, based on multiple regression to define meaningful regressors in the SPW’s time consuming factor model by activities, are demonstrated in the Tab. 8.3.

Table 8.3

Results of the multiple regressions

	Beta	Standard fault Beta	B	Standard fault B	t (1) Student’s criterion	p-level
Free member			0.0	0.000342	0.0	1,0
X 2	0.810847	0.001617	0.810847	0.001617	501.4723	0.001269
X 7	0.160941	0.001012	0.160941	0.001012	159.0674	0.004002
X 17	0.114316	0.001104	0.114316	0.001104	103.5665	0.006147
X 12	0.056014	0.001035	0.056014	0.001035	54.1274	0.011760
X 5	-0.065677	0.002323	-0.065677	0.002323	-28.2731	0.022507

Data from the Tab. 8.3 shows that among all activities duration of preparation to lectures and practical classes X2, lecturing, X5; supervising of educational and manufacturing practice, X7; preparation and publishing of a textbook (manual), X12; publishing of the article in foreign scientific editions, organization and carrying out of scientific and methodic seminars with participation of lecturers, representatives from enterprises and foreign firms, X17 were the most significant to provide effectiveness (quality) of internal processes.

Column B in the Tab. 8.3 shows coefficients of regression equation with every variable quantity and free member in the regression model, which will be shown in the following way (formula 8.1):

$$Y_i = 0,810847 \times X2 + 0,160941 \times X7 + 0,114316 \times X17 + 0,056014 \times X12 - 0,065677 \times X5, \quad (8.1)$$

where Y (i) – duration of i-type activity.

Thus, the best ratio “price-quality” with providing of educational service by the strategy “total cost reduction” is provided: firstly, owing to labor-capacity quality and control of such activities as preparation to classes (coefficients in the regression equation is 0.81).

All other activities, included to the regression model, are characterized by the small impact on total time consuming factor (coefficients 0.05-0.16), that is why they can be observed as secondary factors. Therefore time reduction for lecturing by 1 % will increase SPW's labor efficiency by 0,066 %.

Considering results of the conducted ABC (ABCD) – analysis and regressive analysis of time consuming factor by SPW's activities, balancing of internal processes indicators with indexes of financial and client's constituent have individual character for educational program, realized by concrete HEI, depending on planned and real financial indicators of its activity, level of staff provision, informational technologies in regulating and conducting of the educational process. Analysis of the time consuming factor by SPW's activities by specialties and related specialties groups of typical technological university proves reasonability to implement individual approach to form balanced indicators systems for realization of educational program or its group for related specialties.

According to data from the Tab. 8.4, there is a difference of time consuming factor by separate specialties from expenses structure in general in HEI. Particularly, group “Chemical technologies and engineering. Biotechnologies and bioengineering. Pharmacy” concentrates 12.7 % of time consuming to prepare the electronic educational and methodic complex on discipline and theses defense, which are 2.5 % in the whole university. The structure of cost by the educational programs groups for specialty “Computer sciences and informational technologies”, and “Automatization and computer-integrated technologies” distinguishes 15.7 % for such activities as article publishing (in the specialized editions) – at university 2.4 %.

Table 8.4

Comparative analysis of the time consuming factor structure by SPW's activities types by educational programs groups

№	SPW's activities (internal process or direction of the activity)	Structure, %				
		Chemical technologies and engineering. Biotechnologies and bioengineering.	Technology of light industry	Design	Marketing.Economics Accounting and Taxation. Finances, banking and insurance	Computer Sciences and informational technologies. Automatization and computer-integrated technologies
1	2	3	4	5	6	7
1	Preparation to lectures, practical classes, seminars (methodic)	16.2	18.4	20.5	17.9	18.7
2	Practical classes (educational)	–	10.1	29.3	24	6.0

Table 8.4 continuation

1	2	3	4	5	6	7
3	Consultations on educational disciplines (educational)	7.0	7.5	7.9	8.9	8.0
4	Lecturing (educational)	5.7	8.8	–	5.1	8.8
5	Laboratory classes (educational)	10.2	9.1	–	–	15.8
6	Supervising of degree works (projects) (educational)	6.6	–	4.4	5.9	8.0
7	Preparation of the electronic educational and methodic complex on the discipline (methodic)	3.6	7.2	–	–	–
8	Semester control (educational)	–	–	–	–	–
9	Supervising of educational and manufacturing practice (educational)	–	–	–	–	–
10	Publishing of articles (in the specialized editions) (scientific)	–	–	–	–	15.7
11	Checking of: tests, calculating and graphic works, analytical reviews, translations, projects (educational)	–	–	–	–	–
12	Supervising and receiving of course papers, projects (educational)	–	–	–	–	–
13	Publishing of: monograph; explanatory dictionary, guidance (scientific)	–	–	–	–	–
14	Preparation and publishing of textbook (manual) (scientific)	–	–	–	–	–
15	R&D by the international program, state program, by economic contracts; receiving of international grants (scientific)	9.0	–	–	–	–
16	Supervising of students' scientific work (scientific)	–	–	–	–	–
17	Publishing of the article in the foreign scientific editions (scientific)	–	–	–	–	–
18	Theses defense (scientific)	3.7	–	–	–	–

Analogical situation can be observed for different specialties, which are included to one group of related ones. Particularly, Tab. 8.5 shows comparison of time consuming structure by SPW's activities, which are involved in the economic educational programs realization, such as "Economics", "Marketing", "Management", "Finances, banking and insurance". The structure of SPW's time consuming, involved in the educational programs realization by sciences "Economics" and "Management", was not different from the SPW's time consuming structure of the whole university, but analysis of the specific weight of some activities showed differences from general tendencies of such activities in specialties:

- supervising of degree works (projects) for educational programs in specialties "Management" and "Finances, banking and insurance";
- preparation of the electronic educational and methodic complex on disciplines for educational programs in specialty "Management";
- supervising of educational and manufacturing practice; checking of: tests, calculating and graphic works, analytical reviews, translations, projects – for all educational programs in the specialty "Management";
- publishing of articles; publishing of the monograph; explanatory dictionary, guide; dictionary; preparation and publishing of the textbook (manual), theses defense – for educational programs in specialties "Marketing" and "Economics" (Economic cybernetic).

That is why, in spite of the general strategy "by total cost reduction" in general at HEI, peculiarities of the internal processes, used to realize different educational programs, define reasonability to investigate the separate balanced scorecard for each of such programs (their groups). Particularly, possibility to use the balanced scorecard or strategic map for an economic educational program considering result of ABC (ABCD) – analysis is observed in the work [5].

Degree of internal processes organization depends on internal management traditions, on extension of the culture to improve and to exchange experience (knowledge) between workers, personnel's readiness to work with informational systems and proper technologies. Considering demands of the internal processes, based on the SPW's rating data, who are engaged in realization of some educational programs, some works were distinguished, which determine degree of development and study. According to indicators of time consuming factor, in order to carry out such activities after their normalization, correlations matrix is built between indicators and regressive analysis is conducted, based on multiple regression on defining of significant regressors in the model of SPW's time consuming factor, which are related to development and study, results are shown in the Tab. 8.6.

Table 8.5

Comparative analysis of the SPW's time consuming structure by activity types in some economic specialties (educational programs of the related specialties)

№	Types of SPW's activities (internal process or direction of the activity)	Structure, %		
		Finances, banking and insurance	Management	Marketing. Economics
1	Preparation to lectures, practical classes, seminars (methodic)	13.7	11.3	15.4
2	Practical classes (educational)	13.4	12.0	10.8
3	Consultations on academic disciplines (educational)	11.0	13.4	7.7
4	Lecturing (educational)	7.1	4.8	8.6
5	Laboratory classes (educational)	–	–	4.7
6	Supervising of degree works (projects) (educational)	5.2	9.8	–
7	Preparation to electronic educational and methodic complex on the discipline (methodic)	6.3	–	–
8	Semester control (educational)	–	–	–
9	Supervising of educational and manufacturing practice (educational)	–	6.4	–
10	Publishing of articles (scientific)	6.1	–	–
11	Checking of: tests, calculating and graphic works, analytical reviews (educational)	–	3.6	–
12	Supervising and receiving of course papers, projects (educational)	–	–	–
13	Publishing of: monograph; explanatory dictionary, guide; dictionary, (scientific)	4.7	–	–
14	Preparation and publishing of textbook (manual) (scientific)	–	–	7.1
15	R&D by the international program, by state program, by economic contract topic; receiving of grants by the international programs (educational)	–	–	–
16	Supervising of students' scientific works (scientific)	–	–	–
17	Publishing of the article in the foreign scientific editions (scientific)	–	–	–
18	Theses defense (scientific)	–	–	6.7

Table 8.6

## Results of the multiple regressions

	Beta	Standard fault Beta	B	Standard fault B	t (1) Student's criterion	p-level
Free member			0.0	0.007531	0.0	1.0
X 1	1.113464	0.080367	1.113464	0.080367	13.85466	0.005169
X 7	0.246725	0.023060	0.246725	0.023060	10.69935	0.008623
X 5	-0.200039	0.028049	-0.200039	0.028049	-7.13183	0.019099
X 14	-0.198496	0.080524	-0.198496	0.080524	-2.46505	0.132609

According to the data from Tab. 8.6, total equation of regression was made (formula 8.2):

$$Y_i = 1,113464 \times X1 + 0,246725 \times X7 - 0,200039 \times X5 - 0,198496 \times X14 \quad (8.2)$$

where Y (i) – total SPW's time consuming factor;

X 1 – time consuming factor for preparation to lectures, practical classes, seminars and individual classes – direct link;

X 7 – time consuming factor to carry out scientific and research work by the international program, by the state program, by economic contracting topic, receiving of grants by the international programs – direct link;

X 5 – time consuming factor to write and publish the article in foreign scientific editions – reverse link;

X 14 – time consuming factor to prepare and publish methodic materials on the academic disciplines in foreign language, and to republish methodic materials in foreign language – reverse link.

Correlation analysis and analysis of the multiple regression prove that some factors (types of activities), which are selected as meaningful ones by ABC (ABCD) – analysis method, according to data of the regressive analysis are characterized by small impact on the internal processes effectiveness in the part of SPW's labor efficiency. The above facts prove reasonability to use indicators, calculation and achieving of which are under control, regulating SPW's time consuming. In another case, enrollment to the time actually worked in the total amount of some SPW's activities, which is planned in norms-hours, can lead to unjustified time consuming increase, or planned time (particularly, for such important activities as preparation to classes) can be used to conduct unpredictable activities or obligatory activities with not enough justified

small time norms. It is reasonable to carry out analysis of the time consuming to conduct activities with relatively small time norms.

Therefore, results of the time consuming analysis by the activity types in comparison with their significance to perform strategic and tactical controlling tasks can be evidence of balance (or its absence) of financial and client's constituent indicators with indexes of internal processes (educational, methodic, scientific and organizational), and with indicators of SPW's development and study. Such activities with high specific weight of time consuming have to provide mostly efficiency to realize the financial and client's constituent of the HEI's educational activity strategy or separate educational program (depending on the set tasks). Under such conditions, refusal to plan such activities or to minimize time norms for their conducting can be justified from economic point of view. It can be used while investigating methodic recommendations to estimate HEI's economic security.

Taking into account the above facts, one has to ascertain that practical use of balanced scorecard, adapted for HEI's demands, will help to increase efficiency of their functioning. As a result it will also have positive impact on their economic security level increase via distribution of the released money to investigate contraction measures for negative impact of internal and external factors. They lead to appearing and deployment of threats for HEI's functioning (since internal processes efficiency decrease – educational, methodic, scientific and organizational – can be internal threats for HEI's functioning), under conditions of market relations, in general, state and national security on the whole.

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### **8.3 ECOLOGICAL SLOGANS IN THE SYSTEM OF ENVIRONMENTAL PROTECTION**

Today's troubles will disappear sooner or later, but the problem to keep and to improve environment will always disturb humanity. The resource problem, which appeared as a result of limitation of Earth's physical abilities and its population's constant increase, requires rational limitation of non-renewable resources (oil, gas, coal) consumption, their substitution by artificial ones etc. that is why resource conservation, wastes reduction and environmental protection have to be the scientists' subjects of attention [1, p. 99].



Exceeding of produced goods quantity by half in comparison with required for consumption, production of goods, including single-use ones, which cannot be repaid, improvement of package in direction of the additional material use, their unsatisfactory utilization lead to necessity to remind marketing specialists and all participants of the chain *investigator* → *supplier of raw material* → *producer* → *mediator* → *consumer* to **keep to ecological marketing regulations**. One of its activity directions is systematic informing of economic subjects via the most effective *tool* – *slogan*.

Two interesting examples, which prove, that some developed European countries have passed the ecologization. The famous Ukrainian football player Ye. Konoplyanka announced about his adaptation to living conditions in Germany. He informed that his neighbor in the street complained to police, that family of Ye. Konoplyanka do not sort rubbish before its putting to garbage cans. Clearly, the football player did not worry about that problem, because in Ukraine or later in Spain, where he lived during one year, rubbish is not sorted in general, or is sorted. It is the same situation with this problem in Oslo. There are automats everywhere, in which one can put the used plastic bottle and receive 1 Norwegian krone for it (at the exchange rate krone is equal to 3 UAH). Clearly, in Norway empty bottles do not pollute environment.

Unfortunately, in Ukraine both single-use package and returnable one, such as glassware, do not have either reuse system, or utilization system. For example, in times of the Soviet Union glass jar or bottle had in average triple circulation. Today almost all small glass rubbish and many bottles are thrown into garbage cans; it is in general economically unprofitable either for entrepreneurs, or for consumers and society. It is known that glass can be smelted and recycled into a new product without loss of quality. On the one hand, consumers wish the package not to be crashed, broken, not to be decomposed and not to be dissolved in the water, and on the other hand – it has to be utilized, chemically decomposed etc. That is why ecologists try to find the so called “golden mean”. The mostly used pack is recycled with the help of industrial methods and transported to dumps; it causes disorders of the ecological balance in the country. At the same time most of its types is a valuable recycled raw materials. At least 48 % of paper and carton, 24 % of the plastic materials, 15 % of glass, 5 % of wood can be involved in the quality of building materials, additional means, the same packing materials etc. Thus, the used pack is not rubbish, but valuable secondary resource, which can be the base for profitable business. One can confirm that reuse of containers and its utilization is a constituent of the gradual formation of comfortable living environment.

While purchasing, in the situation of choosing between several analogical variants, consumer will compare them, based on those features, which are the most meaningful

for him, including ecological peculiarities. The advertiser's task is to rebroadcast urgent information. For example, Ihor Nikonov, honorable president of the companies group KAN Development explained the project philosophy "Файна Таун": "Our company does not create square meters and soulless boxes, but friendly space for life, – this is our main principle. That is why, on the example of "Файна Таун" we wish to create something which can be called "Kiev of dream". 12 hectares of the total 39 hectares of the future quarter will be allocated for improvements: 4 thousand bushes and 1000 trees will be planted, 420 benches, 7 training apparatus constructions, 24 children's and 17 sport playgrounds, 6 art-objects, 3 kilometers promenade with bike path will be set. Developing the conception of the quarter with cornerstone, in creation of the living space attention was paid to neighborliness, leisure areas, open quarters, different from notorious Kiev "commuter areas" – concrete blocks, bulked on each other which are used for sleep, but not for normal life, gave a depressing impact on people. We also try to create positive space for life, *living quarter*", – Ihor Nikonov stated. Besides security and comfort one puts emphasis on ecological compatibility and energy efficiency. Ukrainians worry especially about the latest resulting from rising cost for utility tariffs. Houses, equipped with boilers, individual heat energy counters, energy-saving lightning, and systems of rubbish gathering by underground containers, and independent boiling room will be suggested to inhabitants of the quarter "Файна Таун". There will be own infrastructure with shops, cafes, supermarket, fitness center, children's playgrounds, resting areas for families, youth and elderly people, on the territory of complex. There will be a zone for picnics as a part of living complex. Animators will organize leisure time for inhabitants of "Файна Таун". According to Ihor's Nikonov words, the living quarter «Файна Таун» will be the project of friendly format, and there is no analog in the capital" [2].

Unfortunately, in Ukraine gaps concerning environmental protection problems solving do not have a fragmentary, but complex nature. It is known that recently Lviv is considered abroad to be cultural IT-capital of Ukraine. In fact we can see that the situation is far from it. Mayor of the city, which at the same time headed one of governmental parties, cannot solve the problem not only concerning utilization and recycling of rubbish or wastes reuse during the long time, but also concerning its transportation to the landfill.

Tasks, represented in the Fig. 8.2, are important and uneasy, but the main task to solve this problem is to increase citizens' awareness, which can be achieved by means of compulsive informing and upbringing. It is not bothersome informing, that is why it must be always improved and varied. Slogan is the most suitable for it among advertising tools.

Utilization and recycling of rubbish	Complex of communication measures	Creation of the rubbish recycling plants ————— Separation of waste
Reusing of pack		Setting of the feed-back distribution net
Careful attitude to natural resources use		Using of the ecologically clean materials ————— Citizens' normal behavior

Figure 8.2 – Complex of the communication measures to reduce and utilize waste

**Slogan** is an effective sentence, statement, motto, which shows unique quality of goods, service, company's (organization, institution) activity orientation in direct form, in foreign language or in abstract form [3, p. 274]. Slogan is to be caught by rumor. In this regard, it is necessary to find a factor, for which a product, service or social event will be given recognition.

There is a specific slogan in the environmental sector. It can concern either ecological qualities of the good, its packing, waste utilization and recycling, or formation of ideas and ways among citizens to protect and save the environment. Slogan, which has to show ecological innovativeness of the product, service, public phenomenon or consumers' action, is a text, which recommends potential consumers to be purchasers of the goods or service, and public activists to hold an event etc. In order to strengthen the slogan effectiveness, it must be rebroadcasted via various advertising means, mass media, via readers, listeners, and spectators. Such actions will help to find new fans, and then followers of the proper behavior [4, p. 85].

Slogan must exactly render an advertiser's intention, since a message has to reach the recipient (reader, listener or spectator) without distortions. Such statement reminds consumer why he or she needs not only to buy this or that product, but also to recommend it his or her relatives and friends, and then a potential consumer of the company will be its follower. By means of ecological slogans companies addresses to potential consumers in order to inform them about the problem, to which they have not been given thought yet.

Besides, slogan is written in order to switch other people's attention to concrete object, and its text has to be oriented for reader's or listener's spontaneous attention. If in advertising messages, due to research, "titles are read in average five times more, than texts [5, p. 218], slogans are more often repeated and remembered, because they are key statements, which demonstrate position of the company, people or society in general.

Slogan can promise reader and listener any benefit or advantage – *"Вікна нового покоління й свіже повітря у дарунок"* *"Windows of the modern generation and fresh air as a*

gift”. Short slogans are more expressive and attract more attention, for example, advertisement of milk products ‘Skeleton’ “Скелетон” – “Потурбуйтеся, діти, про свій кістяк” “Children, take care about your bones”, long slogans are commercially beneficial, because they have concrete information, which acts effectively, than generalized information. The positioning of slogan is also important (to achieve the situation when a product, service, object, which are advertised, can be differed from others). The advertising moto, in which main advertising idea is shown in the intent way, performs triple function: attraction of attention, initial informing and persuasion” [6].

Slogan has to be bright, clear, figurative and aphoristic, which will provide its fast learning on the subconscious level. Changes of the communication expectations (so called “planned surprise”), direct addressing to reader, listener, spectator, and motivating character of the slogan text, i.e. formation of recipient’s guidance, aspirations and internal imperatives, which encourage people to actions, will help it. Tab. 8.7 shows some verbal means, which are implemented in slogans, oriented to protect the environment.

Table 8.7

Examples of some verbal means, used in the environmental communications

Verbal mean	Example
1	2
Different forms of imperative	<p><i>Використовуй рівно стільки, скільки потрібно. Use as much as you need.</i></p> <p><i>Зберись! Попади в урну. Brace yourself! Fall into the box.</i></p> <p><i>Хочеш відпочивати в чистому місці — прибирай за собою. If you want to have a rest in clean places, pick up after yourself!</i></p> <p><i>Піклуєшся про Україну — почни з наведення чистоти на своїй вулиці.</i></p> <p><i>If you take care about Ukraine – start with cleaning your street.</i></p> <p><i>Деревам — рости! Птахам — співати нічні!</i></p> <p><i>Trees- grow! Birds – sing!</i></p>
Rhyme	<p><i>За небо, за воду, за нашу природу.</i></p> <p><i>For sky, for water, for our nature!</i></p> <p><i>Сын ваш веточку сломал - объясните крохе, Что такое «хорошо», а что такое - «плохо».</i></p> <p><i>Your son broke the branch of the tree – explain him what is “bad” and what is “good”.</i></p> <p><i>Чему учил нас Сент-Экзюпери?</i></p> <p><i>С утра проснулся — город уберу.</i></p> <p><i>What did Saint-Exupry teach us?</i></p> <p><i>When you get up – clean your city!</i></p>

Table 8.7 continuation

1	2
Application — inclusion of idioms, fixed phrases, proverbs, sayings, often in changed form	<p><i>На природу з чистою совістю. Go outside with clean conscience. Один за всіх — і всі за чистоту! На екологів сподівайся, а сам не сміти. Don't rely on ecologists, don't litter! Чистота врятує світ. Cleanness will save the world. One for all – and all for cleanness! У людини все має бути чистим: і місто, і будинок, і думки, і совість. A person must have everything clean: city, house and conscious. Чисто не там, де прибирають, а там — де штрафують. It is not clean in those places, where people clean up, but where one fines. Посієш свій пакет зі сміттям, поженеш звалище під своїми вікнами. If you sow your rubbish, you will reap scrap heaps under your windows.</i></p>
Rhetorical question	<p><i>Не вистачає влучності поцілити недопалком до урни? Don't you have enough accuracy to throw butt into litter-box?</i></p>
Repetitions, word-play, equivoque	<p><i>Для боротьби із сміттям достатньо не смітити. It will be enough not to litter to fight with litter Люби природу. Ця любов є взаємною. Love nature. This love is mutual.</i></p>
Comparing	<p><i>Рослинам потрібен регулярний полив так само, як і вашій шкірі. Plants require regular watering as your skin.</i></p>
Personification is transfer of living creature's features and functions to inanimate object	<p><i>Папір: “Дайте мені третій шанс”. Paper: “Give me the third chance”. Пакети, здавайтесь! Packages, give up! Допоможемо місту озеленитися! Let us help our city to be green! Твоє сміття потрапляє в душу міста. Your rubbish gets into city's soul!</i></p>

It goes without saying, that Tab. 8.7 does not represent all verbal means. Besides mentioned above there are metaphor, hyperbole, antithesis, deviations from normative orthography, combination of Latin and Cyrillic, using of occasional words, which are absent in language system etc. The following epithets take special places in the structure of ecological slogans: *unnatural state, polluted environment, clean air, unspoilt nature, safe future.*

There are such recommendations to create ecological slogan and to increase its efficiency as: it is necessary to find an ability to inform its followers, that enterprise, firm, company have to suggest a new creative idea concerning a product, service, project etc; to concentrate on those new features of the product or service, which will differ them from goods and service-analogues; to propose bright legend (dream), which is necessary to render an idea to a larger audience, to potential consumers; to use well-aimed means of the verbal impact on the recipient, to choose carrier, by which slogan will more effectively and faster reach as much as possible potential consumers.

For example, producer of mother juice without sugar, water and concentrates, uses such slogan: “*GALICIA – здорового життя традиція*” “*GALICIA – tradition of healthy life*”. In Ukraine there is an ecological slogan “Just do it!” “*Просто зроби це*” that is a short proposal to sort rubbish for its further utilization.

If the communication measures to protect the environment for Ukraine are usual things, the necessity to motivate people to utilize rubbish, to recycle and to reuse pack, starts only to be extended among them. If one constantly, persistent, but not insistently, by means of advertisement, propaganda, PR and other tools of the marketing communications influences people from their childhood, it will be possible to accustom them to take care about to the environment. Such abstract statements as “*Спочатку екологія — потім ідеологія*” “*At first ecology – then ideology*”, “*Збережена природа і нас береже*” “*Saved nature will safe us*”, “*За збереження природи відповідаєш і ти*” “*You are responsible for nature saving*”, “*За день природу не врятуєш*” “*It is impossible to save nature in one day*”, “*Ми не успадкували Землю наших предків, ми запозичили її в борг в наших дітей*” “*We did not inherit Earth of our ancestors, we borrow it from our children*”, “*Екологічні злочини не мають строку давності*” “*Ecological crimes do not have a period of limitation*”, are more often substituted with more concrete ones: “*Упаковка може не тільки засмічувати природу, але й допомагати їй*” “*Packing can not only litter the nature, but also to help it*”, “*Екологічна упаковка — упаковка, що не наносить шкоди навколишньому середовищу при знищенні та утилізації*” “*Ecological pack is a packing, which does not cause harm to environment while destructing and utilizing*” and etc. As we can see, three main factors of ecological pack are distinguished in slogans: ecological compatibility, interactivity, functionality.

Recently the concept “social responsibility”, which is interpreted as “social activity subject’s attitude to social necessity demands, public obligation, social tasks, norms and values, realizing of the performed activity consequences for some social groups and

peculiarities towards social progress in society” [7, p. 51], is constantly included to the Ukrainians’ public life, but it correlates in a weak way with so called corporative social responsibility in the system of environmental activity. In most developed countries in the world, everyone understands that it is a time of **social responsibility for the environment**, main principles of which consist in necessity to carry out obligations of society in relation to citizens and obligations of citizens in relation to society. These obligations have to be carried out due to the establishment of high professional standards of informality, accuracy, truthfulness, unambiguity, objectivity, which is largely realized through the use of appropriate slogans.

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